KNOWLEDGE MANAGEMENT IMPLEMENTATION, INNOVATION, AND ORGANISATIONAL PERFORMANCE: AN EMPIRICAL STUDY IN THE IRAQI MOBILE TELECOMMUNICATIONS SECTOR

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ABSTRACT

In today's Mobile Telecommunications Sector (MTS), Knowledge Management (KM) has become a lifeline. Even as the complexity of KM has increased due to a deficient comprehension of core requirements for successful implementation, a great need has developed for a better understanding of KM's role in affecting innovation and Organizational Performance (OP) in the MTS context. This need is particularly acute in developing countries such as Iraq. To address these requisites, an integrative theoretical framework was developed based on the perspectives of the Resource-Based View and Knowledge-Based View theories. The framework describes the relationships among core requirements of KM implementation (critical successes factors, strategies, and processes) and OP through the mediating role of innovation. To test this framework, a quantitative approach using the survey method was employed. Based on proportionate stratified random sampling, 300 questionnaires were distributed to mid-level managers in Iraqi MTS between March and June, 2011. Of these, 220 questionnaires were usable, resulting in a response rate of about 73.3%. The data were analysed using the structural equation model. The findings indicated that overall core requirements of KM implementation had a statistically significant and direct, positive effect on innovation. Both critical success factors and strategies of KM had a statistically significant, direct positive effect on OP. The direct relationship of KM processes with OP was positive, although not statistically significantly. Innovation had a positive, statistically significant effect on OP. More importantly, the findings indicated that overall core requirements of KM implementation had a positive, statistically significant effect on OP, through the partial mediating effect of innovation. These results offer theoretical, methodological, and practical contributions and will help academics and practitioners in KM field. Nonetheless, further studies are necessary both to confirm the findings and to incorporate additional variables that may influence results.

Keywords: Knowledge Management Implementation, Innovation, Organizational Performance, and Mobile Telecommunication Sector.

ABSTRAK

Dalam Sektor Telekomunikasi Mudah Alih (STMA) kini, Pengurusan Pengetahuan (PP) sudah menjadi satu keperluan. Namun begitu, kekompleksan PP telah meningkat disebabkan oleh kurangnya kefahaman berkenaan keperluan asas dalam melaksanakan PP tersebut. Justeru, wujud keperluan untuk lebih memahami peranan PP yang memberi kesan kepada inovasi dan Prestasi Organisasi (PO) dalam konteks STMA, khususnya bagi negara membangun seperti Iraq. Untuk menangani isu tersebut, rangka kerja teoretikal yang integratif telah dibina berdasarkan perspektif Pandangan Berasaskan Sumber dan teori Pandangan yang Berasaskan Pengetahuan. Rangka kerja tersebut menghuraikan hubung kait antara keperluan teras dalam pelaksanaan PP (faktor kejayaan kritikal, strategi, dan proses) dan PO melalui peranan perantaraan inovasi. Untuk menguji rangka kerja tersebut, pendekatan kuantitatif yang menggunakan kaedah kaji selidik telah digunakan. Berdasarkan pensampelan rawak berlapis berkadar, 300 borang kaji selidik telah diedarkan kepada pengurus lapis tengah dalam STMA di Iraq pada Mac hingga Jun 2011. Daripada jumlah itu, 220 borang kaji selidik didapati boleh digunakan. Ini menghasilkan kadar respons sebanyak 73.34%. Data yang diperoleh dianalisis dengan menggunakan model persamaan struktur. Dapatan yang diperoleh menunjukkan bahawa keperluan teras keseluruhan bagi pelaksanaan PP mempunyai perbezaan yang ketara menurut statistik dan mempunyai kesan positif langsung kepada inovasi. Kedua-dua faktor kejayaan kritikal dan strategi PP menunjukkan perbezaan ketara menurut statistik dan kesan positif langsung kepada PO. Sementara itu, hubung kait langsung antara proses PP dengan PO menunjukkan kesan positif, walaupun tidak ketara dari segi statistik. Selani itu, inovasi menunjukkan kesan positif dan kesan yang ketara menurut statistik terhadap PO. Malah yang lebih penting, dapatan turut menunjukkan bahawa keperluan teras keseluruhan bagi pelaksanaan PP mempunyai kesan positif dan kesan yang ketara menurut statistik terhadap PO melalui kesan perantaraan separa yang ada ditunjukkan oleh inovasi. Semua keputusan ini tanpa diragui mampu menyumbang dari segi teori, metodologi dan praktik yang boleh membantu ahli akademik dan pengamal dalam bidang PP. Kajian lanjut diperlukan bagi mengesahkan dapatan yang diperoleh dan bagi menggabungkan pemboleh ubah tambahan yang boleh mempengaruhi keputusan.

Kata kunci: Pelaksanaan Pengurusan Pengetahuan, Inovasi, Prestasi Organisasi, dan Sektor Telekomunikasi Mudah Alih.

DEDICATION

To my beloved mother and father, the greatest parents in the world. Without your unconditional love, prayers, wisdom, and encouragement, this thesis would not have been possible, and neither would there have been any joy in its completion

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LIST OF ABBREVIATIONS

AVE	Average Variance Extracted
BMI	Business Monitor International
BSC	Balanced Scorecard
C.R	Critical Ratio
CFA	Confirmatory Factor Analysis
CRI	Composite Reliability
CSFs of KM	Critical Success Factors of Knowledge Management
EFA	Exploratory Factor Analysis
GDP	Gross Domestic Product
KBV	Knowledge-Based View
KM	Knowledge Management
KMPs	Knowledge Management Processes
KMSs	Knowledge Management Strategies
MTS	Mobile Telecommunications Sector
OP	Organisational Performance
RBV	Resource-Based View
SEM	Structural Equation Model
SMC	Squared Multiple Correlation
SRW	Standardized Regression Weights

CHAPTER ONE

OVERVIEW OF THE STUDY

1.0 INTRODUCTION

This chapter comprises the overview of the study, which consists of nine sections. The first section presents the background of the study followed by the key issues of Iraqi mobile telecommunications sector in the second section. Then, the problem statement of present study is discussed in the third section. The research questions are stated in the fourth section and the fifth section presents the research objectives. The significance and the scope of the study are explained in sections sixth and seventh, respectively. The eighth section provides the key definitions of the main concepts used in the study. Finally, the ninth section describes the organisation of the thesis.

1.1 BACKGROUND

Mobile Telecommunications Sector (MTS) is regarded a life-blood of economic growth in the 21st century. This sector plays a vital role in the development of numerous businesses and increased Gross Domestic Product (GDP) in different countries, particularly in developing countries (Bouwman & Carlsson, 2007; Chen, Watanabe, & Griffy-Brown, 2007; Gao & Rafiq; 2009). According to a study done by the World Bank in the 120 countries, in every 10 percentage point increase in the mobile phones penetration, there is an increase in economic growth of .8 percentage point in developing countries (Qiang, 2009). This has induced many governments of these countries to look for more investors within this sector (Gao & Rafiq, 2009).

Dr. Martin Cooper made the first call on mobile phone in 1973. He was considered the inventor of the initial mobile phone (Steinbock, 2005). Today, the whole world communicates through mobile phones (Althini & Sylvén, 2007). According to Mouradi (2011), the total number of mobile subscribers all over the world has risen to over 5.3 billion in 2011. Accordingly, the mobile phone has become more than a just communication tool; it is a lifestyle in the modern days (Nassuora & Hassan, 2010a). It is described as "the remote control of life" (Althini & Sylvén, 2007). As such, the MTS is considered one of the rapidly growing sectors in the world economy (Chen *et al.*, 2007; Lee & Park, 2008).

In the rapidly growing of MTS, many companies seek to survive in an ever-changing sector due to technological development, increasing mobile subscribers and increasing fierce competition (Cegarra-Navarro & Martínez-Conesa, 2007; Chong, 2006; Chong, Chong, & Wong, 2007, 2009). They are now facing the need to improve their Organisational Performance (OP) to gain more benefits and cope with the changes (Chong *et al.*, 2009; Marqués & Simón, 2006). As a consequence, the OP measurement (financial perspective, customer perspective, internal process perspective, and learning and growth perspective) and the factors that affect it, has become ever more prominent in the MTS (Chen & Mohamed, 2008; Lee & Lee, 2007b; Visser & Sluiter, 2007; Yu & Liying, 2009).

The rapid diffusion of MTS is mainly due to technological development, which reflects on the success of technological innovation. The technological innovation is regarded a critical key to development of MTS. Several studies in this sector show the real role of technological innovation in the dissemination of mobile services (Al-

Enzi, 2008; Blazevic, 2003; Forge & Bohlin, 2008; Gruber, 2001; Jaspers, Hulsink, & Theeuwes, 2007). Hence, many of these companies are now giving priority to technological innovation to support other innovation types such as administrative, radical, and incremental (Al-Enzi, 2008; Blazevic, 2003; Forge & Bohlin, 2008; Gruber, 2001; Jaspers *et al.*, 2007; Oke, 2007). For that reason, the types of innovation have attracted considerable attention of various companies and studies in this area in order to maintain the innovation continuity and achieve high OP (Al-Enzi, 2008; Chen *et al.*, 2007; Gao & Rafiq, 2009; Lee & Park, 2008; Oke, 2007).

In the knowledge-based era, Knowledge Management (KM) is regarded the best way to enhance innovation and improve OP (Darroch, 2005; Rhodes, Hung, Lok, Lien, & Wu, 2008). According to Jafari, Akhavan, Fesharaki, and Fathian (2007), KM is defined as an oriented methodology to create and manage knowledge when using knowledge assets of the organisations for enhancing innovation and improving OP.

According to Resource-Based View (RBV) and Knowledge-Based View (KBV) theories, knowledge is a key resource for survival, stability, and growth of the organisations. Thereby, since 1990s the success of organisations is closely related to managing knowledge (Drucker, 1993; Ho, 2008; Jiang & Li, 2009; Kim & Gong, 2009; Liao & Wu, 2010; Nonaka & Takeuchi, 1995; Wiig, 1997). Therefore, the main contemporary issue in knowledge field is how to create and manage it (Asare, 2008; Kiessling, Richey, Meng, & Dabic, 2009; Pathirage, Amaratunga, & Haigh, 2007; Rhodes *et al.*, 2008). Accordingly, KM implementation today has attracted much attention in many businesses and academic fields (Chadam & Pastuszak, 2005; Wong, 2005). In other words, several organisations are viewing KM implementation as a big savior in the changeable and dynamical environment (Asare, 2008; Kiessling *et al.*, 2009). In this regard, many researchers have presented a set of frameworks for the KM implementation from different perspectives. These frameworks include numerous requirements to ensure the success of the KM implementation. Despite the differences in the requirements of each framework, there exist three core requirements agreed to by most researchers. They are Critical Success Factors of Knowledge Management (CSFs of KM), Knowledge Management Strategies (KMSs), and Knowledge Management Processes (KMPs) (Ajmal, Helo, & Keka, 2010; Anantatmula & Kanungo, 2010; Jafari, Rezaeenour, Akhavan, & Fesharaki, 2010; Kucza, 2001; McElroy, 2002; McLaughliny & Paton, 2008).

Given the importance of KM to organisational success, there have been empirical attempts to examine the KM implementation in the MTS (e.g. Chong, 2006; Chong & Yeow, 2005; Chong *et al.*, 2007, 2009; Marqués & Simón, 2006). These studies primarily focused on CSFs of KM (Marqués & Simón, 2006; Chong, 2006; Chong *et al.*, 2009), KMSs (Chong *et al.*, 2007, 2009), and KMPs (Chong & Yeow, 2005; Chong *et al.*, 2009) to improve overall OP.

At present, the rise of KM implementation is mostly ascribed to its ability to provide valuable benefits of the organisation. For example, it is said that KM implementation is able to provide benefits to 80% of the largest organisations in the world (Kridan & Goulding, 2006; Ramachandran, 2010). In other words, the KM implementation can help MTS to improve many areas such as performance, competitive advantage, productivity, decision making, responsiveness, innovation, product and service, learning curve, employee retention, flexibility and cost efficiency (Chong *et al.*, 2009).

1.2 KEY ISSUES OF IRAQI MOBILE TELECOMMUNICATIONS SECTOR

Iraq is considered as a developing country under the redeveloping stage. It has encountered many crises and hard conditions, such as the first and second Gulf War, economic sanction, and lastly the U.S. occupation from 2003 to 2011. These conditions have considerably contributed to the collapse of the infrastructure in various sectors, such as oil, education, electricity (Al-Azzawi, 2011; Hafedh, Akoum, Zbib, & Ahmed, 2007), and particularly telecommunications (Report of United Nations Economic and Social Commission for Western Asia, 2005).

Traditionally, the Iraqi Ministry of Communications was responsible for providing the telecommunications services through fixed lines. But it faced many challenges to rebuild and expand the Iraqi telecommunications infrastructure from 1991 to 2002. In early 2000, the ministry tried to acquire a mobile phone network in all of Iraq, but was unsuccessful due to lack of enthusiasm of an international company to break the international sanction imposed on Iraq. For that reason, by the end of 2002 the Iraqi telecommunications sector was regarded as the weakest sector in the Middle East (Report of United Nations Economic and Social Commission for Western Asia, 2005; Report of U.S. Agency for International Development, 2009). This reveals a serious gap in the improvement of the telecommunications sector in this country.

The U.S. occupation in 2003 was the beginning of MTS in all of Iraq. The Coalition Provisional Authority supervised the affairs of the Iraqi MTS for more than a year prior to delivering responsibility to Iraqi National Communications and Media Commission, which is able to gain control of MTS through performance audit and granting licenses for mobile companies (Al-Enzi, 2008). According to the latest report issued by the Iraqi National Communications and Media Commission (2011), Iraq has five private companies that are able to provide mobile phone services. They are Asia-Cell, Korek and Sanatel, Zain Iraq, Omnnea, and Itisaluna, which accumulatively in 2011 have about 22 million subscribers for a population of approximately 29 million. However, the services offered by these companies are still limited to voice calls, SMS, balance transfer and TV voting. Other services are still in queue such as voice mail and MMS (Report of National Communications and Media Commission of Iraq, 2011).

The development of MTS in Iraq is essential to develop the economy because it increasingly contributes to the country's GDP. It was reported that the Iraqi MTS contribute 5% of the country's GDP in 2009 (Report of U.S. Agency for International Development, 2009). In addition, it is essential to create job opportunities, encourages foreign and local investment, alleviates poverty, and contributes to the development of the technology sector (Report of U.S. Agency for International Development, 2009; Report of Tariff Consultancy Ltd, 2008).

It is worthy of note that the spread of MTS in Iraq is not due to the good services but the result of weak infrastructure of the fixed line systems in all of Iraq (Report of BuddeComm's Annual Publication, 2010). As such, recently, Iraqis began to complain about poor mobile services as there was a decrease in the mobile phone penetration in Iraq (Report of National Communications and Media Commission of

Iraq, 2011). Subsequently, in mid-2011 the Iraqi government approved all recommendations made by the ministerial committee that oversees the licensing of mobile phone companies to impose a USD 260 million-dollar fine, which can be increased, on the MTS if the companies do not improve their services (Decisions of the Ministerial Council of the Iraqi Republic, 2011). In this regard, by the end of 2010 Business Monitor International (BMI) estimate Iraq's mobile penetration rate had surpassed the 72.1% mark. Indeed, this places the country at the bottom position of BMI regional rankings (see Table 1.1).

Table 1.1
Regional Mobile Penetration Overview

Country	Mobile penetration 2010e (%)	Regional rank 2010
United Arab Emirates	231.4	1
Bahrain	212.3	2
Saudi Arabia	193.9	3
Qatar	188.7	4
Oman	158.7	5
Kuwait	157.7	6
Libya	154.0	7
Tunisia	139.0	8
Israel	127.2	9
Jordan	113.8	10
Algeria	101.7	11
Iran	92.2	12
Morocco	86.8	13
Egypt	77.8	14
Iraq	**72.1**	**15**
Average	140.5	

e = estimate. *Source:* Adopted from Business Monitor International (2011, p.70).

According to the Report of the United Nations Economic and Social Commission for Western Asia (2005), mobile phone penetration in Iraq is much less than it should be, especially in rural areas. As a result, many obstacles adversely affect the development of MTS. The most important is the security issue. Other factors include the existing bad infrastructure and the lack of training of professionals that hinder the KM implementation. In this regard, IZ Technologies Team (2009) emphasized that the government should be committed to a plan to develop information technology and telecommunications infrastructure. This should be combined with adopting long-term plans to create knowledge and paying attention to knowledge transfer at all levels in this sector. Mahdi (2008) similarly noted that KM in the Iraqi MTS is still in its earliest stage, but its possibility of acceptance is high because KM is strongly related to technological organisations. Therefore, it is necessary to conduct extensive studies on the influence of KM implementation on MTS. Moreover, the role of innovation in improving the OP of Iraqi MTS needs more empirical studies (Al-Enzi, 2008).

In a nutshell, the Iraqi MTS is currently facing numerous problems that need to be addressed. Consequently, present study seeks to address the issues of KM implementation in this sector to enhance innovation and improve OP.

1.3 PROBLEM STATEMENT

In today's MTS, we see an increasing and fierce competition between companies due to continuous innovation brought by technological development and advancements. In this regard, enhancing innovation has been recognized as an important substance of OP improvement in this sector (Al-Enzi, 2008; Akgün, Keskin, Byrne, & Eng, 2009; Blazevic, 2003; Forge & Bohlin, 2008; Gruber, 2001; Hwang & Lee, 2000; Jaspers *et al.*, 2007; Oke, 2007). However, an intensive review of the literature reveals that only a small number of empirical studies have discussed innovation as an important part of OP in the MTS (Chong *et al.*, 2009; Marqués & Simón, Oke, 2007). Thus, there is a need for researchers to identify the practical way to enhance innovation toward improving OP in the MTS.

In the knowledge-based economy era, superior organisations depend more on their knowledge-based resources to survive (Choi, Poon, & Davis, 2008; Ho, 2008; Kim & Gong; 2009; Yang, Marlow, & Lu, 2009b) and to improve OP (Haas & Hansn, 2005; Liao & Wu, 2009; Safa, Shakir, & Boon, 2006). KM is important to increase innovation in new services (Blazevic, 2003; Lin, 2007; Sáenz, Aramburu, & Rivera, 2009). Apart from that, KM implementation can help the organisation improve its performance by creating knowledge-based innovation (Darroch, 2005; Rhodes *et al.*, 2008). In short, the main outcome of KM implementation is enhanced innovation and improved OP (Jafari *et al.*, 2007). Based on the above, the present study attempts to highlight the significant role of KM implementation in enhancing innovation and improving OP in the MTS. Thus, based on the previous studies of KM (e.g. Anderson, 2009; Asoh, Belardo, & Crnkovic, 2007; Bierly & Daly, 2007; Choi *et al.*, 2008; Chong *et al.*, 2009; Greiner, Böhmann, & Krcmar, 2007; Kim & Gong, 2009; Liao & Wu, 2009; Marqués & Simón, 2006; Razi & Abdul Karim, 2010; Shahrokhi, 2010; Tasmin & Yap, 2010; Zack, McKeen, & Singh, 2009), the question of how can organisations implement KM successfully, remain unanswered.

Anderson (2009) revealed that although contemporary organisations have spent billions of dollars to implement KM, its implementation has yielded only marginal results and the percentage of failure in such implementation ranges from 50 to 70%. Because there are risks of failure for KM implementation (Razi & Abdul Karim, 2010; Zack *et al.*, 2009), many researchers want to understand the actual reasons for this phenomenon.

Although there are a large number of KM implementation frameworks, organisations still face difficulty with KM implementation due to a lack of an integrated framework of KM implementation (Daud & Hassan, 2008; Kim, 2009; Shahrokhi, 2010; Wong & Aspinwall, 2005). Thus, studies that look at the core requirements of successful KM implementation holistically in a single empirical endeavour are rather limited. As such, it has been recommended that more studies need to be carried out that consider the core requirements of successful KM implementation, which include CSFs of KM, KMPs, and KMSs (Abdullah, Date, & Sinha, 2009; Darroch, 2005; Garavelli, Gorgoglione, & Scozzi, 2004; Hwang, 2003; Maier & Remus, 2003; Razi & Abdul Karim, 2010; Tasmin & Yap, 2010), particularly in the MTS (Chong *et al.*, 2009; Elashaheb, 2005). Examining the core requirements of successful KM implementation is important because success in KM implementation may lead to innovation and subsequently OP (Darroch, 2005; Rhodes *et al.*, 2008; Sáenz *et al.*, 2009; Yang *et al.*, 2009b).

Even though KM implementation is claimed to help improve, support, and enhance innovation (Chang & Lee, 2008; Donate & Guadamillas, 2011; Liao & Wu, 2010; Tan & Nasurdin, 2010), empirical studies that have examined the relationship between the core requirements of KM and innovation in a single research are still scarce (Brachos, Konstantinos, Soderquist, & Prastacos, 2007; Darroch & McNaughton, 2002; Jantunen, 2005; Jiang & Li, 2009; Lin, 2007; Rhodes *et al.*, 2008; Sáenz *et al.*, 2009). Particularly in the MTS where very few, if any, studies have directed attention to the influence of knowledge on new mobile service innovation (Blazevic, 2003; Mufioz, 2008).

Further, empirical investigations that have examined the influence of the core requirements of KM implementation on OP are also limited. Even though KM is seen as able to improve OP (Bierly & Daly, 2007; Choi *et al.*, 2008; Shahrokhi, 2010). Moreover, empirical studies that examine the relationship between the core requirements of KM and OP measured by BSC indicators in one study are extremely rare (Chen & Mohamed, 2008; Lee & Lee, 2007b; Yu & Liying, 2009), particularly in the MTS context (Visser & Sluiter, 2007). Therefore, there is also an existing gap in the literature on KM and its influence on OP (Yang *et al.*, 2009b; Zack *et al.*, 2009). That gap is consistent with Kalling's (2003) remark that "there are relatively few knowledge management texts that make an explicit connection between knowledge and performance" (Kalling, 2003, p. 67).

There are also limited studies that investigate the relationship between innovation and OP. Despite the claim that innovation is broadly described as a critical tool to improve OP (Akgün *et al.*, 2009; Li, Zhao, & Liu, 2006; Lin & Chen, 2007), several organisations are not able to develop it appropriately (García-Morales, Matías-Reche, & Hurtado-Torres, 2008). In this regard, several studies have shown that OP improvement does not depend much on the clear mission or competitive ability of the organisations, but on other factors that have a direct effect on innovation (Aragón-Correa, García-Morales, & Cordón-Pozo, 2007; Darroch, 2005; Roper & Love, 2002). More importantly, there is a large gap that exists in the literature regarding the important factors that have a direct effect on innovation to improve OP (Akgün *et al.*, 2009; Aragón-Correa *et al.*, 2007; Calantone, Cavusgil, & Zhao, 2002; Camisón & López, 2010; García-Morales, Lloréns-Montesa, & Verdú-Joverb, 2007). Furthermore, very limited studies have examined the relationship between innovation and BSC indicators (Yu & Liying, 2009), particularly in the MTS context (Visser & Sluiter, 2007).

In sum, the above research efforts show that there are still existing gaps in our knowledge with respect to the core requirements of KM implementation (CSFs of KM, KMSs, and KMPs). Subsequently, empirical attempts that link KM implementation (CSFs of KM, KMSs, and KMPs), innovation, and OP in a single research effort are extremely rare (Darroch, 2005; Darroch & McNaughton, 2003; Lopez-Cabrales, Pérez-Luño, & Cabrera, 2009; Rhodes *et al.*, 2008), particularly in the MTS context (Chong *et al.*, 2009; Marqués & Simón, 2006). According to Darroch (2005) and Rhodes *et al.* (2008), there is a large gap in the literature of KM implementation, innovation, and OP, so disentangling the complexities in these relationships is still problematic. Accordingly, the present study contributes to the previous studies by investigating these specific relationships in the Iraqi MTS context.

In this regard, Kasim (2008) argued that the developing countries do not pay more attention to KM implementation. Furthermore, there is a lack of empirical studies that look at issues relating to KM implementation in Arab countries in general (Al-Adaileh & Al-Atawi, 2011) and the Iraq context in particular (IZ Technologies Team, 2009). Furthermore, as noted by Mahdi (2008), because the KM implementation in the Iraqi MTS is still at its infancy stage, a lot of work is required to examine how KM implementation can help Iraqi MTS to improve its OP, where OP is rather poor (Report of United Nations Economic and Social Commission for

Western Asia, 2005). In addition, Al-Enzi (2008) believed that poor OP in the Iraqi MTS is due to lack of knowledge of the real factors that affect innovation.

Briefly, the Iraqi mobile telecommunications companies have not been able to successfully implement KM due to lack of understanding of the core requirements of KM. This has led to the decline in innovation and OP in the Iraqi MTS. Thus, present study seeks to address the issue of KM implementation from a comprehensive view and investigate its relationship to innovation and OP. In particular, present study seeks to examine four aspects of this relationship (i) the direct relation between core requirements of KM implementation and innovation; (ii) the direct relation between core requirements of KM implementation and OP; (iii) the direct relation between innovation and OP, and (iv) the indirect relation between core requirements of KM implementation and OP through innovation.

1.4 RESEARCH QUESTIONS

Based on the problem statement above, the present study aims to address four major questions:

1. What is the relationship between core requirements of KM implementation and innovation?
2. What is the relationship between core requirements of KM implementation and OP?
3. What is the relationship between innovation and OP?
4. How does innovation mediate the relationship between core requirements of KM implementation and OP?

1.5 RESEARCH OBJECTIVES

The main objective of present study is to explore the relationships among core requirements of KM implementation, innovation, and OP in the context of Iraqi MTS. Specifically, the research objectives are:

1. To investigate the relationship between core requirements of KM implementation and innovation.
2. To examine the relationship between core requirements of KM implementation and OP.
3. To determine the relationship between innovation and OP.
4. To investigate the mediating effect of innovation on the relationship between core requirements of KM implementation and OP.

1.6 SIGNIFICANCE OF THE STUDY

Review of the literature suggests that empirical studies examining the relationships among KM implementation (CSFs of KM, KMSs, and KMPs), innovation, and OP in a single research are scarce, and hence their results are mostly inconclusive (Darroch, 2005; Rhodes *et al.*, 2008). In this regard, this is what present study attempts to address. In particular, present study investigates whether successful KM implementation has influence on innovation and OP most especially in the MTS of developing countries by using quantitative research method. The findings of this research are expected to contribute significantly to the body of knowledge in this area, which makes the topic of present study not only unique but also of high practical significance.

Certainly, the result of present study provides basic information about the core requirements of KM implementation. Further, it provides empirical evidence of the influence of KM implementation on innovation and OP in the Iraqi MTS. Thus, present study could contribute to the reformation of the Iraqi mobile companies and provide empirical insight on how to improve its OP.

1.7 SCOPE OF THE STUDY

According to Zheng, Yang, and McLean (2010), further exploration is needed to examine the integration between the RBV and KBV theories. Thus, the present study focuses on investigating the relationships among core requirements of KM implementation, innovation, and OP from the RBV and KBV theories' perspectives. Specifically, the current research was conducted in the Iraqi MTS, which is considered one of the developing Arab countries in the world. This context was chosen for three reasons. First, developing countries have not attracted sufficient attention in the empirical studies of KM (Kasim, 2008), particularly in Arab countries (Al-Adaileh & Al-Atawi, 2011). Second, Iraq in the process of re-developing itself due to the U.S. occupation (Report of United Nations Economic and Social Commission for Western Asia, 2005; Report of U.S. Agency for International Development, 2009). Finally, the Iraqi MTS faces current economic problems and needs to improve its performance (Al-Enzi, 2008; Mahdi, 2008).

In the context of Iraqi MTS, there are five private companies involved, which are Asia-Cell, Korek and Sanatel, Zain Iraq, Omnnea, and Itisaluna. Then, mid-level managers from different functional departments in these companies are the target respondents in the present study. They were chosen as target respondents because they are known as the true "knowledge workers" of creating and managing new knowledge in organisations (Chong, 2006; Chong *et al.*, 2009; Gunther-McGrath, 2001; Huy, 2001; Janczak, 1999, 2004; Lee, 1999; Rainer & Turban, 2009; Richards, 2004; Nonaka & Takeuchi, 1995). In this regard, Janczak (2004) argued that mid-level managers used three processes (analytic, intuitive, and pragmatic) to create and manage new knowledge in organizations (details are explained in section 2.2.5, p. 57-60).

1.8 KEY DEFINITIONS

The following is a list of concepts relevant to present study. In the context of the present study, they will be defined as follows:

1. **KM implementation** refers to systematic activity that contains a group of critical successes factors, strategies, and processes of knowledge to enhance innovation and improve OP.
2. **CSFs of KM** refer to the organisational infrastructures that have the real effect on the successful KM implementation.
3. **KMSs** refer to the processes of collecting, codifying, and transferring explicit and tacit knowledge to get the right information in the right place and at the right time.
4. **KMPs** refer to the typical steps to provide the creation, organization, storage, sharing, and utilisation of the organisational knowledge.
5. **Innovation** refers to getting new business outcomes through creating new ideas, market, product, and service.
6. **OP** refers to the organisation's ability to achieve positive goals that have been identified previously.

1.9 ORGANISATION OF THE THESIS

The whole present study consists of five chapters. Following is a content of each chapter.

- **Chapter one** presents a background for the study, key issues of Iraqi MTS, problem statement, research questions, research objectives, significance of the study, scope of the study, key definition, and an organisation of the thesis.
- **Chapter two** presents an intensive review of the relevant literature by presenting theories and practices of RBV and KBV theories, KM, innovation, and OP.
- **Chapter three** presents theoretical framework of the study, hypotheses/ propositions development, research design (purpose of research, study approach, unit of analysis, identifying population and sample, operational definition, measurement of variables/instrumentation, and questionnaire instrument), statistical analysis procedures, and the results of the pre-test and pilot study.
- **Chapter four** presents the preparation of the data for analysis, preliminary analysis, descriptive statistics, research's underlying statistical assumptions, goodness of the measurement instrument, and hypothesis testing using the Structural Equation Model (SEM).
- **Chapter five** presents a summary of research findings (main indicators of findings and a discussion of hypotheses testing), completion of the research questions and objectives, research contributions (theoretical, methodological, and practical perspectives), assumptions and limitations, and recommendations for managers and future research.

CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION

This chapter presents an intensive review for understanding all related variables under present study. It includes a discussion on the theory, independent variables, mediating variable, and dependent variable. In addition, it provides a discussion on the relationships among these variables. This chapter consists of six main sections. The first section addresses RBV and KBV theories followed by the review of the existing literature related to the KM in the second section. Then, the third section provides a discussion on the literature relevant to the innovation. Whilst the fourth section is dedicated to discussing literatures related to OP. The fifth section displays the relationships among variables of the present study. Finally, the sixth section is the summary of the chapter. In general, the aim of this chapter is to give an accurate justification of present study, rising from the gaps in the literature and the increasing need for an integrative view of KM, innovation, and OP.

2.1 RESOURCE-BASED AND KNOWLEDGE-BASED VIEWS THEORIES

Nowadays, business environment is characterized by a rapid rate of technological change, globalization, and fierce competition. Because of this, business organisations in different sectors have to focus on how to reach excellence in OP. For that reason, many theories such as RBV and KBV of the organization have begun to regard the knowledge as a main resource to improve OP (Anderson, 2009; Asare, 2008; Hsu, 2006; Kiessling *et al.*, 2009; Kim, 2009; Pathirage *et al.*, 2007; Xie, 2009).

The historical background of RBV can be traced back to Penrose (1959). He pointed out in his book *The Theory of the Growth of the Organization* that RBV refers to the significant internal resources of the organisations. The development of the RBV of the organisation started with several studies, such as Barney (1991), Collis and Montgomery (1995), Mahoney and Pandian (1992), Rumelt (1984), Teece and Pisano (1994), and Wernerfelt (1984). In simple term, RBV is defined as a tool used to determine and invest the available strategic resources within the organisation to create a competitive advantage (Rumelt, 1984; Wernerfelt, 1984). From this definition, RBV emphasizes that organisations depend on tangible resources (consisting of land, labor, and capital) and intangible resources (consisting of brand names, knowledge, skilled personnel, etc.) to improve OP. The appropriate investment of these resources is considered the heart of creating a strong competitive position within the context of fierce competition, which in turn leads to the improvement of OP (Anderson, 2009; Hsu, 2006; Kim, 2009; Xie, 2009).

In recent years, there have been several theoretical developments derived from RBV. They are competence-based competition, dynamic capabilities approach, and KBV (Pathirage *et al.*, 2007). Within theoretical perspective of KBV, knowledge has become the main strategic significant source for all successful organisations and not land, labor, capital or the production of other elements. The success of organisations is argued to depend on the efficient management of internal and external knowledge sources to adapt to the change that occurs in the environment. The ability to adapt to these changes is purported to enhance innovation and superior performance (Asare, 2008; Kiessling *et al.*, 2009). According to Anderson (2009), the characteristics of knowledge resources are different from other resources as follows:

1. They are based on the capabilities and possibilities of the employees' minds.
2. They are renewable, which means the possibility for creating new knowledge is continuing.
3. They add value when used.

Generally, KBV seeks to achieve the success of the organisation by consistently creating new knowledge and disseminating it broadly throughout the organisation, so that this knowledge translated into as a positive outcome (Nonaka & Toyama, 2003). Organisations that seek to continue their work in the knowledge environment will be able to enhance innovation and improve OP (Claycomb, Dröge, & Germain, 2001; Kiessling *et al.*, 2009; Mehta, 2008; Wiklund & Shepherd, 2003). However, KBV is still in the growth phase (Bogner & Bansal, 2007).

From the practical point of the literature, many researchers have noted that KM implementation (CSFs of KM, KMSs, and KMPs) plays a significant role in improving OP from RBV theory (Anderson, 2009; Asoh *et al.*, 2007; Liao & Wu, 2009; Mills & Smith, 2011; Zheng *et al.*, 2010). In this regard, Liao and Wu (2009) argued that the success of the relationship between KM implementation and OP depend too much on the RBV perspective. In the same manner, Forcadell and Guadamillas (2002) called for an increase in the effectiveness of the KM strategy based on RBV perspective to enhance innovation during the creation, transformation, and implementation of new knowledge. On the other hand, the RBV is an important perspective in the technological innovation field. A number of researchers have relied on the RBV to investigate the relationship between technological innovation and OP, generally finding a positive relationship (Carmen & José, 2008; Galende, 2006; Irwin, Hoffman, & Lamont, 1998; Ordanini & Rubera, 2010; Yang & Kang, 2008). For example, Li *et al.* (2006) examined the effect of technological innovation as a mediating variable between human resource and OP from the RBV perspective. The results demonstrated that employee training, immaterial motivation, and process control have positive effects on technological innovation, which in turn is positively related to OP. Furthermore, Damanpour, Walker, and Combinative (2009) indicated that innovation, which consists of administrative and technological innovation, has a positive effect on OP from the RBV perspective. However, Darroch and McNaughton (2002) pointed out that only a few empirical studies have examined the relationship between KM and innovation from the RBV perspective. This situation justifies the need to apply RBV as the underlying theory in the present study.

Prior research, such as Bierly and Daly (2007), Keskin (2005), Tsai and Li (2007), and Yang *et al.* (2009b), has provided evidence that effective KM implementation (CSFs of KM, KMSs, and KMPs) is a key instrument for improving OP based on the KBV perspective. For instance, Tsai and Li (2007) mentioned that the OP can be measured as an outcome of knowledge creation processes based on the KBV perspective. Furthermore, Yang *et al.* (2009b) revealed that the success of an organisation's services or operations should depend on KM implementation based on the KBV perspective. Moreover, Bierly and Daly (2007) argued that—although KMSs play a vital role in improving OP from the KBV perspective—a limited number of studies have sought to examine their effects. Alternatively, some studies have applied KBV theory to investigate the relationship between KM and innovation. According to Huang and Li (2009), and Tan and Nasurdin (2010), KM can be employed to enhance innovation types based on KBV perspective. In the same vein, Quintane, Casselman, Reiche, and Nylund (2011) confirmed innovation as KM outcomes based on the KBV perspective during the creation, transformation, and implementation of new knowledge. However, Kiessling *et al.* (2009) pointed out that there is a gap in KBV theory with respect to the nature of the relationship between KM and innovation. Thus, sufficient justification exists to apply KBV as the underlying theory in the present study.

To sum up, previous studies have confirmed that RBV and KBV theories are suitable for studies investigating the relationships among KM, innovation, and OP (Darroch, 2005; Darroch & McNaughton, 2003; Lopez-Cabrles *et al.*, 2009). Despite several studies showing that KM positively and significantly contributes to the overall success of innovation and OP from the perspective of RBV and KBV theories (Bogner & Bansal, 2007; Kiessling *et al.*, 2009; Liao & Wu, 2009; Mehta, 2008; Quintane *et al.*, 2011; Turner & Bettis, 2002), to date many organisations continue to struggle to implement KM successfully to enhance innovation and improvement in OP (Asoh *et al.*, 2007; Darroch, 2005). In this case, Zheng *et al.* (2010) argued that further investigation is required to examine the integration between the RBV and KBV theories. Consistent with previous recommendations, the researcher believes that RBV and KBV theories could provide a useful theoretical basis for explaining the effects of KM implementation on innovation and OP. The basic argument is that KM implementation can contribute to enhanced innovation and OP improvement by encouraging the creation of new knowledge, which is considered the main resource for organisations to achieve a positive outcome. Similarly, innovation is one of the major factors claimed to improve OP. Based on this argument, the researcher considers innovation to be a mediating variable in the present study.

2.2 KNOWLEDGE MANAGEMENT

KM is a lifeline for organisations. It has been used prominently since 1990s as a tool in creating knowledge in organisations (Drucker, 1993; Nonaka & Takeuchi, 1995; Wiig, 1997). However, the concept of KM still needs more attention (Zheng *et al.*, 2010), and has been the subject of much discussion by several researchers. Yet, there is still a lack of empirical studies, as indicated by the KM implementation literature (Meroño-Cerdan, Lopez-Nicolas, & Sabater-Sánchez, 2007; Razi & Abdul Karim, 2010).

2.2.1 A Historical Overview of Knowledge Management

The history of KM is longer than assumed. It goes back to the beginnings of civilisation (Wiig, 1997). According to Bergeron (2003, p. 1), "In Mesopotamia*, about 5,000 years ago, people began to lose track of thousands of baked-clay tablets used to record legal contracts, tax assessments, sales, and law. The solution was the start of the first institution dedicated to knowledge management, the library. In libraries, located in the center of town, the collection of tablets is attended by professional knowledge managers". However, the concept of KM evolve over time as Ives (1998, p. 272) notes: "There is a little difference in the purpose of modern knowledge management from that of those racks of clay tablets buried in the ruins of ancient Mesopotamian cities. It is not the basic requirements that have changed, but the enormous volumes of information, the speed of content changes and the transformation of the workplace".

*Mesopotamia comprises some parts of modern Iraq, northeastern Syria, southeastern Turkey, and southwestern Iran.

The concept of knowledge may not be new because it is regarded as the result of cultures and practices of people throughout the different ages. But it is considered newer when KM emerges as a new discipline of modern business organisations. According to Metaxiotis, Ergazakis, and Psarras (2005), a historical overview of KM can be distinguished within three generations:

1. The first generation of KM extends from 1990 to 1995. This generation focused on the identification of benefits and designs of frameworks of KM. Studies in the artificial intelligence were mainly in the direction of knowledge creation and storage through the benefits from technological development. The most famous thinkers of this period are Senge (1990), Ignizio (1991), Nonaka (1991), Quinn (1992), Wiig (1993), and Drucker (1993).
2. The second generation of KM started to emerge around 1996. During this period, knowledge emerged as a new philosophy or methodology that seeks to create, share and utilize knowledge at all organisational levels. The most famous thinkers of this period are Alavi and Leidner (2001), Holsapple and Joshi (1997), Grant (1997), Rajan, Lank, and Chapple (1999), Thierauf (1999), McAdam and Reid (2001), Carneiro (2000), Rubenstein-Montano, Liebowitz, Buchwalter, McCaw, Newman, and Rebeck (2001), Nemati, Steiger, Iyer, and Herschel (2002), Hasan and Gould (2003), Lan Sia and Al-Hawamdeh (2003), Chua (2003), Maier and Remus (2003), Pervan and Ellison (2003), Liao (2003), and Metaxiotis and Psarras (2003).
3. The third generation of KM is based on the integration of knowledge with the vision, mission, goals, strategies, procedures and practices of organisations. Additionally, it is based on activating knowledge sharing among employees as a part of their daily lives. The most famous thinkers of this period are

Bierly and Daly (2007), Brachos *et al.* (2007), Chang and Lee (2008), Chen and Huang (2009), Choi *et al.* (2008), Darroch (2005); Jiang and Li (2009), Kim and Gong (2009), Plessis (2007), Sáenz *et al.* (2009), Yang *et al.* (2009b), Yang, Zheng, and Viere (2009a), and Zack *et al.* (2009).

Table 2.1 presents some of the most important research contributions to the field of KM, which is considered today as reference points for further research. Based on the contributions, knowledge has become the most precious resource adopted by organisations in production or service delivery. In an era of KM, the human element is considered a key tool for knowledge creation, while information technology has become a secondary tool. This implicitly suggests that when contemporary organisations lack the readiness to manage knowledge, they will lose the opportunity to develop sustainable knowledge creation.

Table 2.1

A Sample of Important Research Contributions to Knowledge Management

KM theme	Authors
Explicit vs. tacit knowledge	Polanyi (1966); Nonaka and Takeuchi (1995)
"Taxonomic" knowledge	Tsoukas (1996)
KM foundations	Wiig (1993); Liebowitz (1999)
KM frameworks	Holsapple and Joshi (1997), Rubenstein *et al.* (2001)
Successful KM projects	Davenport *et al.* (1998)
KM and AI	Fowler (2000), Liebowitz (2001)
KM and decision support	Courtney (2001), Bolloju *et al.* (2002)
KM surveys	Liao (2003), Kakabadse *et al.* (2003)
KM software tools	Tyndale (2002)
KM and SMEs	McAdam and Reid (2001), Wickert and Herschel (2001)
KM and higher education	Rowley (2000), Metaxiotis and Psarras (2003)
KM standardisation	Weber *et al.* (2002)
KM integration	Plessis (2007), Sáenz *et al.* (2009), and Zack *et al.* (2009)

Source: Adapted from Metaxiotis *et al.* (2005, p. 8)

2.2.2 Defining Knowledge Management

Before exploring KM, the concept of data, information, and knowledge should be defined. Song (2007) defined data as a set of unstructured facts about the daily work events of the organisation, while information is the value-added data which is given meaning for specific purposes (Xie, 2009).

Tasmin and Yap (2010) defined knowledge as a person's ability to analyse and evaluate information for more efficient utilisation. Traditionally, knowledge includes two types: tacit and explicit. Tacit knowledge refers to personal knowledge that is stored into skills, experience, learning and mental abilities of the person. Explicit knowledge refers to external knowledge that is stored into documents, textbook and database of the organisation (Do, 2007). Figure 2.1 provides a comparison among data, information and knowledge.

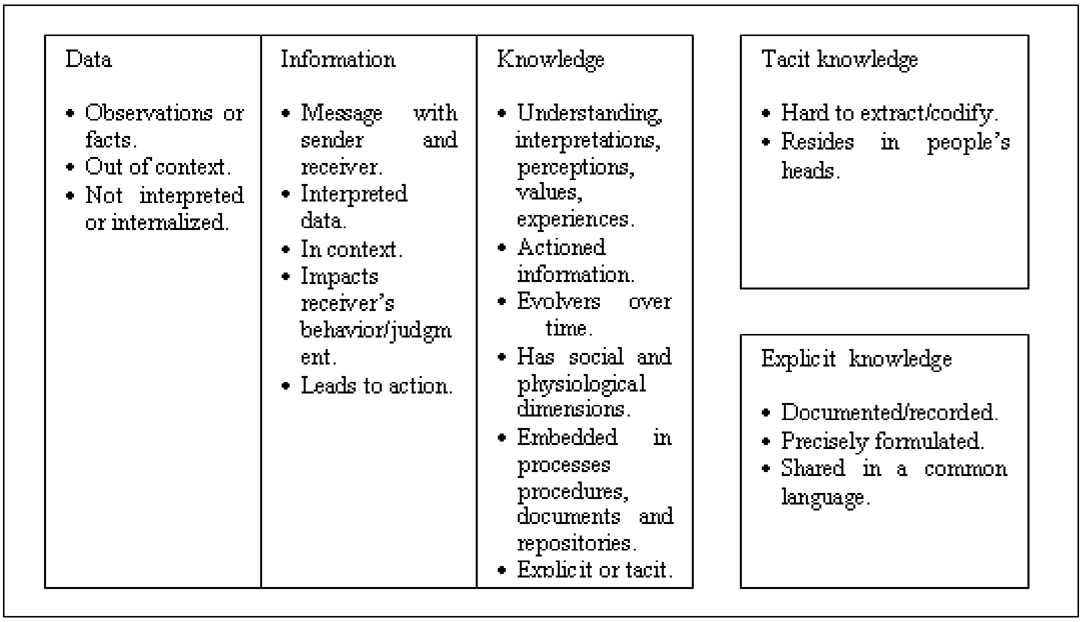


Figure 2.1
Comparison between Data, Information and Knowledge
Source: Adopted from Plessis (2002, p. 20)

For the purpose of present study, KM can be defined from three perspectives: KM as supporting innovation, KM as supporting OP, and KM as supporting both innovation and OP. Table 2.2 provides a description of these perspectives.

Table 2.2
Perspectives of Knowledge Management Definition

Perspectives	Author and Year	Definition of KM
Focus: KM as supporting the innovation	Duffy (2000, p. 64)	"a process that drives innovation by capitalizing organisational intellect and experience."
	Zyngier, Burstein, and McKay (2004, p. 889)	"a strategy to manage organisational knowledge assets to support management decision making to enhance competitiveness and to increase capacity for creativity and innovation."
	Payakpate (2008, p. 38)	"the debate and systematic coordination of an organisation's people, technology, processes and organisational structure, in order to add value through reuse and innovation."
	Abdallah *et al.* (2009, p. 55)	"specific routines that shape the knowledge base of the organisation and make it accessible in the innovation process."
Focus: KM as supporting OP	Kamara (2002, p. 206)	"the organisational optimization of knowledge to achieve enhanced performance, increased value, competitive advantage, and return on investment, through the use of various tools, processes, methods and techniques."
	Kridan (2006, p. 64)	"the systematic and organised attempt to use knowledge (on customer, products, processes, competitors, etc...) within an organisation to improve performance."
	Lakshman (2007, p. 55)	"an organisational capability that allows people in organisations, working as individuals, or in teams, projects, or other such communities of interest, to create, capture, share, and leverage their collective knowledge to improve performance."
	Hu and Deng (2008, p. 465)	"the management discipline concerned with the systematic acquisition, dissemination and responsiveness of knowledge in organisations, aiming to improve an organisation's performance."
	Shahrokhi (2010, p. 356)	"a systematic effort for sharing and using the organisational knowledge within the firm in order to increase organisational performance."
Focus: KM as supporting innovation and OP	Beckman (1999, p. 51)	"the formalization of and access to experience, knowledge and expertise that create new capabilities, enable superior performance, encourage innovation, and enhance customer value."

Accordingly, KM in the present study is regarded as a methodology based on a set of critical success factors, strategies, and processes that are responsible for creating and managing knowledge in order to enable organisations to enhance innovation and improve OP.

2.2.3 Benefits of Knowledge Management Implementation in Mobile Telecommunications Sector

Several prior studies have showed that KM implementation is taken lightly when it comes to achieving success of the organization (Chong *et al.*, 2009; Kim & Gong, 2009; Zack *et al.*, 2009). But in the knowledge-based economy era, most contemporary organisations are operating in a highly competitive business environment. Therefore, there are many attempts to achieve OP through the implementation of KM. In this regard, several researchers have identified KM as a best way to run a successful organisation (Cegarra-Navarro & Martínez-Conesa, 2007; Liao & Wu, 2010; Koh, Gunasekaran, Thomas, & Arunachalam, 2005; Yang *et al.*, 2009b). In fact, according to Okyere-Kwakye, Nor, Ziaei, and Tat (2010), implementation of KM has been helpful to many organisations such as British Telecom, Microsoft, IBM, Xerox, Shell, Schlumberger Limited and Mitsubishi to achieve a sustainable competitive advantage. In addition, KM has been regarded as a strategic resource and a major driver to implement organisational strategy (Chong *et al.*, 2007, 2009).

Moreover, Chong (2006) and Chong *et al.* (2009) argued that KM has a significant role in achieving or maintaining sustainable competitive advantage in a highly competitive environment such as in the MTS. This is because successful KM implementation is regarded as an optimal solution to improve overall OP. Table 2.3 provides a summary of the benefits of KM as pointed out by a number of scholars.

Table 2.3
List of Benefits of Knowledge Management Implementation in the Mobile Telecommunications Sector

No.	Benefits	Authors and Year
1	Sustainable competitive advantage	Cegarra-Navarro and Martínez-Conesa (2007), Chong *et al.* (2007, 2009), Marqués and Saimon (2006)
2	Increased innovation	Cegarra-Navarro and Martínez-Conesa (2007), Chong *et al.* (2009), Elashaheb (2005), Marqués and Saimon (2006),
3	Increased organisational learning	Cegarra-Navarro and Martínez-Conesa (2007), Chong *et al.* (2009)
4	Increased customer satisfaction	Cegarra-Navarro and Martínez-Conesa (2007), Elashaheb (2005)
5	Strategic resource for implementing organisational strategy	Chong *et al.* (2007, 2009), Elashaheb (2005)
6	Improved productivity	Chong *et al.* (2007, 2009), Elashaheb (2005)
7	Improved decision making	Chong *et al.* (2007, 2009), Elashaheb (2005)
8	Improved responsiveness	Chong *et al.* (2007, 2009), Elashaheb (2005)
9	Improved service	Chong *et al.* (2007, 2009), Elashaheb (2005)
10	Improved employee retention	Chong *et al.* (2007, 2009), Elashaheb (2005)
11	Improved flexibility	Chong *et al.* (2007, 2009), Elashaheb (2005)
12	Improved cost efficiency	Chong *et al.* (2007, 2009), Elashaheb (2005)

In addition, Kridan and Goulding (2006) pointed out the main benefits in KM implementation in contemporary organisations as follows:

1. KM is implemented and has been able to provide success in 80% of the largest organisations in the world.
2. KM system provides guarantee for business organisations to store the knowledge and expertise of the current employees and reuse it in the future.
3. The recent changes in business orientation emphasize the importance of greater understanding of knowledge work and knowledge employees.
4. The increasing creation of new knowledge leads to added value for the customers.

2.2.4 The Core Requirements of KM Implementation in Mobile Telecommunications Sector

Numerous studies have shown that KM implementation is able to help achieve or maintain success of contemporary organisations. KM implementation is said to be the best way to improve organisation's ability in various aspects such as innovation (Brachos *et al.*, 2007; Chang & Lee, 2008; Chen & Huang, 2009; Jiang & Li, 2009; Liao & Wu, 2010; Sáenz *et al.*, 2009) and OP (Asoh *et al.*, 2007; Bierly & Daly, 2007; Choi *et al.*, 2008; Ho, 2008; Kim & Gong, 2009; Liao & Wu, 2009; Yang *et al.*, 2009b; Zack *et al.*, 2009). Therefore, researchers have resorted to the development of several frameworks to achieve successful KM implementation. But these frameworks differ in their orientation depending on the different viewpoints of the researchers (Shahrokhi, 2010). The KM framework is defined as a guide to implement knowledge management in an organised way (Elashaheb, 2005; Kim, 2009).

There are many KM implementation frameworks in the literature. Despite this, many organisations are still not able to implement KM successfully. This may be due to the limited comprehensive framework in this area (Daud & Hassan, 2008; Kim, 2009; Mehta, 2008; Shahrokhi, 2010; Wong & Aspinwall, 2005; Yang *et al.*, 2009a), particularly in the MTS (Cegarra-Navarro & Martínez-Conesa 2007; Chong, 2006; Chong *et al.*, 2007, 2009; Elashaheb, 2005; Marqués & Simón, 2006).

Review of literature identifies 23 frameworks of KM implementation that involve three main elements which are CSFs of KM, KMSs, and KMPs. These three elements have been widely acknowledged in the literature as core requirements of successful KM implementation (Ajmal *et al.*, 2010; Anantatmula & Kanungo, 2010; Jafari *et al.*, 2010; Kucza, 2001; McElroy, 2002; McLaughliny & Paton, 2008). Table 2.4 provides a summary of the core requirements of KM implementation frameworks.

Table 2.4
Core Requirements of Knowledge Management Implementation Frameworks

Requirements	Frameworks
CSFs of KM	A basic discipline underlying knowledge management and its enabling factors (Stankosky & Baldanza, 2001). A factor model of knowledge management system implementation (Butler, Heavin, & O'Donovan, 2007). A framework of factors influencing KM initiatives in a project-based context (Ajmal *et al.*, 2010). A success model of KM implementation (Gai & Xu, 2009). A generic knowledge management framework (Abdullah *et al.*, 2009). A framework of KM enablers (Anantatmula & Kanungo, 2010).
KMSs	A strategic framework for mapping knowledge (Zack, 1999). A process oriented KM approach (Maier & Remus, 2002). A knowledge-management system dependency model (KMSDM) with defined relationships (McLaughliny & Paton, 2008). A practical framework for knowledge (Casselman & Samson, 2007). A strategic knowledge management framework (Jafari *et al.*, 2010). The knowledge value proposition strategy (KVSP) framework (Helmi, 2010).
KMPs	A knowledge creating company (Nonaka & Takeuchi, 1995). Building blocks of knowledge management (Probst, Raub, & Romhardt, 1999). A KPMG knowledge management framework (Alavi, 1997). The tasks of knowledge management (Allweyer, 1998). A knowledge management event chain (Despres & Chauvel, 1999). A knowledge management process framework (Bukowitz & William, 2000). A process model (Rastogi, 2000). A process model (Tannenbaum & Alliger, 2000). A knowledge chain model (Holsapple & Singh, 2001). A knowledge management process model (Kucza, 2001). A knowledge life cycle (McElroy, 2002).

Despite the few frameworks of the KM implementation in the telecommunications sector, there is consensus among scholars that the CSFs of KM, KMSs, and KMPs are core requirements of these frameworks. Elashaheb (2005) noted that KM frameworks do not take into account the specific nature of the telecommunications sector, particularly those related to knowledge processes, such as sharing and utilisation that occur between employees, which lead to the loss of large amount of organisational knowledge. Therefore, he proposed a KM framework for the telecommunications sector (KMFT). This framework stresses the need to take into account critical factors of knowledge processes (i.e. strategy, top management commitment, information technology, and change management) to achieve high OP and employee satisfaction.

On the other hand, Mehta (2008) proposed a KM-enabled value creation cycle (VCC) framework at global software companies. According to VCC framework, the successful KM implementation depends on effective interaction and integration among three capabilities articulating the KM strategic intent, facilitating knowledge flows to enable innovation, and assessing KM value. This framework shows the important effect of strategy, procedure, technology, and culture on KM implementation. Further, the successful KM implementation contributes to the development of strategic capacities, increase innovation and value creation for the organisation.

Furthermore, there are series of studies in the telecommunications sector that confirm the need to use CSFs of KM, KMSs, and KMPs to achieve successful KM implementation, to reflect high performance. For example, Chong and Yeow (2005) argued that the success of organisations depends much on its ability to build up KMPs. The results show that construction, embodiment and deployment are good tools to implement KM at various organisations. Moreover, Chong (2006) considered identification of the CSFs of KM as a means of achieving or maintaining organisational success in KM implementation. They found that the success of KM implementation depends on the degree of the organisational desire to adopt business strategy, organisational structure, knowledge team, knowledge audit, and knowledge map as CSFs of KM implementation. They noted a few empirical studies that examined the effect of CSFs on successful KM implementation efforts, particularly in the MTS.

Similarly, Marqués and Simon (2006) revealed the dimensions of KM practices, which include the orientation towards the development, transfer and protection of knowledge, continuous learning in the organisation, an understanding of the organisation as an overall system, development of an innovative culture to encourage R&D projects, an approach based on individuals and competence development and management based on competences have causal linkage with OP measurements, which include capital profitability, growth, operational and financial efficiency, stakeholder satisfaction and competitive position. Marqués and Simon utilized competence-based view of the organisation and focused on the significance of KM as a source of sustainable competitive advantage. They found a significant positive relationship between KM practices and OP. Furthermore, Chong *et al.* (2007) attempted to narrow the gap between perceived importance and actual implementation of KM. They considered KMSs, which consist of culture, leadership, information technology, and measurement, as the main driver for the successful KM implementation. They asserted that determining understanding the nature of knowledge strategies is very important for organisations to get tangible additional value. They indicated limited number of empirical studies that examined the effect of KMSs on successful KM implementation.

In addition, Cegarra-Navarro and Martínez-Conesa (2007) emphasized that KM implementation by linking individual knowledge (consisting of **s**upplier orientation and customer orientation) with social knowledge (consisting of knowledge sharing and knowledge application) in telecommunications sector will be able to achieve or maintain high OP. Alternatively, Mahdi (2008) conducted a first case study to examine the implementation of KM in the Iraqi MTS. Mahdi's study hypothesised that KM could achieve sustainable competitive advantage. However, the examination of implementation requirements of the KM was limited on the knowledge content and knowledge processes. The results found that KM implementation is the best way to improve OP. Thus, the study further recommended more work to be done on KM implementation in the Iraqi MTS as it is still at its infancy stage. The present study is an attempt to follow this recommendation.

Furthermore, Chong *et al.* (2009) examined the critical effects of the perceived importance and actual implementation of KM in the telecommunications sector. They noted that requirements of KM implementation should consist of CSFs of KM, KMSs, and KMPs. The results indicated that successful KM implementation has an important effect on OP in several aspects as innovation, efficiency, responsiveness, product development cycle time, competitive advantage, cost, learning curve, services quality, flexibility, decision making process, employee retention and annual sales. The researchers further noted that very few empirical studies adopted a comprehensive view to implement KM in the telecommunications sector. Thus they suggested that future studies should re-examine these variables in different countries. In line with this recommendation, the researcher has chosen to investigate CSFs of KM, KMSs, and KMPs as core requirements of KM implementation in the Iraqi MTS. Table 2.5 provides a summary of previous empirical studies conducted on KM implementation in the MTS.

Table 2.5

Empirical Studies of Knowledge Management Implementation in the Mobile Telecommunications Sector

Author and Year	**Requirements of KM implementation**	**Country/ Respondent**	**Findings**
Chong and Yeow (2005)	**KMPs:** -Construction -Embodiment -Deployment	Malaysia/289 Mid-level managers	The study highlights the significance of KMPs to implement KM.
Chong (2006)	**CSFs of KM:** -Business strategy -Organisational structure -Knowledge team -Knowledge audit -Knowledge map	Malaysia/289 Mid-level managers	The study shows the significant effect of the CSFs on the KM implementation.
Marqués and Simón (2006)	**Dimension of KM Practices:** -Orientation towards the development, transfer and protection of knowledge -Continuous learning in the organisation -An understanding of the organisation as an overall system -Development of an innovative culture to encourage R&D projects -Approach based on individuals -Competence development and management based on competences	Spain/222 Top managers	The study shows that the dimension of KM practices have significant effect on the contributions in improving the OP.
Cegarra-Navarro and Martínez-Conesa (2007)	**Individual Knowledge:** -Supplier orientation -Customer orientation **Social Knowledge:** -Knowledge sharing -Knowledge application	Spain/107 Top managers	The study shows the significance of KM implementation (individual and social knowledge) in improving OP.
Chong *et al.* (2007)	**KMSs:** -Culture -Leadership -Information technology -Measurement	Malaysia/289 Mid-level managers	The study shows significant differences among all of the KMSs to implement KM.
Chong *et al.* (2009)	**CSFs of KM:** -Business strategy -Organisational structure -KM team -K-Map -K-Audit **KMSs:** -Culture -Leadership -Measurement -Technology **KMPs**: -Construction -Embodiment -Deployment	Malaysia/ 289 Mid-level managers	The study shows the significant CSFs, strategies and process of KM implementation to improve OP.

Based on the above analysis, present study seeks to examine the implementation of KM from a comprehensive view in the Iraqi MTS by considering three key elements, which are CSFs of KM, KMSs, and KMPs, as identified from the literatures. Each element will be discussed in the following sections.

2.2.4.1 Critical Success Factors of Knowledge Management

In today's knowledge-based economy, businesses operate in a dynamic and complex environment. KM implementation is becoming a significant source of sustainable innovation and OP. As such, contemporary organisations consider KM implementation as a key success in today's knowledge-based economy (Akhavan, Jafari, & Fathian, 2006; Chong *et al.*, 2009). Working on this assumption, several studies have been carried out to identify factors that affect successful KM implementation. These factors are called CSFs of KM (Abdullah *et al.*, 2009; Chong *et al.*, 2009; Chourides, Longbottom, & Murphy, 2003; Chuang, 2004; Hung, Huang, Lin, & Tsai, 2005; Zheng *et al.*, 2010). CSFs of KM implementation can be defined as the managerial and organisational factors that need to be effectively addressed in order to increase the probabilities of successful KM implementation (Asoh *et al.*, 2007; Carneiro, 2000). According to Wong (2005), organisations that seek to implement KM successfully must consider the development and understanding of CSFs. This means that without due consideration of CSFs, expected performance is not likely to be delivered. In a similar vein, Al-Mabrouk (2006) asserted that organisations could definitely benefit from a broader understanding of these factors, which are critical to the success of KM. Nevertheless, the adoption of factors that are not appropriate can hinder the desired performance achievement. In particular, Chong (2006) and Chong *et al.* (2009) stressed the need to consider the CSFs as an important issue when implementing KM in the telecommunications sector. Hence, the present study seeks to consider the CSFs as a significant part of KM implementation in the Iraqi MTS.

It has been argued that generally business organisations fail to implement KM successfully because they are not able to identify the critical factors for successful KM implementation (Greiner *et al.*, 2007). As a result, they may face risk when implementing KM. Because KM implementation is one of management issues not appropriately valued by leaders in organisations, and because there is a lack of academic and scholarly endeavors, more investigation into CSFs of KM is still needed (Abdullah *et al.*, 2009; Razi & Abdul Karim, 2010), particularly in the definition and examination of the relationship between CSFs of KM and innovation (Brachos *et al.*, 2007; Chang & Lee, 2008; Chen & Huang, 2009; Donate & Guadamillas, 2011; Liao & Wu, 2010; Lin, 2007; Rhodes *et al.*, 2008) and the relationship between CSFs of KM and OP (Anderson, 2009; Asoh *et al.*, 2007; Gold, Malhotra, & Segars, 2001; Lin & Kuo, 2007; Yang *et al.*, 2009b; Zheng *et al.*, 2010). Accordingly, the researcher is interested in investigating how CSFs contribute to the successful KM implementation, which may lead to enhanced innovation and improved OP.

In short, successful KM implementation requires preparation to create an organisational environment to get the best possible use of knowledge, and a conducive environment of effective KM implementation. Previous studies have identified a broad range of factors that could have an effect on the success of KM implementation. Table 2.6 provides a summary of the main CSFs in those studies.

Table 2.6

Critical Success Factors of Knowledge Management Implementation

Author and Year	**CSFs of KM**
Chait (2000)	Ensuring vision and alignment, managing four domains: content, process and infrastructure, and culture and creating an effective plan.
Grover and Davenport (2001)	Strategy, structure, culture, and technology.
Stankosky and Baldanza (2001)	Leadership, organisation, technology, and learning.
Gold *et al.* (2001)	Technology, structure, and culture.
Nemati (2002)	Culture, structure, information technology infrastructure, organisational and managerial, and industry specific.
Lee and Choi (2003)	Collaboration, trust, learning, centralisation, formalization, T-shaped skills, and information technology support.
Chourides *et al.* (2003)	Strategy, human resource management, information technology, quality, and marketing.
Chuang (2004)	Technical resource, structural resource, culture resource, and human resource.
Hung *et al.* (2005)	A trusting and open organisational culture, senior management leadership and commitment, employee involvement, employee training, trustworthy teamwork, employee empowerment, information systems infrastructure, performance measurement, benchmarking, and knowledge structure.
Wong and Aspinwall (2005)	Management leadership and support, culture, information technology, strategy and purpose, measurement, organisational infrastructure, processes and activities, motivational aids, resources, training and education, and human resource management.
Chong (2006)	Business strategy, organisational structure, knowledge team, knowledge audit, and knowledge map.
Al-Mabrouk (2006)	Management leadership, culture, information technology, strategy, measurement, organisational infrastructure, training and education, motivation, resources, and processes.
Yeh, Lai, and Ho (2006)	Corporate culture, people, information technology, and strategy and leadership.
Akhavan *et al.* (2006)	Human resources management and flexible structures, KM architecture and readiness, knowledge storage, benchmarking, and chief knowledge officer.
Lin and Kuo (2007)	Human resource management and organisational learning.
Slagter (2007)	Coaching leadership style, structure, roles and responsibilities, Emphasis on learning and education, attention to motivation, trust, reward and recognition, and establishing the right culture.
Asoh *et al.* (2007)	Technology, leadership, culture, and measurement.
Tasmin and Woods (2008)	Leadership, culture, technology, process, and measurement.
Rhodes *et al.* (2008)	Information technology systems, flexible structure and design, innovative organisational culture, and structured learning strategies.
Chong *et al.* (2009)	Business strategy, organisational structure, knowledge team, knowledge audit, and knowledge map.
Abdullah *et al.* (2009)	Knowledge infrastructure, knowledge employee, knowledge work, and knowledge asset.
Anderson (2009)	Culture, structure, and information technology.
Yang *et al.* (2009b)	Culture, structure, and information technology.
Zheng *et al.* (2010)	Organisational culture, organisational structure, and organisational strategy.
Ling and Shan (2010)	Culture, leadership, employee participation, information and communications technology, and organisational structure.
Allameh, Zare, and Davoodi (2011)	Culture, structure, and information technology.

According to CSFs of KM listed above, most of the success factors explored by the researchers mentioned in human resource management, information technology, leadership, organisational learning, organisational strategy, organisational structure, and organisational culture. The next seven sections each focus on CSFs of KM concepts.

1. Human resource management

Most researchers suggest that human resource management is crucial for the KM implementation in achieving success (Edvardsson, 2008; Gloet, 2006; Shih & Chiang, 2005; Yahya & Goh, 2002). Human resource management is responsible for equipping employees in the organisation, who are the main source of knowledge creation through the sharing of ideas, opinions and experiences (Monavvarian & Khamda, 2010). But often employees are reluctant to share their knowledge with others because of vested interests and lack of trust. Therefore, it is important for organisations to harness the involvement and contribution of employees through KM. Human resource management practices are essential to capture and support employees' knowledge and skills that an organisation needs (Chen & Huang, 2009).

Human resource management practices are defined as a strategic personnel management that gives emphasis on the gaining, organising and motivation of human resources (Svetlik & Stavrou-Costea, 2007). In this regard, Lee and Lee (2007a) pointed out that human resource management practices, including staff training and development, performance appraisals, compensation, planning of human resource management and employees security have a significant influence on OP improvement. In the same manner, Chen and Huang (2009) found that human resource management practices, which include training, compensation, performance appraisal, staffing and participation, are able to contribute to successful KM implementation.

In general, the successful KM implementation hinges on the motivation of employees to create, share and apply knowledge. Therefore, human resource management practices have become the most vital issue in the KM implementation (Lin & Kuo, 2007). However, many KM frameworks have neglected to identify the nature of the relationship between employees and KM success, which is reflected in the limited examination of human resource management practices in the KM literature (Theriou & Chatzoglou, 2008; Yang *et al.*, 2009a). In this case, Lopez-Cabrales *et al.* (2009) argued that human resource management practices can improve the knowledge within organisations, but there are few studies about the use of human resource management in managing knowledge. Thus, based on the above, present study focuses on human resource management practices to implement KM in the Iraqi MTS because there are few empirical studies that focus on this role (Lopez-Cabrales *et al.*, 2009; Theriou & Chatzoglou, 2008; Yang *et al.*, 2009a).

2. Information technology

Modern systems of information technology have a decisive role in KM implementation because it can provide important tools to organisations, such as the use of information of clients and competitors, technical databases, decision support systems, management models, successful solutions to competitive situations, and access to specialized sources of knowledge. This will facilitate and expedite the KM implementation in organisations (Carneiro, 2000).

According to Chong, Holden, Wilhelmij, and Schmidt (2000), KM refers to a process of leveraging, articulating skills and experiences of employees supported by information technology. Subsequently, the information technology systems will be able to maintain continuously new knowledge, knowledge transfer and knowledge storage (Mohamed, Stankosky, & Murray, 2006). In addition, it can help employees in organisation to reduce time of transfer knowledge. It also helps achieve higher efficiency, quality and employees' participation of transfer knowledge (Vaccaro, Parente, & Veloso, 2010). In this context, Ray (2008) argued that there are three elements of information technology systems that can help successful KM implementation. Firstly, the role of information technology in KM implementation needs to be identified. Secondly, it should facilitate document storage, organization, and access. Thirdly, organisations should maintain the databases, hardware, and software and information survivability. Thus, based on the above, present study focuses on the important role of information technology in implementing KM in the Iraqi MTS.

3. Leadership

Leadership is regarded as an important component of successful KM implementation. A leader is a role model for others in continuous learning. KM requires an unusual manner of leadership to guide others to achieve the highest levels of OP (Stephen, 2000). Leadership is defined as the support of top management for achieving KM activities (Asoh *et al.*, 2007).

Several researchers have investigated the relationship between leadership and KM. Lakshman (2007) considered leadership role as a key variable in the relationship between KM and OP improvement. He identified two internal and external dimensions of leadership role in supporting KM implementation. These dimensions depend on the leader's comprehension of the importance of KM implementation. Internal dimension is the leader's comprehension of the importance of technological and socio-cognitive role in the KM implementation. External dimension is the leader's comprehension of the importance of customer-focused knowledge in the KM implementation. Moreover, Singh (2008) emphasized that the leadership style is a key role in the KMPs for gaining competitive advantage. He suggested four leadership styles (i.e. directive, supportive, consulting, and delegating) in the implementation of KM. The results indicate that directive and supportive styles of leadership are significantly and negatively related to KMPs, but the consulting and delegating styles are positively and significantly related to KMPs.

Furthermore, Politis (2001) examined the relationship between transformational leadership (which includes attributed charisma, individual consideration, and intellectual stimulation), transactional leadership (which includes contingent reward and consideration), and various dimensions of knowledge acquisition (which includes communication, personal traits, control, organization, and negotiation). He found a strong positive relationship between various styles of transformational leadership and transactional leadership, and various dimensions of knowledge acquisition. In addition, he considered mid-level managers as gatekeepers of information and knowledge. He recommended that further studies should reexamine these variables. Similarly, Crawford (2005) looked at the relationship between styles of transformational leadership and KMPs. He hypothesised that transformational leadership styles leads to the creation of knowledge culture in the organisation, which leads to successful implementation of KMPs and to more innovation. The results indicated that transformational leadership style, which consists of charisma, individual consideration, intellectual stimulation, and inspiration, is significantly related to KMPs (which consist of acquisition, creation and application). He suggested the needs for future research to investigate the relationship between transformational leadership styles and KM.

To conclude, according to Migdadi (2005), transformational leadership has recently received unprecedented attention in KM because of the effect of this style on employees' motivation to create and share knowledge. However, only a few empirical studies have focused on the effect of transformational leadership role on KM. Hence, present study focuses on the importance and the role of the transformational leadership styles in the implementation of KM in the Iraqi MTS (Crawford, 2005; Migdadi, 2005).

4. *Organisational learning*

The success of contemporary organisations depends on creating organisational environment that combines organisational learning with KM (Pemberton & Stonehouse, 2000). Organisational learning has been defined as a collective ability based on experiential and cognitive processes involving acquisition, sharing and utilisation of knowledge (Aragón-Correa *et al.*, 2007). In addition, it is defined as an integral feature of any learning organisation that successfully utilizes its knowledge assets to generate superior performance (Dimitriades, 2005). López, Peón, and Ordás (2004) argued that KM and organisational learning should "go hand in hand" in the organisation to achieve superior performance.

Organisational learning consists of three major dimensions: commitment to learning, vision sharing and open-mindedness (Baker & Sinkula, 1999; Calantone *et al.*, 2002; Lee & Lee, 2007a; Liu, Zhou, & Gao, 2008; Razi & Abdul Karim, 2010; Zhang & China, 2008). These dimensions could have a significant positive effect on KM implementation (Baker & Sinkula, 1999; Calantone *et al.*, 2002). Indeed, Liu *et al.* (2008) and Zhang and China (2008) mentioned that these dimensions have a significant positive effect on knowledge transfer, which includes organisational knowledge transfer, group movements and procedure movements. Based on the above, present study focuses on the organisational learning activities in the Iraqi MTS.

5. Organisational strategy

The successful KM implementation always needs to be linked with effective organisational strategy. In this regard, Chong *et al.* (2007, 2009) revealed that the organisation's ability to succeed in its KM implementation program depends on its ability to choose and apply the organisational strategy needed, which gives it a sustainable competitive advantage. Therefore, the efforts to link KM implementation with organisational strategy are important to achieve OP.

Knowledge creation plays a critical role in the development of organisational strategy by providing knowledge about the customer, service, technology and market, which is considered key for strategic choice (Yang, Phelps, & Steensma, 2010). Moreover, Greiner *et al.* (2007) emphasized that the KM implementation must therefore support the strategic direction of the organisation. Based on the above, present study focuses on the role of organisational strategies in implementing KM in the Iraqi MTS.

6. Organisational structure

Organisational structure refers to the outcome of the combination of all the ways in that work can be divided into various tasks, the coordination of which must subsequently be ensured (Claver-Cortés, Zaragoza-Sáez, & Ortega, 2007). Most organisations seek to implement KM by choosing suitable organisational structure to maintain the continuity of creating new knowledge. As such, suitable organisational structure must encourage team spirit at work and increase exchange of the ideas with low degree of formalization and a decentralisation of the decision making process (Gold *et al.*, 2001; Zheng *et al.*, 2010).

According to Chen and Huang (2007), organisational structure is divided into three elements: formalization, centralisation, and integration. They noted a few studies that have investigated the effect of organisational structure on the KM implementation. The results indicate that interaction had positive effect on knowledge sharing and application. Also, the decreased rate of creating new knowledge comes due to the adoption of the formalization structure and structure of centralisation procedures in the workflow. Based on their findings, they suggested that a decrease in formalization and centralisation procedures in the workflow and more decentralised is pertinent. By doing so, creation of new knowledge can be enhanced through social interaction between employees.

Furthermore, Claver-Cortés *et al.* (2007) indicated the important role of the flexible organisational structures on successful KM implementation. Flexible structures help achieve decentralisation of decision-making process by facilitating the communication process at all organisational levels. In the same vein, Al-Alawi, Al Marzooqi, and Mohammed (2007) emphasized that organisational structure characterized by participative decision making, ease of information flow and cross-functional teams contribute positively to support knowledge sharing. Hence, based on the above, present study focuses on the characteristics of decentralised organisational structure in the implementation of KM in the Iraqi MTS.

7. Organisational culture

Organisational culture is a vital element in directing and monitoring efforts towards KM implementation. It is defined as a model of shared basic assumptions that is a taught to the group as a way to solve its troubles of external adaptation and internal integration and therefore it is taught to new members as the right way to perceive, believe and feel in relative to those troubles (Park, Ribière, & Schulte, 2004). In essence, both organisational culture and KM depend on human dimensions (Al-Alawi *et al.*, 2007; Park *et al.*, 2004). Furthermore, organisational culture is an essential building block to creating a “knowledge friendly culture”, which leads to positive outcomes such as more innovation and improvement of OP (Lai & Lee, 2007).

It is argued that organisational culture can either be a hindrance or an enabler to successful KM implementation. Previous studies have highlighted several characteristics of organisational culture considered a major barrier of successful KM implementation (Al-Alawi *et al.*, 2007; Tseng, 2010; Park *et al.*, 2004). But Tseng (2010) noted that organisational culture characteristics such as trust, common cultures and broad ideas of productive work have significant contributions in the successful KM implementation. For example, Park *et al.* (2004) found a positive relation between KM implementation and the characteristics of culture such as stability, flexibility, trust, sharing knowledge freely, and support of employees. Al-Alawi *et al.* (2007) investigated the relationship between culture characteristics, such as trust, communication and information systems and knowledge sharing such as direct assessment, techniques, collaboration required to accomplish tasks and willingness to share knowledge freely. They found that those culture characteristics are positively related to knowledge sharing in the organisation. The researchers recommended further studies to identify other cultural characteristics, which may affect knowledge sharing. Hence based on the above, present study focuses on culture characteristics in the implementation of KM in the Iraqi MTS, particularly with few empirical studies focusing on this issue.

2.2.4.2 Knowledge Management Strategies

Nowadays, KM strategy has become an important topic for any organisation. It is broadly recognized that knowledge is a momentous resource for strategic organisation in enhancing innovation and improving OP (Rhodes *et al.*, 2008). Despite the increasing importance of knowledge as being a resource of strategic perspective, there is still lack of understanding on the appropriate method to implement KMSs (Garavelli *et al.*, 2004; Hwang, 2003; Maier & Remus, 2003). In other words, many managers are unaware of how to implement KMSs in their organisations (Meroño-Cerdan, 2007; Tasmin & Yap, 2010).

A number of studies have noted that KMSs could play a major role in increasing innovation (Darroch & McNaughton, 2002; Forcadell & Guadamillas, 2002; Rhodes *et al.*, 2008). However, there are limited empirical studies that investigate the relationship between KMSs and innovation (Rhodes *et al.*, 2008). Correspondingly, several studies have indicated that KMSs could play a major role in higher OP (Bierly & Daly, 2007; Choi *et al.*, 2008; Chong *et al.*, 2009; Schulz & Jobe, 2001; Turner & Bettis, 2002). However, there is still a lack of studies that attempt to analyse the effect of KMSs on OP (Choi *et al.*, 2008), particularly in the MTS (Chong *et al.*, 2007, 2009).

According to Xie (2009), KM strategy is defined as the typical process of collocating, codifying, and transferring explicit and tacit knowledge of employees in the right place and at the right time. There is almost an agreement among researchers on the division of KMSs types. A better understanding of the types of KMSs can be achieved through a review of most important contributions (see Table 2.7).

Table 2.7
Types of Knowledge Management Strategies

KMSs	**Author and Year**
Codification and personalisation	Edvardsson (2008), Ewing and West (2000), Greiner *et al.* (2007), Hansen, Nohria, and Tierney (1999), Keskin (2005), Kumar and Ganesh (2011), Maier and Remus (2003), Meroño-Cerdan *et al.* (2007), Rhodes *et al.* (2008), Sobahle (2005), Xie (2009), Yu, Yan-fei, Hai-lin (2006)
Cognitive model and community model	Swan, Newell, and Robertson (2000)
Technocratic organisational, and spatial	Earl (2001)
Codification and tacitness	Schulz and Jobe (2001)
Systems-oriented and human-oriented	Choi and Lee (2003), Ju, Li, and Lee (2006)
Explicit-oriented and tacit-oriented	Choi *et al.* (2008), Keskin (2005)
Exploration and exploitation	Bierly and Daly (2007)

The present study adopted two conceptualisations of KMSs (i.e. codification and personalisation strategy) in order to investigate the role of these strategies in the Iraqi MTS. According to Choi and Lee (2003) and Meroño-Cerdan *et al.* (2007), the exploitation, explicit-oriented, cognitive model, technocratic organisational, and systems-oriented strategies are classified as codification whereas exploration, tacit-oriented, community model, organisational, spatial, tacitness, and human-oriented strategies are classified as personalisation.

Codification strategy refers to extracting explicit knowledge for its storage in knowledge databases, where it can be accessed and re-used simply by employees in the organisation. The aim of this strategy is to secure knowledge for any employee through collecting, classifying, documenting, capturing, and recording processes (Greiner *et al.*, 2007; Kumar & Ganesh, 2011). Whilst personalisation strategy is closely linked with the employee who develops the knowledge and is shared mostly through direct employee-to-employee contacts. The aim of this strategy is to achieve the best informal transfer of tacit knowledge at the individual level in an organisation (Choi & Lee, 2003; Smith, 2004). According to Meroño-Cerdan *et al.* (2007), before choosing any one particular strategy above, an organisation should understand some instruments of KMSs, as shown in Table 2.8.

Table 2.8
Instruments of Knowledge Management Strategies

Codification Strategy	**Personalisation Strategy**
Decision support systems	Spontaneous knowledge transfer initiatives
Groupware	Mentoring
Document repositories	Teams communities of practice
Knowledge maps	Groupware
Workflow	Video conferencing
Shared databases	Yellow pages
	Discussion forums

Source: Adopted from Meroño-Cerdan *et al.* (2007)

Generally, the KM instruments of codification strategy seek to make explicit knowledge available to all employees in the organisation, while the KM instruments of personalisation strategy seeks to create interaction and sharing among employees in the organisation (Meroño-Cerdan *et al.*, 2007). For more details, Hansen *et al.* (1999) summarize the difference between codification and personalisation strategies, as shown in Table 2.9.

Table 2.9
Differences between Codification and Personalisation Strategies

	Codification Strategy	**Personalisation Strategy**
Competitive strategy	Provide high-quality, reliable, and fast Information-systems implementation by reusing codified knowledge.	Provide creative, analytically rigorous advice on high-level strategic problems by channeling individual expertise.
Economics	Reuse economics: Invest once in a knowledge asset, reuse it many times.	Expert economics: Charge high fees for highly customised solutions to unique problems.
Knowledge Management Strategy	Use large teams with a high ratio of associates to partners; Focus on generating large overall revenues; People-to-Documents: Develop an electronic document system that codifies, disseminates and allows reuse of knowledge.	Use small teams with a low ratio of associates to partners; Focus on maintaining high profit margins; Person-to-Person; Develop networks for linking people so that tacit Knowledge can be shared.
Information Technology	Invest heavily in IT; the goal is to connect people with reusable and codified knowledge.	Invest moderately in IT, the goal is to facilitate conversation and the exchange of tacit knowledge.
Human Resources	Hire new college graduates who are well suited to the reuse of knowledge and the implementation of solution; Train people in groups and through computer-based distance learning; Reward people for using and contributing to document database.	Hire new MBA who like problem solving and can tolerate ambiguity; Train people through one-on-one for directly sharing knowledge with others.

Source: Adapted from Hansen *et al.* (1999)

According to Hansen *et al.* (1999), before the organisation seeks to implement one of the strategies, it has to find answers to these questions or otherwise it fails in the implementation of KMSs (Hansen *et al.*, 1999):

1. Does the organisation's capability lead to provide standardised or customised products?
2. What are the innovative products provided by the organisation?

3. Does the organisation depend on tacit knowledge or explicit knowledge, or both?

2.2.4.3 Knowledge Management Processes

Several studies have revealed that KMPs are important for innovation and OP (Asoh *et al.*, 2007; Jantunen, 2005; Lin, 2007; Rhodes *et al.*, 2008; Sáenz *et al.*, 2009). Organisations are searching for ways to enhance their innovation and improve OP during the rapid and dynamic change of business environment. There is increasing evidence that effective management of KMPs will lead to a positive result for organisations (Chong, 2006; Chong *et al.*, 2009; Fugate, Theodore, & Mentzer, 2009).

Recent studies have provided evidence that KMPs have a critical affect innovation (Brachos *et al.*, 2007; Jantunen, 2005; Jiang & Li, 2009; Lin, 2007; Sáenz *et al.*, 2009). However, Darroch and McNaughton (2002) noted a mixed evidence of a link between KMPs and innovation. This makes the relationship between KMPs and innovation still not clear. Furthermore, Jantunen (2005) and Jiang and Li (2009) emphasized that there is a gap in the investigation of the relationship between KMPs and innovation. For that reason, one of the main objectives of present study is to investigate the relationship between KMPs and innovation. In the same manner, KMPs are important tools used to investigate the relationship between KM and OP from various perspectives. Studies have generally agreed that there is a complex relationship between KMPs and OP (Asoh *et al.*, 2007; Chong *et al.*, 2009; Fugate *et al.*, 2009; Hass & Hansen, 2005; Lee & Choi, 2003; Liao & Wu, 2009; Tsai & Li, 2007). However, Darroch (2005) indicated that some KMPs do not positively affect

OP. This means that the relationship between KMPs and OP is still unclear. For that reason, one of the main objectives of present study is to investigate the relationship between KMPs and OP. Previous studies have provided multiple sets of KMPs. Despite the differences in the literature in KMPs, the fundamental concepts of these processes are similar (Alavi & Leidner, 2001; Benbya, Passiante, & Belbaly, 2004). Table 2.10 shows some of the most celebrated KMPs in the literature.

Table 2.10
Knowledge Management Processes

Author and year	**KMPs**
Snis (2000)	Creating, organisation, storage, distributing, and applying.
Alavi and Leidner (2001)	Creation, storage/retrieval, transfer, and application.
Gold *et al.* (2001)	Acquisition, conversion, application, and protection.
Darroch and McNaughton (2002)	Acquisition, responsiveness, and dissemination.
Lawson (2003)	Creation, capture, organisation, storage, dissemination, and application.
Bhatt, Gupta, and Kitchens (2005)	Creation, maintenance, distribution, review, and revision.
Chong and Yeow (2005)	Construction, embodiment, and deployment.
Jantunen (2005)	Acquisition, dissemination, and utilisation.
Darroch (2005)	Acquisition, responsiveness, and dissemination.
Park (2006)	Acquisition, protection, conversion, and application.
Asoh *et al.* (2007)	Identification, elicitation, dissemination, and utilisation.
Hsieh (2007)	Acquisition, protection, conversion, and application.
Asare (2008)	Creation, sharing, integration, and utilisation.
Singh (2008)	Creation, storage, organisation, application, and use.
Wei and Xie (2008)	Acquisition, integration, exploitation, and protection.
Anderson (2009)	Acquisition, conversion, application, and protection.
Fink and Ploder (2009)	Identification, acquisition, distribution, and preservation.
Supyuenyong, Islam, and Kulkarni (2009)	Acquisition and creation, organisation and retention, dissemination, and utilisation.
Theriou and Chatzoglou (2009)	Accumulation, sharing, and utilisation.
Fugate *et al.* (2009)	Interpretation, responsiveness, and dissemination.
Ling and Shan (2010)	Creation, transfer, sharing, and utilisation.
Omerzel (2010)	Acquisition, storage, transfer, use, and measure
Singh and Soltani (2010)	Creation, storage, sharing and evaluation, generation, codification, transfer, and application.
Mills and Smith (2011)	Acquisition, application, protection, and conversion.
Chang and Chuang (2011)	Choice, access, storage, and sharing.
Allameh *et al.* (2011)	Creation, capture, organisation, storage, dissemination, and application.

Many researchers generally agree that KMPs are systematic stages aimed at providing the knowledge needed for an organisation to succeed through knowledge creation, organisation, storage, sharing, and utilisation. Accordingly, present study examines the role of these processes as part of KM implementation in the Iraqi MTS. The following sections introduce each of KMPs concepts.

1. *Knowledge creation*

Knowledge creation is defined as an organisational ability to create and disseminate new knowledge throughout the organisational levels and embody it in its outcomes (Yang *et al.*, 2010). According to Nonaka and Takeuchi (1995), creating new knowledge can be a result of knowledge conversion, which leads to four phases

a. Tacit knowledge to tacit knowledge.
b. Tacit knowledge to explicit knowledge.
c. Explicit knowledge to explicit knowledge.
d. Explicit knowledge to tacit knowledge.

These phases of knowledge conversion are defined as SECI model, which consists of socialization, externalization, combination, and internationalization (Marchand, 2009). Figure 2.2 below shows the SECI model of knowledge creation.

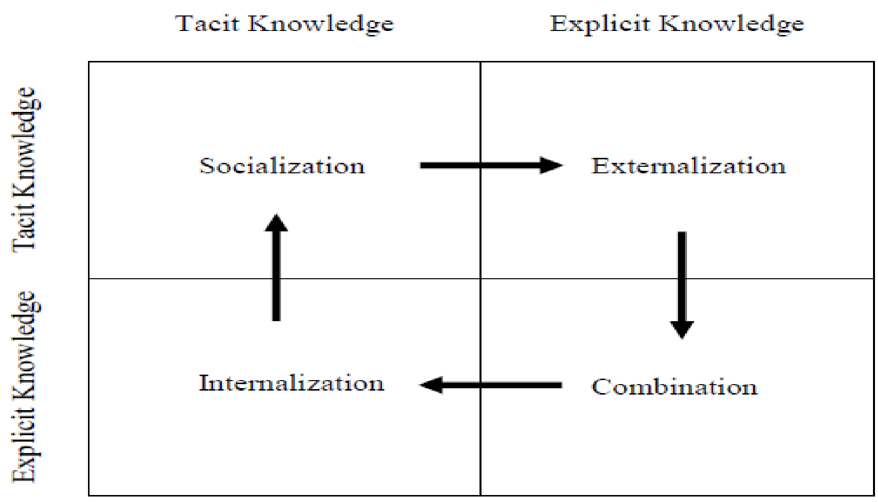


Figure 2.2
SECI Model of Knowledge Creation
Source: Adapted from Nonaka and Takeuchi (1995).

The above model indicates that the SECI knowledge creation process is a result of an escalating spiral of integration between the tacit knowledge and explicit knowledge in the context of knowledge creation. Knowledge creation starts with the formation phase and then moves through the four types of conversion. The combination and internationalization are the most important phases of the process of knowledge transfer because they require the personal commitment of individuals. This can be illustrated by the four stages of the SECI model as follows (Lee & Choi, 2003):

a. **Socialization** refers to the conversion of tacit knowledge to tacit knowledge through sharing experience.
b. **Externalization** refers to the conversion of tacit knowledge to explicit knowledge through allowing sharing knowledge by others.
c. **Combination** refers to the conversion of explicit knowledge to explicit knowledge through direct dissemination of knowledge.
d. **Internationalization** refers to integrating explicit knowledge with tacit knowledge.

The critical key of knowledge creation is "knowledge spiral", which is created through the integration between the levels of knowledge creation in the organisation (ontological dimension) and the transfer from tacit knowledge to explicit knowledge (epistemological dimension). Figure 2.3 illustrates the view on the spiral of knowledge creation (Asare, 2008; Steyn, 2003).

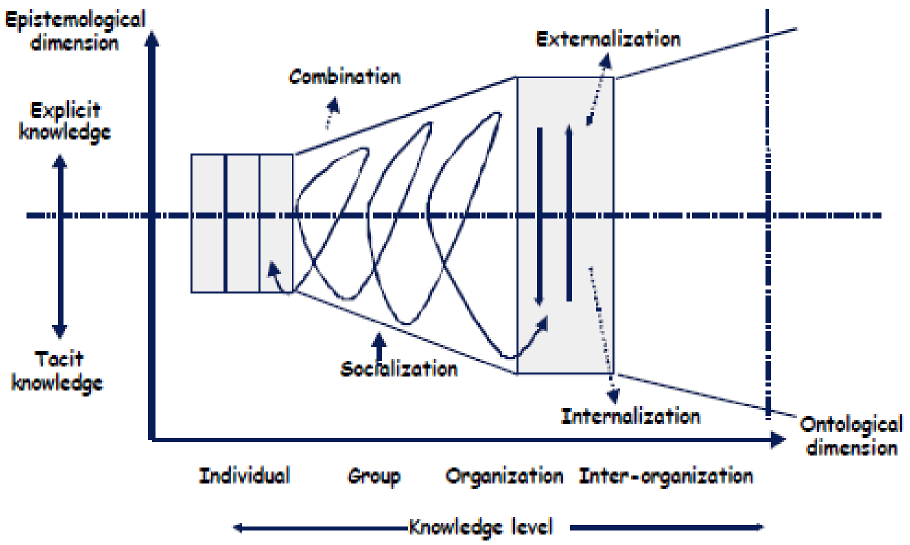


Figure 2.3
Spiral of Knowledge Creation
Source: Adopted from Nonaka and Takeuchi (1995:73)

A spiral of knowledge is more active when there is a dynamic interaction between the tacit knowledge and the explicit knowledge, from the lower level of the ontological dimension towards the high-level of epistemological dimension. In other words, the interaction between tacit knowledge and explicit knowledge can be the largest through the movement of the spiral to the top level of the epistemological dimension. Thus, the spiral process of organisational knowledge creation begins at the individual level, moving up through expanding communities of interaction that pass through group level and organisational level (Asare, 2008; Steyn, 2003).

2. *Knowledge organisation*

After creating knowledge, the organisation resorts to refine and liquidate the knowledge through useful ways. The useful knowledge carries value that can be added to the product or service (Kiessling *et al.*, 2009; Ramachandran, 2010).

3. Knowledge storage

The main idea of the KM approach relates to storing useful knowledge in the organisational memory so that others in the organisation can access it (Allameh *et al.*, 2011; Cheng, Yang, Yang, Lin, Lai, Chen, Lee, Sun, Lai, & Chen, 2005; Fink & Ploder, 2009). Knowledge storage aims to enable employees within the organisation to obtain explicit knowledge at any time through IT tools such as e-mail, bulletin boards, online databases, intranets, data warehouses, software agents, and search engines (Arsenijević, 2009; Asoh *et al.*, 2007). In this regards, Park (2006) argued that organisations need to develop technology that restricts or tracks access to useful knowledge by using password technology. Accordingly, knowledge storage is related to select, retention, and protect processes of the knowledge required by organisation management (Allameh *et al.*, 2011).

4. Knowledge sharing

Knowledge sharing is defined as a social interaction culture, involving the exchange of employee knowledge, skills and experience through all departments in the organisation (Lin, 2007). Based on this definition, knowledge sharing consists of two processes (Lin, 2007):

1. Knowledge donating refers to the motivation of employees to share knowledge with their colleagues.
2. Knowledge collecting is defined as a desire of employees to gather knowledge from their colleagues to increase knowledge.

Indeed, the KMPs in any organisation depend on knowledge sharing on three levels, which are individual level, group/unit/department level and organisational level. It is necessary to support several functions in the organisation to achieve competitive advantage, innovation, productivity and improvement of OP. Thereby, knowledge sharing is considered a critical part in the KMPs (Asare, 2008; Liao & Wu, 2009; Lin, 2007; Nassuora & Hasan, 2010b; Sabherwal & Becerra-Fernandez, 2003).

Undeniably, there are many barriers of successful achievement of knowledge sharing. In this regard, Freydouni and Woods (2010) indicate that successful knowledge sharing depends on employee's desire to share knowledge, which is affected by motivation system and social interaction. Similarly, Okyere-Kwakye *et al.* (2010) revealed that the employee's behavior, which is affected by some factors such as trust, altruism, mutual reciprocity and self-efficacy, is a key for knowledge sharing.

5. Knowledge utilisation

Knowledge utilisation is defined as the application of knowledge toward the attainment of organisational goals (Asoh *et al.*, 2007). Based on the definition, organisations seek to take benefit of both tacit knowledge and explicit knowledge through employing them to create new products or new services, which will lead to achieving superiority in the overall OP (Haas & Hansen, 2005).

2.2.5 Team Members for Knowledge Management Implementation

In order to achieve successful KM implementation, organisations need to determine the team members responsible for it. Therefore, this section discusses the responsible team members for KM implementation and how they are identified.

Nonaka and Takeuchi (1995) are among the first to coin the term “Knowledge Crew”. This concept refers to the team members responsible for the identification, promotion and creation of knowledge within the organisation. The knowledge crew consists of three key people in the organisation: the knowledge officers (top management), the knowledge workers (mid-level managers), and the knowledge practitioners (front-line employees). Table 2.11 briefly describes the roles of the knowledge crew.

Table 2.11
Comparison of the Three Management Models Regarding Knowledge Creation

		Top-down	**Bottom-up**	**Middle-up-down**
Who	Agent of knowledge Creation	Top management	Entrepreneurial Individual	Team (with mid-level managers as knowledge engineer)
	Top management role	Commander	Sponsor/mentor	Catalyst
	Middle management role	Information processor	Autonomous Entrepreneur	Team leader
What	Accumulated Knowledge	Explicit	Tacit	Explicit and tacit
	Knowledge conversion	Partial conversion Focused on Combination/ Internalization	Partial conversion Focused on Socialization/ Externalization	Spiral conversion of Internalization Externalization/ Combination/ Socialization
Where	Knowledge storage	Computerized database/manuals	Incarnated in Individuals	Organisational Knowledge base
How	Organisation	Hierarchy	Project team and Informal network	Hierarchy and task Force(hypertext)
	Communication	Orders/instructions	Self organising Principles	Dialogue and use of Metaphor/analogy
	Tolerance for Ambiguity	Chaos/fluctuation not allowed	Chaos/fluctuation Premised	Create and amplify Chaos/fluctuation
	Weakness	High dependency on Top management	Time consuming cost of coordinating individuals	Human exhaustion Cost of redundancy

Source: Adopted from Nonaka and Takeuchi (1995: pp.130)

According to Nonaka and Takeuchi (1995), knowledge creation generally starts from mid-level managers who are considered the true “knowledge workers” of creating new knowledge in the organisation. They are responsible for synthesizing tacit knowledge of top management and front-line employees, and transfer it into explicit knowledge. They are also able to create a spiral of knowledge across different functional areas in the organisation structure. Accordingly, mid-level managers play a central role in KM implementation. The mid-level managers are defined as "managers occupying positions that fall within a range of two levels below the head of the organisation and one level above supervisory staff or professional employees" (Richards, 2004, p. 67).

Since early 2000s, several studies have been conducted to measure the effective role of mid-level managers in creating new knowledge. All of these studies have agreed that the role of mid-level managers has shifted from just being a link between top management and operational supervisors to a new role that seeks to create knowledge and utilize knowledge through the provision of innovative work, which is reflected in the OP (Gunther-McGrath, 2001; Huy, 2001; Janczak, 2004; Richards, 2004).

Accordingly, Janczak (2004) explored the dynamics and new roles of mid-level managers for creating and managing new knowledge. The author noted that the mid-level managers used three behavioral roles (i.e. analytic, intuitive and pragmatic), which are integrated with knowledge modes to create new knowledge. Table 2.12 summarizes the relationship between mid-level managers' roles and knowledge modes.

Table 2.12
The Relationship between Mid-level Managers Roles and Knowledge Modes

	Analyst	**Intuitive**	**Pragmatic**
Development time	Short term	Medium/long term	Long term
How people are influenced	Authoritarian logic	Emotional logic	Conciliatory logic
Result	Delivering a solution	New work method	Repositioning
Change orientation	Stability/planned	Renewal	Adaptation/incremental
Action process	Reactive	Proactive	Interactive
Nature of knowledge	Explicit	Tacit and explicit	Tacit and explicit
Knowledge initiative	Implementing imported solution	Experimenting new options	Adaptation
Knowledge approach	Collecting external knowledge	Creating and pursuing new opportunities; supporting employees' initiatives	Linking dispersed knowledge, skills, and best practices internal to or across departments.
Nature of results	Technical conformity/ standardization	Satisfaction and professional creativity	Satisfying
Feedback/evaluation	No feedback	At the end	Continuous
Knowledge goal	Truth	Pleasure	Utility
Preferred knowledge roles	Problematic searcher, passive filter	Radar, catalyst, active filter	Opportunistic searcher, connector, missionary

Source: Adopted from Janczak (2004: pp. 221)

Table 2.12 shows that mid-level managers have become a source of knowledge and leaders of knowledge employee (Janczak, 2004). Hence, the aim of mid-level managers is not merely creating new knowledge and transferring it between top management and the front line employees, but to achieve successful KM implementation (Richards, 2004). Furthermore, Takeuchi (2001) believes that the mid-level managers play a critical role in resolving any conflicts that may occur between top managers and front-line employees when KM is implemented. In this regard, Chong (2006) and Chong *et al.* (2009) conducted empirical studies on the KM implementation in telecommunications sector. The researchers selected mid-level managers as respondents. They considered mid-level managers as knowledge workers. As a result, due to the vital role of the mid-level managers in KM implementation, there is enough justification for choosing the mid-level managers of Iraqi MTS as respondents to achieve the main goals of present study.

2.3 INNOVATION

Mobile companies are operating in a complex changeable environment due to emergence of new services, technology development, change of customer's satisfaction, and fierce competition. In this situation, MTS need to adopt innovative ways to achieve high OP (AL-Enzi, 2008; Blazevic, 2003; Forge & Bohlin, 2008; Gruber, 2001; Hwang & Lee, 2000; Jaspers *et al.* 2007).

2.3.1 Defining Innovation

In the literature, innovation is defined in many different ways. Table 2.13 provides some definitions of innovation from various perspectives.

Table 2.13
Definition of Innovation from Various Perspectives

Author and Year	Definition
Weerawardena and Coote (2001, p. 55)	"a process in which the waves of knowledge acquired by the organisation through external and internal sources are integrated into all value creating activities of the organisation."
Herkema (2003, p. 341)	"a process wherein knowledge is acquired, shared and assimilated with the aim to create new knowledge, which embodies products and services."
Chen, Zhaohui, and Xie (2004, p.205)	"the introduction of a new combination of the essential factors of production into the production system."
Mudrak, Wagenburg, and Wubben (2005, p.103)	"a management process, involving multiple activities, performed by multiple actors from one or several organisations, during which new combinations of means and/or ends, which are new for creating and/or adopting a unit, are developed and/or produced and/or implemented and/or transferred to old and/or new market-partners."
Hamel (2006, p.75)	"a marked departure from traditional management principles, processes and practices or a departure from customary organisational forms that significantly alters the way the work of management is performed."
Popadiuk and Choo (2006, p. 309)	"the generating ideas and implementing them to produce value for the organisation, suppliers and consumers."
Plessis (2007, p. 21)	"the creation of new knowledge and ideas to facilitate new business outcomes, aimed at improving internal business processes and structures and to create market driven products and services."
Roberts (2008, p. 6)	"the adaptation of an industry specific idea or concept in use by a subject organisation to satisfy and identify the need to attain a desired, useful end, without regard for its use by others."
Freeman and Engel (2007, p. 94)	"a process that begins with a novel idea and concludes with market introduction."
Damanpour *et al.* (2009, p. 652)	"the development and/or use of new ideas or behaviors."

Based on the above definitions of innovation and the purpose of present study, innovation can be defined as a knowledge-based process to create new ideas, markets, products, and services toward overall OP improvement.

2.3.2 Innovation in Mobile Telecommunications Sector

The rapid dissemination of mobile technology is mostly due to technological growth. In this regard, it sets technological innovation at the high-level of the mobile company's strategic goals. Furthermore, the increased number of mobile subscribers and the high competition between mobile companies set the impetus for enhanced technological innovation (Mufioz, 2008). Subsequently, these companies are seeking to mandatory achievement of it, through supported administrative, radical, and incremental innovation (AL-Enzi, 2008; Blazevic, 2003; Forge & Bohlin, 2008; Gruber, 2001; Jaspers *et al.*, 2007; Oke, 2007) in order to survive. Chen *et al.* (2007) emphasized that there is a strong relationship between diffusion of technological innovation and overall OP in the telecommunications sector. Similarly, Oke (2007) revealed that different types of innovations have a positive related to OP in terms of increasing customer's satisfaction and service quality, while reducing cost. Because AL-Enzi (2008) emphasized that innovation can contribute to OP in the Iraqi MTS, present study seeks to investigate the relationship between innovation and OP in this sector.

Undeniably, the main success factor of MTS in a highly competitive and complex environment is technological innovation (Edvardsson, Gustafsson, & Enquist, 2007; Picot, 2006). Technological innovation is considered a vital element in creating new mobile service innovation, which refers to "any new services that are delivered with the support of wireless devices" (Blazevic, 2003, p. 120). In general, mobile services are divided into four major groups: (a) communication services such as short message service (SMS), multimedia messages (MMS), internet and chatting; (b) information services such as news titles and location-based information; (c) transaction services such as tickets reservation and making financial transactions; and (d) entertainment services such as horoscope, games and ringtones (Mafé, Blas, & Tavera-Mesías, 2010). But despite the importance of mobile service innovation, Blazevic (2003) pointed out that there are few studies that investigate the success factors to create new mobile services.

According to Blazevic (2003) and Mufioz *et al.* (2008), knowledge is regarded as a main source of sustainable mobile services to achieve sustainable competitive advantage in the MTS. Hence, given this, it is justifiable for the present study to investigate the relationship between KM implementation and innovation. Furthermore, there are a few studies, if any, that looked at KM implementation comprehensively to enhance innovation in the MTS. Hence, present study could fill this gap by examining the relationship between KM implementation (CSFs of KM, KMSs, and KMPs) and innovation (technological innovation, administrative innovation, radical innovation, and incremental innovation) in the Iraqi MTS.

2.3.3 Innovation Types

Literatures on innovation indicate a variety of types of innovation (Damanpour *et al.*, 2009; Garcia & Callantone, 2002; Syvertsen, 2008), ranging from incremental to radical, for example. Some researchers group the types of innovation into three main categories: administrative and technical, product and process, and radical and incremental (Yang, 2007). The reasons why organisations adopt different types of innovations are because of environmental conditions, organisational factors, generation processes of innovation, and organisational sector. Table 2.14 provides a summary of the different types of innovation organisations adopt.

Table 2.14
Types of Innovation

Types of innovation	**Author and year**
Incremental innovation and radical innovation	Darroch and McNaughton (2002), Darroch and McNaughton (2003), Herkema (2003), Lin and Chen (2007), Roberts (2008), Sáenz *et al.* (2009), Subramaniam and Youndt (2005), Yang (2007)
Administrative innovation and technological innovation	Birkinshaw, Mol, and Hamel (2008), Carmen and José (2008), Chang and Lee (2008), Damanpour, Szabat, and Evan (2007), Fernandez (2001), Lam (2005), Oke (2007), Yang (2007)
Product innovation, process innovation, administrative innovation, marketing innovation, and service innovation	Lin, Chen, and Chiu (2010)
Product and process innovations	Akgün *et al.* (2009), Aragón-Correa *et al.* (2007), Meeus and Edquist (2006), Yang (2007)
Service innovation, technological process innovation, and administrative process innovation	Damanpour *et al.* (2009)
Incremental innovation, innovation changes, and innovation destroys	Darroch and McNaughton (2002)

Despite innovation is a multi-type activity, present study adopts the results of previous studies in the MTS that considered the technological innovation, administrative innovation, radical innovation, and incremental innovation as a main reason to survival and growth mobile companies (AL-Enzi, 2008; Blazevic, 2003; Forge & Bohlin, 2008; Gruber, 2001; Jaspers *et al.*, 2007; Oke, 2007).

In the MTS context, technological innovation is the knowledge that links methods, components, and techniques with processes to create services (Popadiuk & Choo, 2006). Administrative innovation refers to the changes in organisational structure and processes, like the authority, tasks structuring, personnel recruitment, resources allocation and rewards (Lin *et al.*, 2010). Radical innovation is a main change that represents a new technological pattern (Pedersen & Dalum, 2004), and requires more organisational capabilities and superior profundity of knowledge (Darroch & McNaughton, 2003; Roberts, 2008). Incremental innovation is defined as cumulative and gradual nature of technological changes in organisation to create services (Pedersen & Dalum, 2004). As such, unlike incremental innovation, it does not require much organisational capability (Darroch & McNaughton, 2003; Roberts, 2008).

2.4 ORGANISATIONAL PERFORMANCE

Present study seeks to look at how superior OP can be achieved for the benefits of the Iraqi MTS. Indeed, OP is very important in contemporary organisations that attempt to survive in a dynamic and highly competitive environment (Anantatmula, 2007; Chong *et al.*, 2009; Zack *et al.*, 2009).

2.4.1 Defining Organisational Performance

OP has been defined in different ways. Table 2.15 provides some definitions of OP from various perspectives.

Table 2.15
Definition of Organisational Performance from Various Perspectives

Author and year	Definition
Laitinen (2002, p. 66)	"the ability of an object to produce results in a dimension determined a priori, in relation to a target."
Lee and Choi (2003, p. 181)	"the degree to which companies achieve its business objectives."
Amartunga and Baldry (2003, p. 172)	"a process of assessing progress towards achieving pre-determined goals, including information on the efficiency by which resources are transformed into goods and services, the quality of these outputs and outcomes, and the effectiveness of organisational objectives."
Visser and Sluiter (2007, p. 2)	"the way the organisation carries its objectives into effect."
Ho (2008, p. 1238)	"an indicator which measures how well an enterprise achieves their objectives."
Pitt and Tucker (2008, p. 243)	"avital sign of the organisation, showing how well activities within a process or the outputs of a process achieve a specific goal."

Based on the above definitions of OP and the purpose of present study, OP can be defined as the integration between organisational KM and innovation competence to achieve positive goals for the organisation.

2.4.2 Organisational Performance in Mobile Telecommunications Sector

Nowadays, the MTS is one of the main sources for the growth of world's economy in general and developing countries' economy in particular (Dvornik & Sabolić, 2007; Gao & Rafiq, 2009; Lindmark *et al.*, 2006; Qiang, 2009). Because of its role, Gao and Rafiq (2009) reported an increasing number of studies on this sector that has been carried out in developing countries like Albania, Lithuania, Nigeria, India, Latin America, Pakistan, and Africa. The finding of these studies show that governments can play vital role in this sector through the infrastructure development, liberalization of MTS, foreign direct investment and encouraged competition (Caia & Tylecote, 2008; Gao & Rafiq, 2009; Lin, 2008).

In the case of Iraq, there are many problems facing the developing and improving of telecommunications sector due to the first and second Gulf War, economic sanction, and U.S. occupation. Therefore, studies that aim at stimulating the construction of telecommunications infrastructure and the use of modern management applications are needed (AL-Enzi, 2008; Mahdi, 2008; Report of United Nations Economic and Social Commission for Western Asia, 2005; Report of U.S. Agency for International Development, 2009).

The environment of mobile companies worldwide is characterized by turbulence and radical changes brought about by increasing mobile subscribers, the changing technology and the increasingly fierce competition (Chong, 2006; Chong *et al.*, 2007, 2009; Marqués & Simón, 2006). Therefore, mobile companies need to increase the use of modern management practices and procedures in order to survive and overcome competitors (Cegarra-Navarro & Martínez-Conesa, 2007; Chong *et al.*, 2009). In addition, it needs to develop OP measurement indicators to evaluate and compare their performance with that of the competitors (Liao, Chen, Wu, & Cheng, 2009; Visser & Sluiter, 2007). In addition, the demands from mobile subscribers are getting more complex than ever, which must be attended to if mobile companies want to maintain their competitive advantage. To do so, they must ensure that their mobile services are innovative enough to meet the demands of mobile subscribers (Mafé *et al.*, 2010).

Dvornik and Sabolić (2007) revealed a positive relationship between OP improvement in the MTS and economic growth. The researchers indicated that the increasing number of mobile subscribers is regarded as an indicator of OP improvement in the MTS. They also indicated that developing countries, particularly, should strive to improve the OP in the MTS through innovative mobile services to create more opportunities for economic growth and development. In this regard, since Iraq is still struggling with its economy (as has been indicated previously), it should focus on OP improvement in the MTS to develop its economy. Hence, present study is justified in that it attempts to find ways on how to improve OP in the MTS by examining the effect of KM implementation.

Previous studies showed that OP improvement in the MTS depend on many factors. The important factors that are positively associated with improved OP are technology standards (Jho, 2007), market, competition, organisational structure (Palcic & Reeves, 2010), foreign direct investment (Lin, 2008), company management, financial resource and technological development (Caia & Tylecote, 2008). But among these factors, the growth of the MTS depends mainly on technological development and innovation, as argued by many scholars (AL-Enzi, 2008; Chen *et al.*, 2007; Gao & Rafiq, 2009; Lee & Park, 2008; Oke, 2007). In this regard, Gao and Rafiq (2009) observed that technological innovation has been identified as the critical success factor in the MTS growth in developing countries. He also revealed that creating a new mobile service is closely related to the adoption of technological innovation and that leads to improve the overall OP of MTS. In other words, without technological innovation, accomplishing OP in the MTS will be difficult. Subsequently, the researcher is interested in investigating the relationship between innovation and OP in the Iraqi MTS.

In a knowledge-based economy, knowledge is regarded as an important source to improve, support, and enhance innovation. It promotes innovation in mobile services and generates opportunities to penetrate the MTS market through sustainable competitive advantage (Blazevic, 2003; Darroch & McNaughton, 2002; Ju *et al.*, 2006; Lin, 2007; Mufioz, 2008; Rhodes *et al.*, 2008; Sáenz *et al.*, 2009). However, the effect of knowledge on mobile service innovation in the MTS is still empirically overlooked (Blazevic, 2003; Mufioz, 2008).

On the other hand, the empirical studies in the MTS have showed that KM implementation has empowered mobile companies to achieve high competitive advantage, innovation, organisational learning, customer satisfaction, organisational strategy, productivity, decision making, responsiveness, service, employee retention, flexibility and cost efficiency through spillover effect of the CSFs of KM, KMSs, and KMPs on the overall OP (Chong, 2006; Chong & Yeow, 2005; Chong *et al.*, 2007, 2009; Marqués & Simón, 2006). But there are few, if any, studies that have focused on the comprehensive effect of KM on OP in the MTS through innovation (Chong *et al.*, 2009; Marqués & Simón, 2006). This reveals an important gap to fill, and the present study seeks to do just that. Specifically, present study contributes to prior studies by investigating the direct relationship between KM implementation (CSFs of KM, KMSs, and KMPs) and OP (financial perspective, customer perspective, internal process perspective, and learning and growth perspective) and indirect relationship between KM and OP through innovation (technological innovation, administrative innovation, radical innovation, and incremental innovation) in the Iraqi MTS.

2.4.3 Organisational Performance Indicators in Mobile Telecommunications Sector

The OP indicators have become an important issue in evaluating organisational success (Moullin, 2007). It is defined as "comparing the expected results with the actual ones, investigating deviations from plans, assessing individual performance and examining progress made towards meeting the targeted objectives" (Ngah & Ibrahim, 2010, p. 503). Based on this definition, OP indicators can provide assistance for managers to evaluate the organisational activities and maintain the competitive position or superiority over competitors (Liao *et al.*, 2009; Visser & Sluiter, 2007). But scholars differ in how they measure OP. Table 2.16 provides a summary of the main OP indicators used by previous studies.

Table 2.16
Indicators of Organisational Performance

Author and year	**Indicators of organisational performance**
Calantone *et al.* (2002)	Return on investment, return on asset, return on sales, and overall profitability.
Choi and Lee (2003)	Successfulness, market share, profitability, growth rate, and innovativeness.
Lee and Choi (2003)	Overall success, market share, growth rate, profitability, and innovativeness.
Darroch and McNaughton (2003)	Financial measures (profit) and non-financial measures (market share, sales growth).
Keskin (2005)	Organisation's success, market share, growth, profit, innovation, and size.
Yu *et al.* (2006)	Market performance, human resource efficiency, and successful new product/service.
Marqués and Simón (2006)	Capital profitability, growth, operational and financial efficiency, stakeholder satisfaction, and competitive position.
Lin and Chen (2007)	Rate of sales revenue, rate of profit, rate of net asset return on investment, and rate of market share.
Lin and Kuo (2007)	Market performance (profit margin, sales and customer satisfaction) and Human resource performance (relationship between managers and employees, attraction and retention of employees and employee motivation).
Cegarra-Navarro and Martínez-Conesa (2007)	Growth rate of sales, growth rate of profit, and profitability rate on total assets.
Anantatmula (2007)	Customer satisfaction and business growth.
Visser and Sluiter (2007)	Financial perspective metrics, customer perspective metrics, internal process perspective metrics, and learning and growth perspective metrics.
Rhodes *et al.* (2008)	Financial performance (profit, cost reduction, sales volume, inventory, and turnover rate) and non-financial performance (customer satisfaction rate, frequency of patterns, rate of product development and new competencies and capabilities).
Ho (2008)	Financial performance (relative profitability, return on investment, total sales growth) and Market performance (market share, profit ratio, and customer satisfaction).
García-Morales *et al.* (2008)	Return on assets, return on equity, return on sales, and market share.
Chong *et al.* (2009)	Efficiency, responsiveness, product development cycle time, competitive advantage, innovation, cost, learning curve, products/services quality, flexibility, decision making process, employee retention, and annual sales.
Kiessling *et al.* (2009)	Organisation innovation, product improvement, and employee improvement.
Zack *et al.* (2009)	Non-financial performance (product leadership, customer intimacy, operational excellence) and financial performance (ROA, ROE, and Profitability).
Liao *et al.* (2009)	Productivity and finance.
Lichtenthaler (2009)	Return on sales (ROS).
Kim and Gong (2009)	Quality of products, services or programmers, development of new products, services or programmers, ability to attract essential employees, satisfaction with customers or clients, relations between management and other employees, marketing, growth in sales, growth in profitability, growth in market share, and return on asset.
Ho (2010)	Financial and market performance.
Eshlaghy and Maatofi (2011)	Profitability, sale, and ROI.
Salim and Sulaiman (2011)	Financial and market performance.

After reviewing these different types of OP indicators, they generalized the results into two dimensions: financial performance and non-financial performance. Although the indicators of performance tend to remain as financial or non-financial performance, more recent studies have taken a more holistic approach and adopted the BSC approach in measuring OP (Kaplan & Norton, 2001).

Kaplan and Norton developed the first BCS in the early 1990s, which encompassed financial and non-financial measures. The original BSC recommends that an OP should be assessed from four perspectives (Creamer & Freund, 2010, p. 365):

1. The financial perspective emphasizes the long-term objectives of the organisation in terms of revenue growth and productivity improvement. The financial objectives should be the final goals for the other perspectives.
2. The customer perspective emphasizes the lifetime relationship and service delivery with customers.
3. The internal process perspective focuses on the use of customer information to sell new services according to their needs.
4. The learning and growth perspective is the foundation of the BSC; this perspective looks at the motivation, training, and capacity to innovate that employees need in order to implement organisational objectives.

In fact, the BSC approach is one of different well-known ways for evaluating the KM and innovation performance by examining the gap between a target and an actual performance of the organisation (Fairchild, 2002; Wegmann, 2008; Yu & Liying, 2009), particularly from the RBV and KBV theories' perspectives (Bose & Thomas, 2007; Gonzalez-Padron, Chabowski, Hult, & Ketchen, 2010). According to Lee and

Lee (2007b), several assessment methods are included in the KM performance. These methods can be classified into four groups (financial measures, intellectual capital, tangible and intangible benefits, and BSC), but the BSC is considered to be more useful than intellectual capital or tangible and intangible approaches because it provides a comprehensive view of the organisation's actual performance.

In a similar context, Wegmann (2008) indicated that the BSC approach is compatible with KM. It is the best approach to evaluate KM implementation within any organisation (Hongmei & Yujun, 2010). On the other hand, Yu and Liying (2009) claimed that BSC has become the main approach and a prerequisite for assessing innovation performance. Furthermore, Kaplan and Norton's (2006) BSC provides the evaluation of innovation performance as the first priority in its approach.

Despite the substantial body of BSC literature, empirical studies evaluating KM implementation and innovation based on the BSC perspective are extremely limited (Chen & Mohamed, 2008; Lee & Lee, 2007b; Yu & Liying, 2009). Therefore, Hongmei and Yujun (2010) argued that many issues require further research and discussion in this area. Moreover, the BSC has been recommended as a suitable measurement for measuring the OP in the MTS (Visser & Sluiter, 2007). Thus, the present study seeks to provide empirical evidence for the theoretical claim that the BSC is capable of assessing KM implementation and innovation activities to realise desired organisational objectives.

To date, very limited studies have attempted to look at the relationships among KM implementation (CSFs of KM, KMSs, and KMPs), innovation, and OP measured by

BSC indicators. The present study aims to do just that. Specifically, the present study examines the effect of KM implementation (CSFs of KM, KMSs, and KMPs) and innovation (technological, administrative, radical, and incremental) on financial, customer, internal processes, and learning and growth measures of OP in the Iraqi MTS.

2.5 THE RELATIONSHIPS AMONG THE VARIABLES OF THE PRESENT STUDY

This section presents a review of the relevant literature to help understand the five parts of the research questions. The first part introduces the empirical evidence of the nature of the relationship between KM and innovation. The second part introduces the empirical evidence of the relationship between KM and OP. The third part introduces the empirical evidence of the relationship between innovation and OP. The fourth part introduces the possible the mediating role of innovation on the relationship between KM and OP. Finally, the fifth part addresses ways in which to fill the identified gaps.

2.5.1 Knowledge Management and Innovation

The main objective of this section is to identify studies that have investigated the relationship between KM and innovation. To this end, the researcher classified previous works into three categories based on the core requirements of KM: (1) the relationship between CSFs of KM and innovation; (2) the relationship between KMSs and innovation; and (3) the relationship between KMPs and innovation.

2.5.1.1 Critical Success Factors of KM implementation and Innovation

For the first category, the researcher identified seven CSFs of KM: human resource management, information technology, leadership, organisational learning, organisational strategy, organisational structure, and organisational culture. These factors are important for successful KM implementation to create, support, and enhance innovation.

In this stream of research, Gloet and Terziovski (2004) indicated that the success of innovation performance, which includes new processes, products, and services, significantly depends on the integration of KM practices with soft human resource management activities and hard information technology activities. It is considered to be the main CSFs of KM. However, the results demonstrate that a significant and positive relationship exists between KM practices based on human resource management and innovation. Meanwhile, the results indicate that a significant and negative relationship exists between KM practices based on information technology and innovation. Therefore, further studies are necessary to confirm these results and incorporate the other variables that may have influenced the results.

In this regard, Donate and Guadamillas (2011) highlighted the role of knowledge-centred culture, knowledge-oriented leadership, and knowledge-centred soft human resource management practices in achieving high levels of innovation. Based on the KBV perspective, the results indicated that all these factors have a significant and positive effect on innovation. In addition, the researchers recommended that future studies be conducted to test these factors with other samples. In the same vein, Chang and Lee (2008) argued that organisational culture is regarded as a permanent source of knowledge accumulation capability in order to enhance organisational innovation. They examined the moderator role of culture styles (bureaucratic culture, innovative culture, and supportive culture) between knowledge accumulation capability (accumulation, storage, obtainment, selection, expansion, and establishment) and organisational innovation (administrative innovation and technological innovation). Their results demonstrated that pairing organisational culture and knowledge accumulation capability generates a significant and positive effect on administrative and technological innovation. Further examination of these variables is warranted.

Furthermore, Lin (2007) examined the effect of top management support on knowledge sharing in order to enhance innovation capability. In this regard, Lin suggests that top management support, helping others, and self-efficacy are the main CSFs of knowledge-sharing effectiveness. Meanwhile, increasing innovation capability in order to create new services, products, and ideas depends on the effectiveness of knowledge-sharing processes, which consist of donating and collecting knowledge. Furthermore, the results demonstrate that top management support has a significant and positive effect on knowledge sharing. In addition, the knowledge sharing has a significant and positive effect on innovation capability. However, the researcher noted that a gap exists between the CSFs of knowledge sharing and innovation. Therefore, the researcher recommended that future researchers examine other CSFs that could affect knowledge-sharing processes to enhance innovation capability. Similarly, Sáenz *et al.* (2009) noted the lack of empirical studies examining the CSFs of knowledge sharing on the innovation capability of organisations.

Moreover, Chen and Huang (2009) concluded that the soft human resource management practices have an indirect effect on innovation performance through KM capacity from the KBV perspective. They found that soft human resource management practices, which include performance appraisal, compensation, staffing, participation, and training, have a significant positive effect on KM capacity. They also revealed a significant positive relationship between acquisition, sharing, and application (i.e. KM capacity) and innovation performance, measured as administrative and technological innovation. Thus, future research is required.

On the other hand, Liao and Wu (2010) found that organisational learning capabilities (management commitment, system perspective, openness and experimentation, and knowledge transfer and integration) contribute to the success of KM practices (knowledge acquisition, knowledge conversion, and knowledge application), which in turn leads to the creation of innovation (behaviour innovation, product innovation, process innovation, market innovation, and strategic innovation). The results indicate that all the direct and indirect relationships among variables were significant and positive. Further studies are needed in this area. In addition, Sanz-Valle *et al.* (2011) explored the mediating role of organisational learning (knowledge acquisition, knowledge distribution, knowledge interpretation, and organisational memory) on the relationship between organisational culture (adhocracy culture) and technological innovation (product and processes innovation). They found that adhocracy culture has an indirect significant and positive effect on technological innovation through the mediating role of organisational learning. Meanwhile, hierarchy culture has an indirect significant and negative effect on technological innovation through the mediating role of organisational learning. The researchers recommended further research in this area.

In general terms, Brachos *et al.* (2007) indicated that few studies have examined the relationships among organisational context, knowledge transfer, and innovation. The results indicate that organisational factors, which include trust, motivation to transfer knowledge, management support, and learning orientation, have a significant and positive effect on knowledge transfer in order to enhance innovation. Similarly, Rhodes *et al.* (2008) stated that a lack of substantial empirical studies exist that have examined the relationships between critical organisational factors of knowledge transfer strategies and innovation. They noted that the information technology systems, learning strategies, trust culture, and flexible structure and design can play a vital role in enhancing innovation. However, the results indicate that only information technology systems have a significant and positive related to innovation capability. The researchers suggested examining these factors among different sectors and cultures.

As with causal ambiguity, there is generally a lack of understanding of the relationship between CSFs of KM and innovation from a comprehensive view. Thus, an agreement exists among previous studies investigating the effects of CSFs of KM (human resource management, information technology, leadership, organisational learning, organisational strategy, organisational structure, and organisational culture), as a part of KM implementation, on innovation in the Iraqi MTS.

2.5.1.2 Knowledge Management Strategies and Innovation

The second category is related to the relationship between KMSs and innovation. In general, the literature indicates two strategies of KM (i.e. codification and personalisation). Darroch and McNaughton (2002) emphasized that increased innovation requires different knowledge resources and, hence, different KMSs.

In this context, Majchrzak, Cooper, and Neece (2004) demonstrated that the KM implementation is a strategy to improve innovation. They recommended a significant and positive effect of explicit knowledge reuse (which considered a codification strategy) on radical innovation. In the same vein, Rhodes *et al.* (2008) argued that the effect of codification and personalisation strategies that regarded as a knowledge transfer strategy leads to enhanced innovative capabilities, including product innovation and process innovation. According to the results, only the personalisation strategy is significantly and positively related to product innovation and process innovation. Due to the lack of empirical studies investigating the relationship between KMSs and innovation, the researchers suggested that further research be conducted in other industries, which the present study does.

As the discussion thus far indicates, few researchers have attempted to analyse in depth the relationship between KMSs and innovation; consequently, this relationship is not yet well understood. Furthermore, previous studies concur that the effects of KMSs, as part of KM implementation, on innovation need to be examined. The present study examines these effects in the Iraqi MTS.

2.5.1.3 Knowledge Management Processes and Innovation

The third category focuses on the relationship between KMPs and innovation. The literature identifies five KMPs: knowledge creation, knowledge organisation, knowledge storage, knowledge sharing, and knowledge utilisation.

On this point, Chang and Lee (2008) argued that enhancing administrative and technological innovation could stem from knowledge accumulation capability, which includes accumulation, storage, obtainment, selection, expansion, and establishment. The results indicate that only knowledge storage has a significant positive effect on administrative innovation whereas only knowledge obtainment significantly affects technological innovation. Further studies are needed to verify the generalisability of these findings.

From the RBV perspective, Darroch and McNaughton (2002) revealed the lack of empirical studies examining the relationship between KM and innovation types. According to the researchers, the effective radical and incremental types of innovation are changed and destroyed depending on the effectiveness of KMPs (i.e. acquisition, dissemination, and responsiveness). Knowledge acquisition and knowledge responsiveness were shown to have a significantly positively affect whereas knowledge dissemination did not affect innovation, contrary to what the researchers hypothesised. Because of this finding, the researchers recommended further research to confirm the results obtained. Jantunen (2005) further emphasized that an organisation can be more innovative when it can create new knowledge. Few empirical studies have been conducted regarding the effect of KMPs on organisational innovation from the RBV perspective; thus, Jantunen measured KMPs in terms of acquisition, dissemination, and utilisation to enhance innovation in the organisation. According to the results, knowledge acquisition and knowledge dissemination have a positive effect on innovation activities, although the effect is not significant; meanwhile, knowledge utilisation has a significant and positive effect on innovation activities. Thus, it is clear that future studies should be conducted to re-examine the relationship between KMPs and innovation. Furthermore, Jantunen recommended that the results needed further verification through empirical research. In the same way, Darroch (2005) examined the relationship between KMPs and innovation types from the RBV perspective. KMPs were measured as knowledge acquisition, dissemination, and responsiveness. For innovation, the measure focused on radical innovation and incremental innovation. The results indicated that the effectiveness of KMPs is an important factor for more innovation. The KMPs appear to have a significantly positively affect on innovation.

Using KBV perspective, Tan and Nasurdin (2010) argued that the best way to improve technological innovation (product innovation and process innovation) is to continually enhance the effectiveness of KMPs (acquisition, sharing, and application). However, the study results show that only knowledge acquisition effectiveness was found to have a significant positive effect on product innovation. Huang and Li (2009) also used the KBV perspective to indicate that KMPs have a significant and positive relationship with administrative and technological innovation. Further research is required in the service sector as well as related to organisational factors or other KMPs.

On the other hand, Ju *et al.* (2006) developed a strategic contingency model to investigate the relationship between KMPs and innovation. They found a statistically significant and positive effect of KMPs (acquisition, conversion, and application) on organisational innovation, measured in terms of product innovation and process innovation. They also suggested applying this model to different industries and under different cultural environments.

In general terms, Wei and Xie (2008) highlighted the role of KMPs in increasing innovative capability. The results showed that acquisition, integration, exploitation, and protection of knowledge have a significant and positive effect on organisational innovative. Future studies should be conducted to test these factors with other samples. In the same manner, Liao and Wu (2010) examined the relationship between KM practices and organisational innovation. The results indicated that KM practices, which include knowledge acquisition, knowledge conversion, and knowledge application, have a significant and positive related to organisational innovation, which includes behaviour innovation, product innovation, process innovation, market innovation, and strategic innovation. Moreover, Jiang and Li (2009) investigated the relationship between knowledge sharing and creation and innovation performance, noting the lack of empirical studies that investigated the relationship between KMPs and innovation. They found that knowledge sharing and knowledge creation have a positive and significant relation to innovative performance. In addition, the interaction of knowledge sharing and creation positively and significantly relates to innovative performance. Further studies are needed to confirm the generalisability of these results.

Building on this literature, the bulk of studies provide a somewhat discrepant and uncoordinated picture of the details of the relationship between KMPs and innovation. Previous studies concur with the need to investigate the effects of KMPs, as part of KM implementation, on innovation; thus, present study does so by focusing on the Iraqi MTS context.

In short, based on previous works, it appears that KM implementation is important for creating more innovation (Chang & Lee, 2008; Donate & Guadamillas, 2011; Liao & Wu, 2010; Tan & Nasurdin, 2010). Forcadell and Guadamillas (2002) summarized the relationship between KM and innovation: 'innovation as a goal and KM as a method' (p. 168). Despite the aims of KM in creating, supporting, and enhancing innovation, there is a lack of empirical studies examining the relationship between KM and innovation (Brachos *et al.*, 2007; Darroch & McNaughton, 2002; Jantunen, 2005; Jiang & Li, 2009; Lin, 2007; Rhodes *et al.*, 2008; Sáenz *et al.*, 2009). Moreover, it is extremely rare for empirical studies to examine the relationship between KM implementation (CSFs of KM, KMSs, and KMPs) and innovation in one study. Thus, the researcher is motivated to realize the nature of the relationships among these variables in the Iraqi MTS. Table 2.17 summarizes the key empirical evidence on the effect of KM on innovation.

Table 2.17

Previous Empirical Studies of the Relationship between Knowledge Management and Innovation

Author and year	Independent Variable	Dependent Variable	Area	Country/ Respondent	Findings
Darroch and McNaughton (2002)	KMPs	Innovation Types	Different sectors	Australia & New Zealand/443 Top managers	Mixed results
Gloet and Terziovski (2004)	KM practices	Innovation performance	Manufacturing industry	Australian & New Zealand/70 Top managers	Mixed results
Darroch (2005)	KMPs	Innovation Types	Different sectors	New Zealand/433 Top managers	Significant positive related
Jantunen (2005)	Knowledge processing capabilities	Innovation performance	Different industries	Finland/299 Top managers	The results of dissemination did not appear to be significant
Ju *et al.* (2006)	KM capability	Organisational innovation	Different industries	China/217 KM Managers	Significant positive effect
Lin (2007)	Knowledge sharing	Innovation capability	Different industries	Taiwan/172 Employees	Significant positive effect
Brachos *et al.* (2007)	Knowledge transfer	Innovation process (new product and services)	ICT, pharmaceutical , and food companies	Greece/295 Mid-level managers and line management	Significant positive related
Chang and Lee (2008)	Knowledge accumulation capability	Innovation types	Different sectors	China/129 Top managers	Only knowledge storage has a significant positive effect on administrative and knowledge obtainment significantly affects technological innovation
Rhodes *et al.* (2008)	Knowledge transfer strategies	Innovation capability	Technological firms	Taiwan/233 Top managers	The results of codification did not appear to be significant
Wei and Xie (2008)	KMPs	Organisational innovation	Different sectors	China/205 Top managers	Significant positive effect
Chen and Huang (2009)	KM capacity	Innovation performance	Different sectors	Taiwan/147 Top managers	Significant positive related
Huang and Li (2009)	KMPs	Innovation Types	Different sectors	Taiwan/167 Managers	Significant positive related
Jiang and Li (2009)	Knowledge sharing and creation	Innovation performance	Different sectors	German/127 Top managers	Significant positive related
Liao and Wu (2010)	KMPs	Organisational innovation	Manufacturers and financial firms	Taiwan/327 Top managers	Significant positive related
Tan and Nasurdin (2010)	KMPs	Technological innovation	Manufacturing industry	Malaysia/171 Top managers	Only knowledge acquisition has a significant and positive related to product innovation
Donate and Guadamillas (2011)	KM practices	Innovation performance	Different industries	Spain/111 Top managers	Significant positive effect

2.5.2 Knowledge Management and Organisational Performance

The main objective in this section is to highlight studies that investigated the relationship between KM and OP. These studies can be classified into three categories depending on the core requirements of KM implementation: (1) the relationship between CSFs of KM and OP; (2) the relationship between KMSs and OP; and (3) the relationship between KMPs and OP.

2.5.2.1 Critical Success Factors of Knowledge Management and Organisational Performance

The studies in the first category focus on the relationship between CSFs of KM and OP. The literature identifies seven CSFs of KM: human resource management, information technology, leadership, organisational learning, organisational strategy, organisational structure, and organisational culture. These factors are important for successful KM implementation in order to improve OP.

Gold *et al.*'s (2001) model is probably the most widely cited theory in the recent literature of KM for exploring the relationship between CSFs of KM and OP. The results indicated that CSFs of KM comprise technology, organisational culture, and organisational structure, which are positively related to organisational effectiveness. This approach has the benefit of allowing researchers to focus on the main factors of improving OP. Gold *et al.* ultimately recommended that further studies be done within different countries and sectors.

Using the RBV and KBV theories, Anderson (2009) identified three CSFs of KM (i.e. culture, structure, and technology) to help increase the capabilities of organisations. He showed that CSFs of KM have a significant and positive relation to organisations' capabilities. However, the results highlight the need for more studies. In the same manner, Asoh *et al.* (2007) found a significant and positive relationship between CSFs of KM and OP from RBV and KBV theories' perspectives. The CSFs of KM were technology, leadership, culture, and measurement. They also pointed out the need for more studies on the relationship between CSFs of KM and OP with a bigger sample size. Zheng *et al.* (2010) also proposed that structure, culture, and strategy are significant success factors for KM effectiveness to achieve high OP. The results demonstrate that organisational culture, structure, and strategy all have a significant and positive effect on organisational effectiveness mediated by KM effectiveness. They recommended that further exploration is needed by integrating RBV and KBV theories so that understanding about how knowledge resources in an organisation can be utilized to achieve high OP.

From the KBV perspective, Tsai and Li (2007) indicated that the OP can be viewed as an outcome of knowledge creation processes that depend on the effectiveness of the organisational strategy. The results suggest that new venture strategy is significantly and positively related to socialization, externalization, combination, and internalization. In addition, the results show that new venture strategy is significantly and positively related to new venture performance. Moreover, the results supported the mediating role of the knowledge creation process, which has a significant positive effect on the relationship between new venture strategy and new venture performance. Researchers have called for further studies to investigate the effects of other organisational factors on the knowledge creation process in order to improve OP.

Yang *et al.* (2009b) also used the KBV perspective to perceive CSFs of KM as the heart of OP improvement. The results highlighted the significant positive effect of culture, structure, and information technology of CSFs of KM on the OP, which include innovation, financing, and service. However, the researchers also noted that a gap in the literature exists with regards to the effects of CSFs of KM on OP. Thus, they recommended that further studies be undertaken to investigate the relationship between CSFs of KM with OP as well as studies to investigate the relationship between KM resources and process with OP.

Further, Lin and Kuo (2007) argued that the existence of an organisation depends on the best practices of human resource management (including workflow, training and development, staffing, appraisal, and rewards and compensation) in order to increase KM capabilities (including capturing and creating knowledge, sharing knowledge, and learning and improving), which can contribute towards achieving high OP (including human resource performance and market performance). According to the results, the human resource management practices have significant and positive indirect effects on OP through KM capabilities. nI addition, the results indicated that the KM capabilities have significant and positive direct effects on OP. The researchers recommended further studies in this area.

In a similar vein, Ho (2008) argued that the success of any organisation depends on self-directed learning (including self-recognition, fondness for learning, active learning, and continuous learning) in order to develop KM capabilities (including capturing and creating knowledge, sharing knowledge, and learning and improving) and organisational learning activities (including information-sharing patterns, inquiry climate, learning practices, and an achievement mindset), which affect the improved OP (including financial performance and market performance). Therefore, the results demonstrate that self-directed learning has significant and positive indirect effects on OP through KM capabilities and organisational learning. Further studies in this area are warranted. Chong *et al.* (2009) argued that the business strategy, organisational structure, KM team, K-Map, and K-Audit, as CSFs of KM, have a critical effect on OP improvement. The researchers suggested the need for additional future studies in this field in different countries and samples, particularly in the MTS.

Overall, despite the growing body of literature examining the relationship between CSFs of KM and OP, to the researcher's knowledge, no study has yet examined all the CSFs of KM that may have a direct effect on OP improvement. Given the arguments put forth by the researchers discussed thus far, the present study investigates the relationship between CSFs of KM (human resource management, information technology, leadership, organisational learning, organisational strategy, organisational structure, and organisational culture), as part of KM implementation, and OP in the Iraqi MTS.

2.5.2.2 Knowledge Management Strategies and Organisational Performance

The second category of research involves the relationship between KMSs and OP. Two strategies of KM have been identified in the literature: codification and personalisation.

In this context, Schulz and Jobe (2001) mentioned that achieving high results in OP improvement depends on KMSs. Their results showed that business units with a matched codification focus have higher OP than business units with an unmatched codification focus. Moreover, the results indicate that the codification strategy is an important recourse of superior OP. Thus, the researchers suggested that further studies examine the relation between codification strategy and OP. Similarly, Bierly and Daly (2007) emphasized that KMSs play an important role in improving OP from the KBV perspective, but limited studies have sought to examine their effects. The researchers revealed that only exploration strategy (personalisation strategy) has a positive related to OP. Therefore, they suggested that organisations give more attention to applying KMSs and recommended more studies to confirm their results.

In the same vein, Choi *et al.* (2008) noted the lack of empirical studies examining the relationship between KMSs and OP. These researchers examined the interrelationship between KMSs and their effects on OP. KMSs were measured in two dimensions: (i) explicit-oriented (codification strategy) and (ii) tacit-oriented (personalisation strategy). The results supported a complementary relationship between KM focus (i.e. explicit-oriented, tacit-oriented) and KM source (i.e. external-oriented, internal-oriented), which leads to a positive relationship with OP. They further suggested the need for more studies in this area.

Besides, Keskin (2005) explored the relationship between KMSs and OP from the KBV perspective. KM strategies were divided into explicit-oriented (codification strategy) and tacit-oriented (personalisation strategy) strategies based on knowledge characteristics. The results indicate that KMSs have a significant and positive effect on OP (including the organisation's success, market share, growth, profit, innovation, and size); the effect on OP is higher with the explicit-oriented strategy than the tacit-oriented one. In the same manner, Choi and Lee (2003) recommended that the system-oriented (codification strategy) and human-oriented (personalisation strategy) strategy be considered as two critical factors in building a high OP. Yu *et al.* (2006) also explored the relationship between KMSs, including the codification strategy and personalisation strategy with OP, which includes market performance, human resource efficiency, and successful new product/service. The researchers found that codification strategy has a significant and positive effect on OP while personalisation strategy has a significant and negative effect on OP. Further research in this area should focus on more variables in the link between KMSs and OP.

On the other hand, Chong *et al.* (2007, 2009) proposed four types of strategies in the KM literature: culture, leadership, measurement, and technology. They are described as the key issues of KM implementation as they were found to play an important role in improving the overall OP. They recommended that further research be carried out in different countries and using different samples, particularly in the MTS.

Although some empirical studies have examined the relationship between KMSs and OP, the results to date remain uncertain. Based on the arguments discussed herein, the present study investigates the effects of KMSs, as part of KM implementation, on OP in the Iraqi MTS.

2.5.2.1 Knowledge Management Processes and Organisational Performance

The third category aims to discuss studies that examined the relationship between knowledge processes and OP. Based on previous studies, five KMPs can be identified: knowledge creation, knowledge organisation, knowledge storage, knowledge sharing, and knowledge utilisation.

Under this relationship, Gold *et al.* (2001) proposed a model of the relationship between KMPs and organisational effectiveness that has since become one of the most widely cited theories in the KM literature. In this model, they found that KMPs' acquisition, conversion, application, and protection have significant and positive relationships to organisational effectiveness. Further research should be done to confirm the results. In addition, Lee and Lee (2007b) revealed that KMPs are considered a critical part of organisational superiority, which has the ability to achieve OP improvement by enhancing customer performance and financial performance. Therefore, organisations must find ways to implement KM through the activation of all components, generating, accessing, facilitating, representing, embedding, using, transferring, and measuring KMPs. The study identified a significant and positive relationship between KMPs and OP. Further research is required in this area.

In a similar vein, Ho (2008) argued that survival of an organisation crucially depends on the effectiveness of KM capabilities (including capturing and creating knowledge, sharing knowledge, and learning and improving) in order to improve OP (including financial performance and market performance). Consequently, the results indicate that the KM capabilities have a significant and positive direct effect on OP. Further study of this issue was recommended. Fugate *et al.* (2009) also noted that improvement in the overall OP comes from effective KMPs. They found that knowledge interpretation, knowledge responsiveness, and knowledge dissemination are positively related to OP. The researchers further pointed out the need for more studies in this area.

Moreover, Omerzel (2010) argued that KMPs are important for improving OP. According to their results, the KMPs consisting of acquisition, storage, transfer, use, and measure for knowledge have a significant and positive effect on OP consisting of profitability and growth. They also recommended that further research be undertaken. Meanwhile, Chang and Chuang (2011) proposed that KMPs are an appropriate instrument for OP improvement. They determined that four main elements of KMPs (knowledge choice, knowledge access, knowledge storage, and knowledge sharing) have a significant and positive effect on OP measured as financial and non-financial performance. The researchers recommend that further research should focus on other activities and investigate accordingly.

According to the RBV and KBV theories' perspectives, Asoh *et al.* (2007) found a significant and positive relationship between KMPs (i.e. identification, elicitation, dissemination, and utilisation) and OP. They also pointed out the need for more studies on the relationship between KMPs and OP, using a bigger sample size. Liao and Wu (2009) explored the relationship between KMPs and OP from the RBV perspective. They determined that OP, measured in terms of financial, market, and partnership, depends on the effective implementation of KMPs, which consist of three processes: acquisition, conversion, and applications. In this regard, the results indicate that KMPs have a significantly positively effect on OP.

Alternatively, Darroch (2005) hypothesised that three KMPs (i.e. knowledge acquisition, knowledge responsiveness, and knowledge dissemination) could improve OP from the RBV perspective. According to the results, only knowledge responsiveness has a positive and significant effect on financial performance. Whilst both acquisition and dissemination did not positively affect financial performance. More studies are needed to confirm these results. In accordance with the RBV and KBV theories' perspectives, Anderson (2009) found that KMPs, measured in terms of acquisition, application, conversion, and protection, have a positive relationship with organisational effectiveness. The process of knowledge acquisition and application also appeared to be significant components of organisational effectiveness, although the processes of knowledge conversion and protection did not appear to be significant components of organisational effectiveness. As a result, Anderson suggested conducting future studies to examine the role of KMPs at the team level or business units in successful KM.

Furthermore, Zack *et al.* (2009) stressed that KM has emerged as greater attention has focused on the direction of OP improvement from RBV and KBV theories' perspectives. Nevertheless, the researchers found a serious gap in the literature in terms of the relationship between KM and OP due to the lack of empirical evidence. The results of the study show that KM practices (i.e. the ability to locate and share existing knowledge, the ability to experiment and create new knowledge, a culture that encourages knowledge creation and sharing, and a regard for the strategic value of knowledge and learning) positively relate to OP (i.e. customer intimacy, operational excellence, and product leadership). In addition, a positive relationship exists between KM practices and financial performance, but it was not statistically significant. Apart from that, the organisations need to realign their ‘‘KM mindset’’ and perceptions about how KM practices can enable the organisation to improve OP. Without these, many KM practices might fail. The researchers suggested that further studies be conducted with different samples and cultures. Moreover, Mills and Smith (2011) also examined the relationship between KMPs and OP from the RBV perspective. Their results suggested that the KMPs consisting of acquisition, application, and protection have a significant and positive relationship with OP. Knowledge conversion capability was also positively related to OP, but was not significant. Future researches should examine the relationship between the individual capabilities that make up knowledge resources and OP in specific detail.

In the particular MTS context, Chong *et al.* (2009) asserted that the successful achievement of overall OP is based on the actual application of KMPs. They demonstrated vital relationships among construction, embodiment, and deployment as KMPs and OP improvement. Due to the limited number of studies that examine theses variables in the MTS environment, these researchers suggested the need for additional research in different countries and samples, particularly in the MTS.

In the same vein, Marqués and Simón (2006) mentioned that KM capabilities consist of six interrelated processes: orientation towards the development, transfer, and protection of knowledge; continuous learning in the organisation; an understanding of the organisation as an overall system; development of an innovative culture to encourage R&D projects; an approach based on individuals; and competence development and management based on competences. These authors indicated that knowledge is not only an important resource for an OP improvement, but also serves as a basic source of survival organisation. Therefore, KM capabilities have a significant and positive relationship to OP. However, very few studies have examined the relative contribution of these variables in the MTS environment. Thus, the researchers also recommended that further studies include different samples and cultures, particularly in the MTS.

From a practical point of view, as with causal ambiguity, a lack of mutual understanding exists regarding the logical linkages between KMPs and OP. Previous studies support the re-examination of the effects of KMPs, as part of KM implementation, on OP in the Iraqi MTS.

Although the main aim of KM implementation is the improvement of OP, studies examining the relationship are still unintelligible (Bierly & Daly, 2007; Choi *et al.*, 2008). In addition, limited studies have investigated the relationship between successful KM implementation and the improvement of OP (Shahrokhi, 2010), particularly in the telecommunications sector (Chong *et al.*, 2009; Marqués & Simón, 2006). Therefore, a large gap still exists in the literature between KM and OP (Yang *et al.*, 2009b; Zack *et al.*, 2009). Moreover, very few studies have investigated the relationship between KM implementation (CSFs of KM, KMSs, and KMPs) and the Balanced Scorecard (BSC) indicators of OP measurement. Hence, the present study aims to realize the nature of the relationship between these variables in the Iraqi MTS. Table 2.18 summarizes the significant findings of empirical studies that have examined the relationship between KM and OP.

Table 2.18

Previous Empirical Studies of the Relationship between Knowledge Management and Organisational Performance

Author and year	Independent Variable	Dependent Variable	Area	Country/ Respondent	Findings
Gold *et al.* (2001)	CSFs of KM and KMPs	Organisational effectiveness	Different sectors	U.S/323 Top managers	Significant positive related
Keskin (2005)	KMSs	Organisation's success, market share, growth, profit, innovation, and size	SMEs	Turkey/128 Mid-level managers	Significant positive effect
Darroch (2005)	KMPs	Financial performance	Different sectors	New Zealand/443 Top managers	Only knowledge responsiveness has a positive significant affect OP
Marqués and Simón (2006)	KM practices	Capital profitability, growth, operational and financial efficiency, stakeholder satisfaction and competitive position.	Telecommunications	Spain /222 Top managers	Significant positive related
Yu *et al.* (2006)	KMSs	Market performance, human resource efficiency, and successful new product/ Service	Different enterprises	China/223 Top and mid-level managers	Mixed result
Lin and Kuo (2007)	KM capabilities	Human resource performance and market performance	Financial training centers	Taiwan/553 Mid-level managers	Significant positive effect
Bierly and Daly (2007)	KMSs	OP	Small manufacturing firms	U.S./98 Top managers	Only exploration strategy has a positive relation to OP
Asoh *et al.* (2007)	KM index (KMI) - KM CSFs - KMPs	OP	Private and public companies	U.S. and European/100 Top and mid-level managers	Significant positive related
Tsai and Li (2007)	Knowledge creation processes	New venture strategy and new venture performance	Different sectors	Taiwan/165 Top managers	Significant positive related
Lee and Lee (2007b)	KM capabilities and KMPs	Customer performance and financial performance	Different sectors	Korean/223 Mid-level managers	Significant positive related

Table 2.18 *(continued)*

Ho (2008)	KM capabilities	Financial performance and market performance	Technological companies	Taiwan/236 Top and mid-level managers	Significant positive effect
Choi *et al*. (2008)	KMSs	OP	Different sectors	Korea/115 Mid-level managers	Positive related
Anderson (2009)	CSFs of KM and KMPs	Organisations' capabilities	Different industries	Canada/250 Employees	The results of conversion and protection did not appear to be significant
Zack *et al.* (2009)	KM practices	Customer intimacy, operational excellence, and product leadership	Different industries	Canada, U.S., and Australia/88 Senior and mid-level managers	No significant related to financial performance
Fugate *et al*. (2009)	KMPs	OP	Manufacturing industry	U.S./ 336 Top mid-level managers	Significant positive related
Liao and Wu (2009)	KMPs	Financial, market, and partnership	Manufacturing and financial sectors	Taiwan/327 Top managers	Significant positive related
Yang *et al.* (2009b)	CSFs of KM	Innovation, financing, and service	Shipping companies and agencies	Taiwan/83 Top managers	Significant positive effect
Zheng *et al*. (2010)	KM effectiveness	Organisational effectiveness	Service sector, manufacturing, and agricultural sector	U.S./384Human resources professionals	Significant positive effect
Omerzel (2010)	KMPs	Profitability and growth	Small- and medium-sized companies	Slovenia/1300 Owners and top managers	Significant positive related
Chang and Chuang (2011)	KMPs	Financial and non-financial performance	Different sectors	Taiwan/ 135 Managers and employees	Significant positive effect
Mills and Smith (2011)	KMPs	OP	Service sector and manufacturing	Jamaica/189 Management-level staff	Only knowledge conversion was positive related to OP but not significant

2.5.3 Innovation and Organisational Performance

The main objective of this section is to highlight the studies that have investigated the relationship between OP and innovation. According to Neely, Filippini, Forza, Vinelli, and Hii (2001), examining the relationship between OP and innovation is important in the development of an organisation's business because innovation has the potential to improve the overall OP (Marchington & Wilkinson, 2003). Hence, organisations need to strive for innovation (Carmen & José, 2008; Damanpour *et al.*, 2009; Li *et al.*, 2006; Lin & Chen, 2007).

In this regard, Damanpour *et al.* (2009) asserted that the relationship between innovation and OP is complex. They explored the relationship between innovation types (service, technological process, and administrative) and OP. The results indicated that types of innovation have a significant and positive effect on OP. Moreover, the results suggested that this relationship still needs to be explored. Ho (2010) also studied the relationship between innovation types and OP, where innovation types were technological, administrative, and market innovation while OP was measured in terms of financial and market performance. The results indicated that innovation had a significant and positive effect on OP. Furthermore, administrative innovation was found to be important in explaining financial performance while market innovation was found to be a key component of market performance. Further, Salim and Sulaiman (2011) also studied the relationship between innovation (measured as technology, market, and administration) and OP (measured in terms of both market and financial metrics). The research found that organisational innovation has a significant and positive influence on OP. Meanwhile, Chen, Liu, and Wu (2009) investigated the relationship between the types of innovation (measured as innovation in technological and administration) and OP, providing evidence that innovation has a positive and significant effect on OP. They suggested that future research should expand the scope of the sample.

According to RBV and innovation theories, Li *et al.* (2006) suggested that an interesting relationship exists between technological innovation and OP improvement. The results further showed a significant and positive effect of technological innovation on OP. Further studies should examine the effect of other innovation types, such as radical innovation and incremental innovation, on OP. Based on this recommendation, Lin and Chen (2007) indicted that innovation is considered to be a key driver to performance of contemporary organisations. They subsequently studied the innovation types and their effect on OP. The study found that radical innovation and incremental innovation are positively related to company sales. In addition, incremental innovation has emerged as the most important factor in explaining company sales rather than technological innovations. Consistent with these findings, García-Morales *et al.* (2008) stressed the importance of congruence between innovation capabilities, including a number of new products, processes, and ideas developed and marketed by the organisation, and OP, which was measured as a return on sales, return on equity, return on assets, and market share. These authors found that innovation capabilities have a significant and positive effect on OP. They suggested further studies in this area, particularly related to organisational technology. Eshlaghy and Maatofi (2011) also analysed the impact of organisational innovation on OP, including profitability, sale, and ROI, finding a significant and positive association between organisational innovation and OP. Further studies in this area are required.

Scholars generally seem to agree that innovation has a positive effect on OP. However, the relationship between innovation and organisational performance still needs additional studies because a persistent gap exists in the performance theory of profit and non-profit organisations due to external and internal environmental changes. The gap in performance is the variation between actual performance and expected performance in the organisation. Since innovation leads to OP improvement, innovation is critical for reducing the performance gap (Damanpour *et al.*, 2009).

In particular, the present study contributes to prior studies by investigating the direct relationship between innovation (i.e. technological, administrative, radical, and incremental innovation) and OP (i.e. financial perspective metrics, customer perspective metrics, internal process perspective metrics, and learning and growth perspective metrics) in the Iraqi MTS context. Table 2.19 summarizes the empirical evidence demonstrating that innovation has a positive effect on OP.

Table 2.19
Previous Empirical Studies of the Relationship between Innovation and Organisational Performance

Author and year	**Independent Variable**	**Dependent Variable**	**Area**	**Country/ Respondent**	**Findings**
Li *et al.* (2006)	Technological innovation	OP	Technological firms	China/194 Top managers	Significant positive related
Lin and Chen (2007)	Innovation types	Company sales	SMEs	Taiwan/107 Top and mid-level managers, and employees	Positive related
García-Morales *et al.* (2008)	Organisational innovation	Return on sales, return on equity, return on assets, and market share	Pharmaceutical	Europe & America/164 Top managers	Significant positive effect
Chen *et al.* (2009)	Innovation types	OP	Different sectors	China/325 Top managers	Significant positive effect
Damanpour *et al.* (2009)	Innovation types	OP	Public service organisations	UK/378 Top managers	Significant positive effect
Ho (2010)	Innovation types	Financial and market performance	Electronic industry	Taiwan/412 Top mid-level managers	Significant positive effect
Eshlaghy and Maatofi (2011)	Organisational innovation	Profitability, sale, and ROI	Small firms	Iran/82 Top managers	Significant positive effect
Salim and Sulaiman (2011)	Innovation types	Financial and market performance	ICT industry	Malaysia/150 Top managers	Significant positive effect

2.5.4 Possible Mediating Role of Innovation

The present study considers innovation as a mediating variable between core requirements of KM implementation and OP. To build a consistent argument, this section will provide previously made arguments that are consistent with the researcher's opinion about the choice of innovation as a mediating variable to improve OP (see Table 2.20).

In this way, Calantone *et al.* (2002) argued that learning is an important driver of innovation to improve OP. To enable organisations to innovate effectively, scholars have contended that the main factors of effective learning be considered. It has been shown that commitment, shared vision, open-mindedness, and shared knowledge have a positive effect on learning, which in turn affects innovation. Innovation also has a positive effect on OP improvement. Furthermore, other factors that affect innovation should be studied to improve OP; this is what the present study examines. Moreover, Aragón-Correa *et al.* (2007) investigated the effect of organisational learning on innovation in order to improve OP. They found that organisational learning has a positive and statistically significant effect on OP through innovation. They recommended that future studies look into the effects of other factors on organisational innovation to improve OP. In addition, García-Morales *et al.* (2007) revealed that personal factors have a positive indirect effect through innovation capability on OP. Various innovation capabilities, which include new products or services and new production processes, have positive direct effects on OP, measured as profitability of the economy and financial percentage of profits, market share, satisfaction of employees, acquiring capacity, and knowledge sharing. They pointed out that the effect of innovation on OP may differ from one organisation to another depending on the characteristics and performance measurement of the organisation. Therefore, the relationship between innovation and OP is still important for contemporary organisations. Additionally, the further studies are needed to examine the effect of other important factors on innovation to improve OP. Akgün *et al.* (2009) also examined the mediating role of innovation, measured as product and processes, on the relationship between expressive capability and OP. The results indicate that emotional capability has a positive direct effect on innovation, which in turn has a positive direct effect on OP. These researchers also suggested conducting further studies in this area.

Building on the RBV perspective, Camisón and López (2010) stressed that the issue of the relationship between the factors affecting innovation to improve OP still ranks first. They also indicated that a large gap exists in the empirical studies concerning this area. They argued that manufacturing flexibility has an indirect effect by generating innovation capabilities on OP improvement. The results showed the significant and positive effect of manufacturing flexibility on innovation (product, process, and organisational innovation), which in turn positively affects OP (economic and satisfaction performance). Nevertheless, the researchers suggested the need to examine the effect of other factors on innovation to improve OP.

Based on these recommendations, the present study examines how KM implementation (CSFs of KM, KMSs, and KMPs) can improve OP through innovation. In general terms, previous empirical studies have demonstrated that some characteristics of innovative organisations such as a clear mission and competitive ability are not enough to improve OP (Aragón-Correa *et al.*, 2007; Darroch, 2005;

Roper & Love, 2002); however, other factors, such as organisational learning, personal factor, expressive capability, and manufacturing flexibility, were found to have a direct effect on innovation and, consequently, OP (Akgün *et al.*, 2009; Aragón-Correa *et al.*, 2007; Calantone *et al.*, 2002; Camisón & López, 2010; García-Morales *et al.*, 2007).

Table 2.20
Previous Empirical Studies that Examine the Mediating Role of Innovation

Author and Year	Independent Variable	Mediating Variable	Dependent Variable	Future Research Recommendations
Calantone *et al.* (2002)	Organisational learning	Innovation	OP	Other factors that affect innovation should be studied to improve OP.
Aragón-Correa *et al.* (2007)	Organisational learning	Organisational innovation	OP	Future studies look into the effects of other factors on organisational innovation to improve OP.
García-Morales *et al.* (2007)	Personal factors	New products or services and new production processes	Profitability	Further studies are needed to examine the effect of other factors on innovation to improve OP.
Akgün *et al.* (2009)	Expressive capability	Product and processes innovation	OP	Further studies are required in this area.
Camisón and López (2010)	Manufacturing flexibility	Innovation capabilities	Economic and satisfaction performance	Further studies are required to examine the effect of other factors on innovation to improve OP.

Based on the above, investigating the mediating role of innovation on the relationship between KM and OP in contemporary organisations is still relevant for two reasons. First, OP improvement depends on the factors that have a direct effect on innovation (Aragón-Correa *et al.*, 2007; García-Morales *et al.*, 2007; Li *et al.*, 2006). Second, there are few studies in the field of innovation, particularly those that determine the significant factors that influence directly innovation to improve OP (Akgün *et al.*, 2009; Aragón-Correa *et al.*, 2007; Calantone *et al.*, 2002; Camisón & López, 2010; García-Morales *et al.*, 2007). Thus, researchers contend that it is now appropriate to consider the effect of the main drivers of effective innovation, thereby justifying the examination of the mediating role of innovation on the relationship between KM implementation (CSFs of KM, KMSs, and KMPs) and OP in the Iraqi MTS context.

In a sense, although knowledge is a strategic source for innovation and OP improvement (Nonaka & Takeuchi, 1995), empirical studies linking KM, innovation, and OP are scarce (Darroch, 2005; Darroch & McNaughton, 2003; Lopez-Cabrles *et al.*, 2009; Rhodes *et al.*, 2008). According to some scholars (Darroch, 2005; Rhodes *et al.*, 2008), the large gap in the literature on KM, innovation, and OP warrants the need to understand the complexities in the relationship to realize the nature of the relationships among these paradigms.

In this regard, Darroch and McNaughton (2003) proposed that a KM orientation leads organisations to innovate and perform better from the RBV perspective. The researchers analysed the relationships between KMPs (consisting of knowledge acquisition, dissemination, and responsiveness) and innovation types (radical innovation and incremental innovation) in order to improve OP (financial and non-financial performance). The results indicate that KMPs have a positive and significant relationship to innovation types and OP. The results also indicate that effective KM processes help increase innovation and improve OP. They recommended further studies to examine the possible relationships among KM, Innovation, and OP.

Meanwhile, Darroch (2005) conducted an empirical study to investigate the role of KM as a coordinating mechanism between innovation types and financial performance from the RBV perspective. She examined the relationships among KMPs (i.e. knowledge acquisition, dissemination, and responsiveness), innovation (i.e. radical innovation and incremental innovation), and financial performance (i.e. industry average, profits, market share, and sales growth). The results indicate that effective KMPs help increase innovation and improve OP. In addition, she found that knowledge processes have a positive effect on innovation, but no significant relationship exists between innovation and OP. Moreover, knowledge acquisition and knowledge dissemination did not affect OP. Darroch ultimately revealed that a large gap exists in the literature between the role of KM, resulting in a positive organisational outcome. She suggested conducting further studies to examine the role of KM in achieving the success of organisations.

Similarly, Rhodes *et al.* (2008) considered the critical factors of the organisation for high innovation and OP through knowledge transfer strategies. They showed a significant positive relationship of critical organisational factors (consisting of critical factors of information technology, learning strategies, innovative culture, and flexible structure and design) with knowledge transfer strategies (consisting of strategy codification and personalisation). In addition, only information technology has a significant and positive relationship with innovation capabilities. Furthermore, the personalisation strategy is significantly and positively related to innovative capabilities (consisting of product and process innovation). Innovation capability also has a significant positive relation to OP (consisting of financial and non-financial performance). The researchers revealed that organisations could use the findings in this study to set priorities for allocating resources more effectively in order to optimize the opportunities for better KMSs and OP. This large gap in the

KM research has not been addressed yet. Therefore, the researchers indicated that the relationships between knowledge transfer strategies and OP and between innovation and OP are still unclear. Consequently, they suggested retesting these factors in different industries and cultures, as the present study does. Furthermore, Lopez-Cabrles *et al.* (2009) examined the effect of knowledge-based human resource management practices and collaborative human resource management practices on enhancing innovative and improved OP from the RBV perspective. They indicated that a limited number of previous studies have explained the effective role of employee knowledge and human resource management practices on innovative activities to improve OP. These researchers investigated the mediating role of valuable knowledge between knowledge-based human resource management practices and innovative activities to improve OP. In addition, they investigated the mediating role of unique knowledge between knowledge-based and innovative activities to improve OP. They also investigated the mediating role of unique knowledge between human resource management practices and innovative activities to improve OP. They found that human resource management practices have an indirect effect on innovation through uniqueness of knowledge. In addition, unique knowledge has a positive and a significant effect on innovation activities. Finally, innovative activities have a positive effect on OP. Future research should examine the specific knowledge-based human resource management practices and how they affect innovation and OP.

To recap, although the relationships among KM, innovation, and OP have received considerable attention from researchers and organisations in recent years (Darroch, 2005; Darroch & McNaughton, 2003; Lopez-Cabrles *et al.*, 2009; Rhodes *et al.*, 2008), empirical evidence and a comprehensive view of the relationships among KM, innovation, and OP are lacking. The current research could not find any study that has investigated the direct relationship between KM implementation (i.e. CSFs of KM, KMSs, and KMPs) and OP (i.e. financial perspective, customer perspective, internal process perspective, and learning and growth perspective) as well as the direct relationship between KM implementation and innovation, which includes technological innovation, administrative innovation, radical innovation, and incremental innovation. From the literature review, the present study could not find any research that examined the indirect relationship between KM implementation (CSFs of KM, KMSs, and KMPS) and OP by investigating the mediating role of innovation, particularly in the MTS context. Consequently, the current research is interested in contributing toward this issue by considering it within the Iraqi MTS.

2.5.5 How Does The Present Study Fill the Gaps?

Present study argues for the importance of KM implementation in organisations mainly in the MTS. It is necessary to conduct extensive studies on the influence of the KM implementation on innovation, and OP in the MTS, particularly in the contemporary knowledge-based economy where organisations depend on knowledge as a source to achieve success. In addition, intensive review of the empirical studies shows some gaps in the work of past researchers in KM implementation with regards to the following: (i) the CSFs of KM; (ii) KMSs; (iii) KMPs; (iv) KM implementation and innovation; (v) KM implementation and OP; and (vi) KM implementation, innovation, and OP. Furthermore, a serious gap exists in the literature regarding the important factors that have a direct effect on innovation in order to improve OP. The researcher also found a lack of empirical studies on the above issues especially with respect to understanding them from a comprehensive view of KM implementation (see Figure 2.4). As such, present study is probably the first empirical study that attempts to fill those gaps by taking a comprehensive view to address the relationships among core requirements of KM implementation, innovation, and OP from RBV and KBV theories' perspectives in the Iraqi MTS. Therefore, it offers empirical evidence that will be helpful for the Iraqi MTS to implement KM in order to enhance innovation, which in turn improves OP.

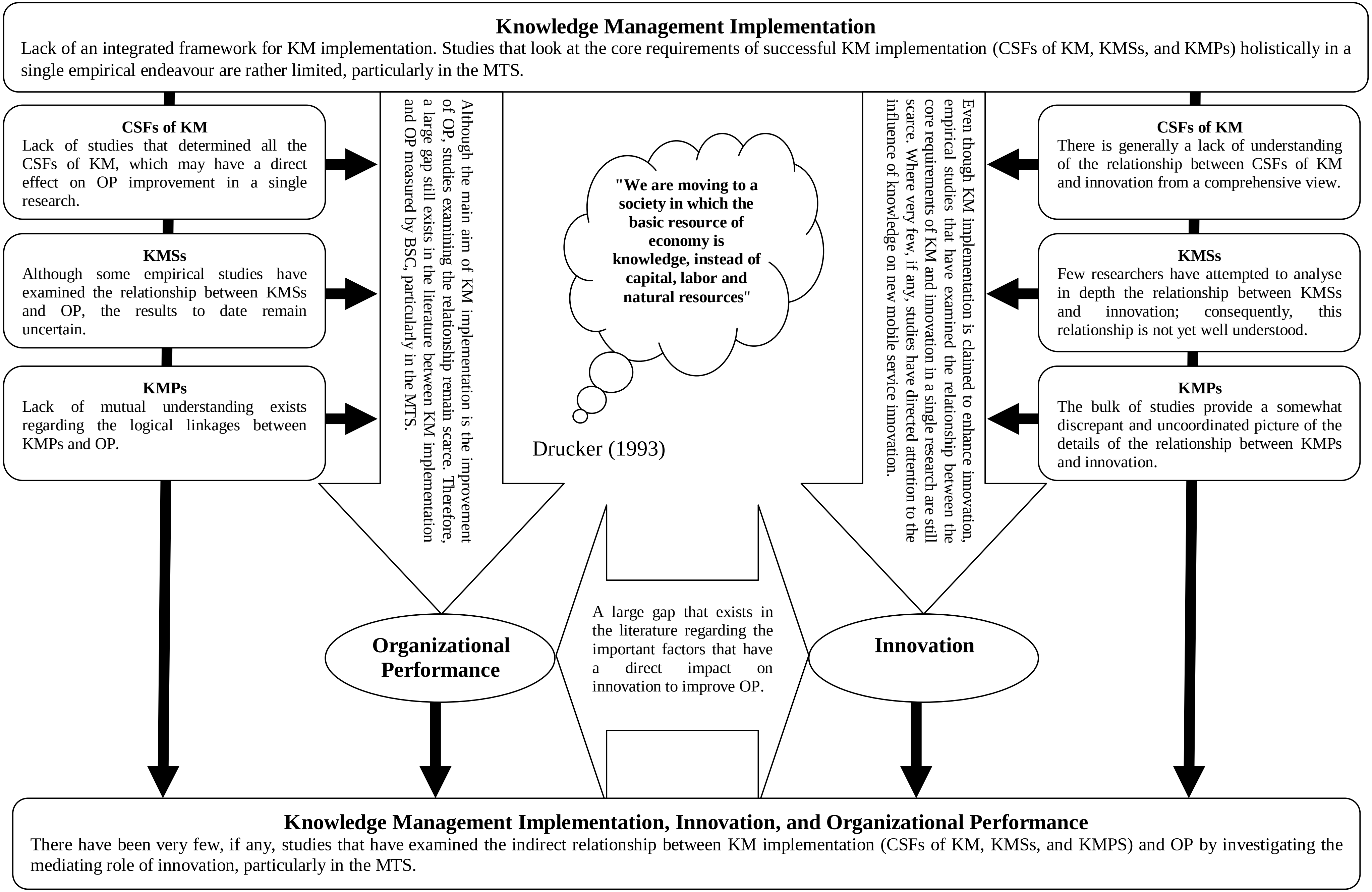


Figure 2.4
Research Gaps

2.6 CHAPTER SUMMARY

This chapter has provided an overview of previous studies focused on core requirements of KM implementation, innovation, and OP in several organisations and sectors. The review of literature confirm that only one way exists to achieve survival, stability, and growth of the organisation in the era of knowledge-based economy—namely, successful KM implementation (CSFs of KM, KMSs, and KMPs). In other words, successful KM implementation will enable sustainability of innovation, which in turn may improve OP. However, the results of previous studies have not been conclusive in this area, resulting in a lack of KM implementation in various sectors, particularly in the MTS. In addition, a large gap that exists in the literature between KM implementation and innovation as well as in empirical studies that have examined the relationship between KM and OP. A lack of empirical studies that have examined the relationship between innovation and OP. Consequently, empirical studies that examined the relationships among KM implementation, innovation, and OP are very rare and incomplete. The interrelationships among these variables, coupled with the fact that studies are limited, have led to the present study, which investigates the relationships among KM implementation, innovation, and OP in the Iraqi MTS from a comprehensive view.

CHAPTER THREE

METHODOLOGY

3.0 INTRODUCTION

The previous chapter has critically and thoroughly reviewed the existing literature related to KM implementation, innovation, and OP. Then, this chapter covers an overview of methodology used to arrive at the logical sequence of the research processes. This chapter consists of sixth sections. The first section introduces the theoretical framework of the study, followed by the second section, which presents the hypotheses/propositions development. The research design, which includes purpose of research, study approach, unit of analysis, identifying population and sample, operational definition, measurement of variables/instrumentation, and questionnaire instrument are presented in the third section. The fourth section outlines the statistical analysis procedures. This is followed by the fifth section, which presents the results of the pre-test and pilot study, respectively. Finally, the sixth section is the chapter summary.

3.1 THEORETICAL FRAMEWORK OF THE STUDY

The theoretical framework is a logical foundation of the interrelationships among several variables (independent, moderating, mediating, and dependent) that are identified through theories and literature review to arrive at good solutions to the problem statement. Moreover, it provides a solid base for developing the hypotheses and measurement instruments (Sekaran & Bougie, 2010).

The present study could not find any integrative framework for the direct relationship between core requirements of KM implementation (CSFs of KM, KMSs, and KMPs) and OP (financial perspective, customer perspective, internal process perspective, and learning and growth perspectives) as well as for the direct relationship between core requirements of KM implementation and innovation (technological innovation, administrative innovation, radical innovation, and incremental innovation). Moreover, for the direct relationship between innovation and OP. Further, for the indirect relationship between core requirements of KM implementation and OP is determined by investigating the mediating role of innovation, particularly in the MTS context (Chong *et al.*, 2009; Darroch, 2005; Rhodes *et al.*, 2008).

Based on the literature review in chapter two, successful KM implementation depends on three core requirements, which are CSFs of KM, KMSs, and KMPs (Ajmal *et al.*, 2010; Anantatmula & Kanungo, 2010; Jafari *et al.*, 2010; Kucza, 2001; McElroy, 2002; McLaughliny & Paton, 2008). More precisely, the CSFs of KM consist of seven dimensions, which are human resource management, information technology, leadership, organisational learning, organisational strategy, organisational structure, and organisational culture (Al-Mabrouk, 2006; Akhavan *et al.*, 2006; Asoh *et al.*, 2007; Chait, 2000; Chong, 2006; Chong *et al.*, 2009; Chourides *et al.*, 2003; Lee & Choi, 2003; Lin & Kuo, 2007; Stankosky & Baldanza, 2001; Tasmin & Woods, 2008). Meanwhile, KMSs consist of two dimensions, namely, codification and personalisation (Edvardsson, 2008; Ewing & West, 2000; Hansen *et al.*, 1999; Greiner *et al.*, 2007; Maier & Remus, 2003; Schulz & Jobe, 2001; Sobahle, 2005; Rhodes *et al.*, 2008; Xie, 2009). In addition, KMPs consist of five dimensions, which are knowledge creation, knowledge organisation, knowledge storage, knowledge sharing, and knowledge utilisation (Alavi & Leidner, 2001; Asare, 2008; Asoh *et al.*, 2007; Bhatt *et al.*, 2005; Gold *et al.*, 2001; Jantunen, 2005; Lawson, 2003; Ling & Shan, 2010; Park, 2006; Singh, 2008; Snis, 2000; Supyuenyong *et al.*, 2009).

The implementation of KM is regarded as an important way to enhance innovation and improve OP (Chong *et al.*, 2009; Razi & Abdul Karim, 2010; Shahrokhi, 2010; Tasmin & Woods, 2008; Zack *et al.*, 2009). According to some scholars (e.g. Birkinshaw *et al.*, 2008 ; Chang & Lee, 2008 ; Sáenz *et al.*, 2009; Roberts, 2008; Yang, 2007), the enhancement of innovation is reflected on the effectiveness of four major types of innovation, which are technological innovation, administrative innovation, radical innovation, and incremental innovation (Edvardsson *et al.*, 2007; Jaspers *et al.*, 2007; Oke, 2007; Picot, 2006). Likewise, BSC measurement including financial perspective, customer perspective, internal process perspective, and learning and growth perspective are considered the best way to measure OP (Chen & Mohamed, 2008; Hongmei & Yujun, 2010; Lee & Lee, 2007b; Visser & Sluiter, 2007; Yu & Liying, 2009).

In essence, the research framework of the present study is developed based on RBV and KBV theories' perspectives (Kiessling *et al.*, 2009; Kim & Gong, 2009; Liao & Wu, 2009; Mehta, 2008). These perspectives generally assert that knowledge leads to enhanced innovation and improved OP (Asare, 2008; Greiner *et al.*, 2007; Kiessling *et al.*, 2009; Pathirage *et al.*, 2007). The framework, based on RBV and KBV theories' perspectives, is conceptualized based on a number of previous studies (Anderson, 2009; Asoh *et al.*, 2007; Bierly & Daly, 2007; Carmen & José, 2008; Chen & Huang, 2009; Damanpour *et al.*, 2009; Darroch, 2005; Fugate *et al.*, 2009;

Liao & Wu, 2009; Li *et al.*, 2006; Lopez-Cabrales *et al.*, 2009; Tan & Nasurdin, 2010; Tsai & Li, 2007; Yang & Kang, 2008; Yang *et al.*, 2009b; Zack *et al.*, 2009).

As contributions to the body of knowledge, the proposed theoretical framework shown in Figure 3.1 describes the causal relationships among five variables of the CSFs of KM, KMSs, KMPs, innovation, and OP. The independent variables in this framework are the CSFs of KM, KMSs, and KMPs. On the other hand, the dependent variable is OP. Innovation acts as the mediating variable between the core requirements of KM implementation and OP. The framework comprehensively takes into account all the pertinent variables that affect OP within the knowledge field in a single study.

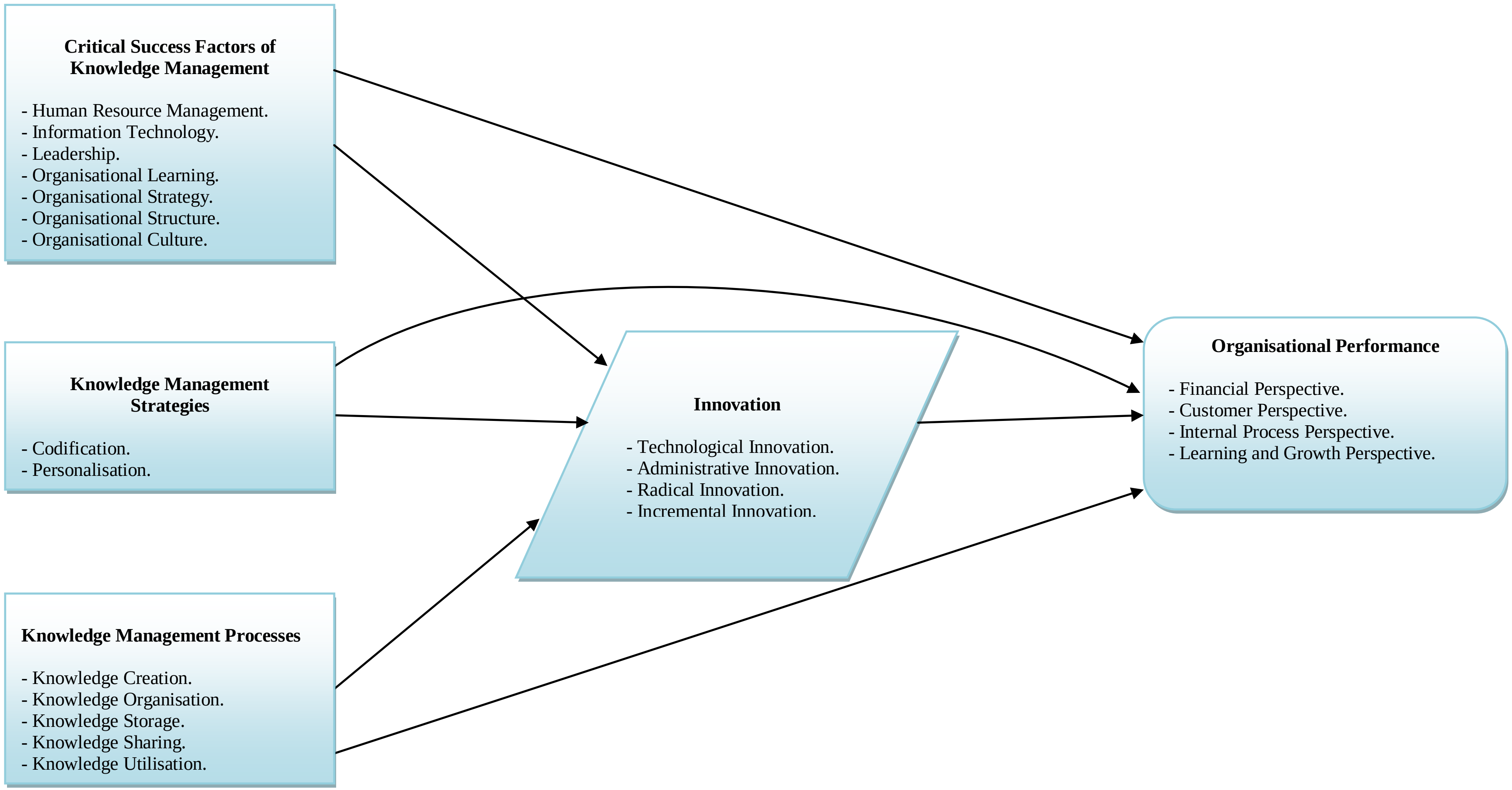


Figure 3.1
Theoretical framework of the study

3.2 HYPOTHESES/PROPOSITIONS DEVELOPMENT

A hypothesis is a formal proposition of the logically guessed relationship between two or more variables, which is based on the theory of theoretical framework that is empirically testable to find the expected solution to the problem statement (Sekaran & Bougie, 2010; Zikmund, Babin, Carr, & Griffin, 2010). The main argument of present study is that successful KM implementation could lead to innovation continuity, which subsequently improves OP. Consequently, there are causal relationships among core requirements of KM implementation, innovation, and OP, which were tested under SEM (see Figure 3.2). In this section, the researcher will provide the literature that supports these relationships together with the development of hypotheses that define the causal relationships. In the development of the hypotheses, the word 'effect' is used to reflect the fact that when there is a change in one variable, it will have impact on the other whenever applicable.

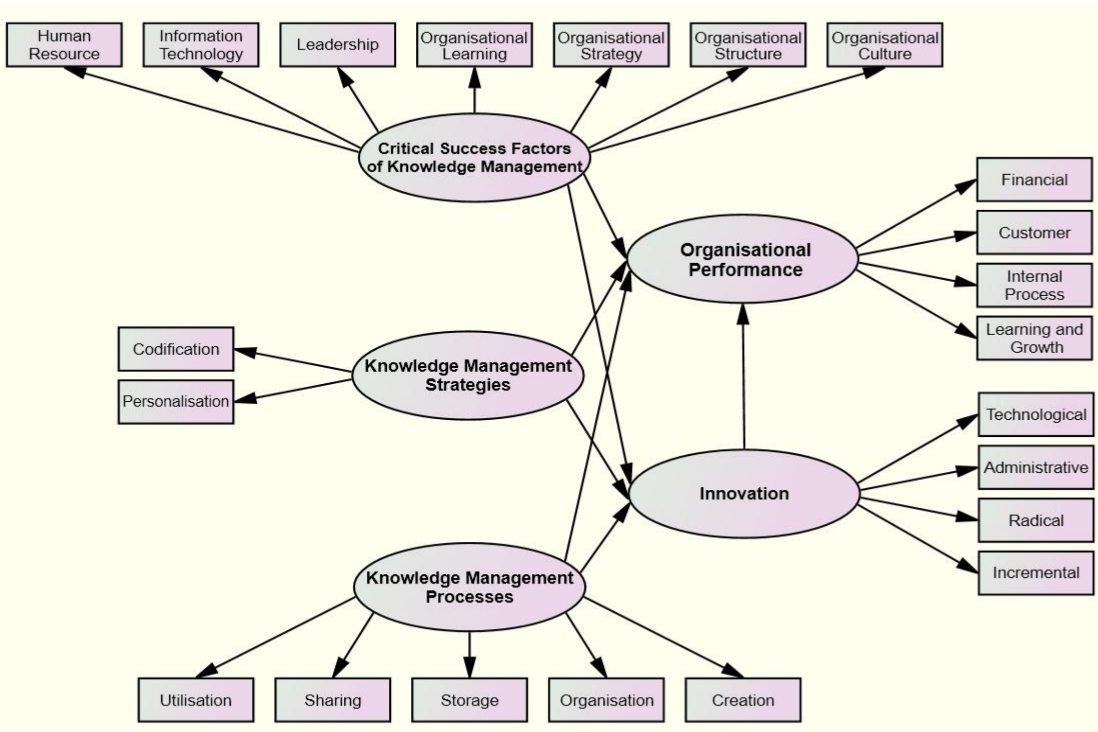


Figure 3.2
Hypothesised Structural Equation Model

3.2.1 The Relationship between Core Requirements of Knowledge Management Implementation and Innovation

In reality, the main aim of KM implementation (CSFs of KM, KMSs, and KMPs) is to enhance innovation (technological innovation, administrative innovation, radical innovation, and incremental innovation). However, there is a lack of empirical studies that examine the relationship between KM and innovation (Brachos *et al.*, 2007; Darroch & McNaughton, 2002; Jantunen, 2005; Jiang & Li, 2009; Lin, 2007; Rhodes *et al.*, 2008; Sáenz *et al.*, 2009). Further, empirical studies that examine the relationship between KM implementation (CSFs of KM, KMSs, and KMPs) and innovation in a single research study are very rare.

In order to identify the nature of the relationship between KM and innovation, a review of the literature is very important (see Table 2.17). In essence, the research by Brachos *et al.* (2007), Chen and Huang (2009), Darroch (2005), Donate and Guadamillas (2011), Jiang and Li (2009), Ju *et al.* (2006), Liao and Wu (2010), Lin (2007), Rhodes *et al.* (2008), and Wei and Xie (2008) demonstrate that there is a positive direct relationship between the core requirements of KM implementation and innovation.

3.2.1.1 The Relationship between Critical Success Factors of Knowledge Management and Innovation

In superior organisations, it is important to determine the CSFs of KM that enhance innovation (Chang & Lee, 2008; Chen & Huang, 2009). In spite of past investigation, there are very few previous studies that examined the relationship between CSFs of KM and innovation from a comprehensive viewpoint (Brachos *et al.*, 2007; Chang &

Lee, 2008; Chen & Huang, 2009; Donate & Guadamillas, 2011; Liao & Wu, 2010; Lin, 2007; Rhodes *et al.*, 2008). Some studies have shown that CSFs of KM do have a significant and positive relationship to innovation. For instance, Donate and Guadamillas (2011) showed that culture, leadership, and human resource management have a significant and positive effect on innovation. Liao and Wu (2010) found that organisational learning is significant and positively related to innovation. In the research by Sanz-Valle et al. (2011), culture has a significant and positive effect on technological innovation through the mediating role of organisational learning. In assessing the relationship between information technology and innovation, Rhodes et al. (2008) argue that information technology has a significant and positive relationship to innovation performance. Thus, it is expected that:

H1: CSFs of KM have a significant and positive effect on innovation.

3.2.1.2 The Relationship between Knowledge Management Strategies and Innovation

Even though KMSs are regarded as the best way to enhance innovation (Majchrzak *et al.*, 2004; Rhodes *et al.*, 2008). There have been few empirical studies that have examined the relationship between KMSs and innovation. However, Majchrzak *et al.* (2004) concluded that explicit knowledge reuse (considered a codification strategy) has a significant and positive relationship to radical innovation. Rhodes *et al.* (2008) found that personalisation strategy has a significant and positive related to product innovation and process innovation. Thus, it is expected that:

H2: KMSs have a significant and positive effect on innovation.

3.2.1.3 The Relationship between Knowledge Management Processes and Innovation

In fact, the effect of KMPs plays a vital role in the continuity of innovation (Darroch, 2005; Tan & Nasurdin, 2010; Wei & Xie, 2008). Despite in Darroch and McNaughton's (2002) research identified mixed results in the relationship between KMPs and innovation. A number of recent empirical studies showed a significant and positive relationship of KMPs with innovation, such as Chang and Lee (2008), Darroch (2005), Huang and Li (2009), Jantunen (2005), Jiang and Li (2009), Ju *et al.* (2006), Liao and Wu (2010), Tan and Nasurdin (2010), and Wei and Xie (2008). For example, Huang and Li (2009) found that KMPs, which consist of acquisition, sharing, and application, have a significant and positive relationship with administrative and technological innovation. Furthermore, Darroch (2005) explored KMPs' (i.e. knowledge acquisition, dissemination, and responsiveness) significant and positive effect on radical innovation and incremental innovation. Thus, it is expected that:

H3: KMPs have a significant and positive effect on innovation.

3.2.2 The Relationship between Core Requirements of Knowledge Management Implementation and Organisational Performance

Although the main focus of KM implementation (including CSFs of KM, KMSs, and KMPs) is to improve OP (including financial perspective, customer perspective, internal process perspective, and learning and growth perspective), several studies have highlighted the lack of empirical evidence investigating the relationship between KM implementation and OP (Bierly & Daly, 2007; Choi *et al.*, 2008). In addition, very few studies have investigated the relationship between successful KM implementation and improvement of OP (Shahrokhi, 2010).

In order to identify the nature of the relationship between the core requirements of KM implementation (CSFs of KM, KMSs, and KMPs) and OP, a review of the literature indicates that previous studies have shown a positive direct relationship between the core requirements of KM implementation and OP; these studies include those by Asoh *et al.* (2007), Chang and Chuang (2011), Choi *et al.* (2008), Fugate *et al.* (2009), Gold *et al.* (2001), Ho (2008), Keskin (2005), Lee and Lee (2007b), Liao and Wu (2009), Lin and Kuo (2007), Marqués and Simón (2006), Omerzel (2010), Tsai and Li (2007), Yang *et al.* (2009b), and Zheng *et al.* (2010). Table 2.18 provides more details.

3.2.2.1 The Relationship between Critical Success Factors of Knowledge Management and Organisational Performance

Even with a large body of literature documenting how CSFs of KM influence OP, no study gathers all the CSFs of KM that may affect OP in one research (Anderson, 2009; Asoh *et al.*, 2007; Gold *et al.*, 2001; Lin & Kuo, 2007; Yang *et al.*, 2009b; Zheng *et al.*, 2010), particularly in the MTS context (Chong *et al.*, 2009). In any case, previous empirical studies have shown that CSFs of KM have a significant and positive relationship with OP. For instance, Anderson (2009) and Gold *et al.* (2001) argued that technology, organisational culture, and organisational structure measured as CSFs of KM have a significant and positive relationship with OP. Asoh *et al.* (2007) also found that the CSFs of KM (i.e. technology, leadership, culture, and measurement) have a significant and positive relationship with OP. Moreover, Zheng *et al.* (2010) determined that CSFs of KM (i.e. structure, culture, and strategy) have a significant and positive effect on OP. Yang *et al.* (2009b) highlighted the significant positive effect of culture, structure, and information technology on OP. In Lin and Kuo's (2007) research, the results indicated that human resource management practices have significant and positive indirect effects on OP through KM capabilities. Likewise, Ho (2008) pointed out that organisational learning has a significant and positive effect on OP. Thus, it is expected that:

H4: CSFs of KM have a significant and positive effect on OP.

3.3.2.2 The Relationship between Knowledge Management Strategies and Organisational Performance

KMSs are becoming increasingly important assets for organisations throughout the world (Schulz & Jobe, 2001; Yu *et al.*, 2006). In simple terms, they lead to perfect OP, particularly in the MTS context (Chong *et al.*, 2009). Yet few empirical studies have concentrated on determining the effect of KMSs on different indicators of OP (Bierly & Daly, 2007). However, Choi and Lee (2003), Choi *et al.* (2008), and Keskin (2005) demonstrated that KMSs (codification strategy and personalisation strategy) are positively and statistically significantly related to OP. Thus, it is expected that:

H5: KMSs have a significant and positive effect on OP.

3.2.2.3 The Relationship between Knowledge Management Processes and Organisational Performance

KMPs are becoming the most valuable activities for any organisation (Chang & Chuang, 2011; Darroch, 2005; Fugate *et al.*, 2009). In specific terms, they lead all organisational efforts to achieve an ideal OP, particularly in the MTS context (Chong *et al.*, 2009). However, understanding of how KMPs are related to OP is limited due to the mixed and not significant results in prior studies that examined the relationship between KMPs and OP (Anderson, 2009; Darroch, 2005; Mills & Smith, 2011; Zack *et al.*, 2009). However, a number of recent empirical studies have shown how KMPs are significantly and positively to OP; these studies include Asoh *et al.* (2007), Chang and Chuang (2011), Fugate *et al.* (2009), Gold *et al.* (2001), Ho (2008), Lee and Lee (2007b), Liao and Wu (2009), and Omerzel (2010). For example, Gold *et al.* (2001) found that KMPs, which include acquisition, conversion, application, and protection, are significantly and positively related to organisational effectiveness. Furthermore, Omerzel (2010) revealed that KMPs consisting of acquisition, storage, transfer, use, and measure of knowledge have a significant and positive relationship with OP. Chang and Chuang (2011) also argued that knowledge choice, knowledge access, knowledge storage, and knowledge sharing, measured as KMPs, have a significant and positive effect on OP. Thus, it is expected that:

H6: KMPs have a significant and positive effect on OP.

3.2.3 The Relationship between Innovation and Organisational Performance

Prior research provides evidence that effective innovation types are a key instrument for OP (Damanpour *et al.*, 2009; Eshlaghy & Maatofi, 2011; García-Morales *et al.*, 2008; Li *et al.*, 2006). However, more research is needed due to the complex relationship between innovation and OP (Damanpour *et al.*, 2009). In this case, some studies have shown that innovation (including technological innovation, administrative innovation, radical innovation, and incremental innovation) is positively related to OP (Chen *et al.*, 2009; Damanpour *et al.*, 2009; Eshlaghy & Maatofi, 2011; García-Morales *et al.*, 2008; Ho, 2010; Li *et al.*, 2006; Lin & Chen, 2007; Salim & Sulaiman, 2011), as indicated in the literature review chapter (see Table 2.19). For instance, Chen *et al.* (2009) found that innovation in technological and administrative have a positive and significant effect on OP. Furthermore, Lin and Chen (2007) argued that radical innovation and incremental innovation have a positive relationship with OP. Thus, it is expected that:

H7: Innovation has a significant and positive effect on OP.

3.2.4 Innovation's Mediating Effect on the Relationship between Core Requirements of Knowledge Management Implementation and Organisational Performance

The extant literature reveals that a gap remains in the innovation field, particularly in the determination of the significant factors that have a direct effect on innovation to improve OP (Akgün *et al.*, 2009; Aragón-Correa *et al.*, 2007; Calantone *et al.*, 2002; Camisón & López, 2010; García-Morales *et al.*, 2007). In this regard, the indirect relationship between core requirements of KM implementation (CSFs of KM, KMSs, and KMPs) and OP (financial perspective, customer perspective, internal process perspective, and learning and growth perspective) through innovation (technological innovation, administrative innovation, radical innovation, and incremental innovation) has never been previously explored within a single study. In such conditions, where a relationship has never been previously explored, an indirect hypothesis should be formulated (Sekaran & Bougie, 2010). Therefore, in line with many researchers (Akgün *et al.*, 2009; Aragón-Correa *et al.*, 2007; Calantone *et al.*, 2002; Camisón & López, 2010; García-Morales *et al.*, 2007), the present study proposes that innovation plays a significant and positive mediating role in the relationship between core requirements of KM implementation and OP, based on RBV and KBV theories' perspectives that provide a theoretical basis for explaining the influence of KM implementation on OP through innovation. Thus, it is expected that:

H8: Innovation has a significant and positive mediating effect on the relationship between the CSFs of KM and OP.

H9: Innovation has a significant and positive mediating effect on the relationship between KMSs and OP.

H10: Innovation has a significant and positive mediating effect on the relationship between KMPs and OP.

To answer the research questions and achieve research objectives of present study, Zikmund *et al.* (2010) argued that the hypotheses of research should be related to the research questions and research objectives. Table 3.1 illustrates the logical link between the research questions, research objectives and hypotheses of present study.

Table 3.1
Research Questions, Research Objectives and Hypotheses of Research

Research questions	Research objectives	Hypotheses of research
What is the relationship between core requirements of KM implementation and innovation?	To investigate the relationship between core requirements of KM implementation and innovation.	CSFs of KM have a significant and positive effect on innovation.
		KMSs have a significant and positive effect on innovation.
		KMPs have a significant and positive effect on innovation.
What is the relationship between core requirements of KM implementation and OP?	To investigate the relationship between core requirements of KM implementation and OP.	CSFs of KM have a significant and positive effect on OP.
		KMSs have a significant and positive effect on OP.
		KMPs have a significant and positive effect on OP.
What is the relationship between innovation and OP?	To investigate the relationship between innovation and OP.	Innovation has a significant and positive effect on OP.
How does innovation mediate the relationship between core requirements of KM implementation and OP?	To investigate the mediating effect of innovation on the relationship between core requirements of KM implementation and OP.	Innovation has a significant and positive mediating effect on the relationship between CSFs of KM and OP.
		Innovation has a significant and positive mediating effect on the relationship between KMSs and OP.
		Innovation has a significant and positive mediating effect on the relationship between KMPs and OP.

3.3 RESEARCH DESIGN

The research design depends on making a strategic plan that includes specific methods and procedures for collecting and analysing the required data about study population to arrive at a solution of problem statement (Sekaran & Bougie, 2010; Zikmund *et al.*, 2010). The main purpose of present study is to explore the causal relationships among core requirements of KM implementation, innovation, and OP in order to propose a solution of the problems faced by Iraqi mobile telecommunications companies. In this regard, the following sections include purpose of research, study approach, unit of analysis, identifying population and sample, operational definition, measurement of variables/instrumentation, and questionnaire instrument.

3.3.1 Purpose of Research

A research study's purpose is a set of steps defining what is to be accomplished by conducting the research and how the results will be used (Yin, 2003). Several scholars have identified three primary purposes of research: exploratory, descriptive, and hypotheses testing (Sekaran & Bougie, 2010). Exploratory research is conducted when the problem examined has not been sufficiently and clearly defined as of yet. This approach helps determine what is happening, seek new insights, ask key questions, and deal with a set of phenomena in a new light. It always used in qualitative research. Meanwhile, descriptive research is conducted to explain phenomena accurately using narrative-type descriptions, classification, or measured relationships. In other words, it depicts an accurate profile of events, organisations, or situations (Robson, 2002; Sekaran & Bougie, 2010). Finally, hypotheses testing allow researchers to uncover and infer the causal relationships among variables (Sekaran & Bougie, 2010). The purpose of the research can also include a combination of these categories in order to answer research questions.

Recalling the research questions of present study, the first research question is "what is the relationship between core requirements of KM implementation and innovation?". The second research question is "what is the relationship between core requirements of KM implementation and OP?". The third research question is "what is the relationship between innovation and OP?". The fourth research question is "how does innovation mediate the relationship between core requirements of KM implementation and OP?". Certainly, the answering research questions is achieved by investigating the causal relationships among core requirements of KM implementation, innovation, and OP. Therefore, present study appears to be in line with a hypotheses testing as well as a descriptive research.

3.3.2 Study Approach

To meet the research objectives, such as the one specified in the present study, the use of a quantitative approach is considered suitable. Quantitative research is a formal, objective, systematic process used to describe and investigate the expected causal relationships and compute interaction effects among variables (Burns & Grove, 2005). Therefore, the quantitative approach to data analysis can be of great value to the researcher looking for significant results from data collected. In addition, the approach allows for a summary of the analysis results in numeric statistical values to provide a high degree confidence (Alexei, 2002; Zikmund *et al.*, 2010). Accordingly, the researcher has enough justification to use a quantitative approach in the present study.

3.3.3 Unit of Analysis

According to Sekaran and Bougie (2010) and Zikmund *et al.* (2010), to find a solution to the problem statement, researchers must explain their unit of analysis, which refers to the level of aggregation of the data to be collected during the data analysis phase. The analysis unit may be at the individual, group, business unit, or organisational level. The present study uses the business unit as the unit of analysis because this level comprises the middle level in an organisational structure. In fact, mid-level managers act as evaluators of the organisational activities (Janczak, 2004; Nonaka & Takeuchi, 1995). As a result, the choice of business units as the unit of analysis is consistent with the objectives of the present study.

3.3.4 Identifying Population and Sample

This section explains the background information of the Iraqi MTS, target population, sample frame, and data collection procedures.

3.3.4.1 Background Information of Iraqi Mobile Telecommunications Sector

As a first step of the identifying population and sample, it is an important to give background information about Iraqi MTS in this section. Before the U.S. occupation of Iraq in 2003, the mobile telecommunications services did not exist outside the three cities Sulaymaniyah, Erbil, and Duhok in north of Iraq since 1999. In 2003, mobile telecommunications companies began to operate in all of Iraq. They are under the control of the Iraqi Communications and Media Commission, who governs this sector by doing performance audit and granting licenses (Report of National Communications and Media Commission of Iraq, 2011).

Despite the recent of MTS in Iraq, there are five private companies able to provide mobile phone services, which are Asia-Cell, Korek and Sanatel, Zain Iraq, Omnnea, and Itisaluna. Most are comprised of medium to huge companies and include local and multinational telecommunications corporations. Additionally, Iraqi mobile companies have around 77 branches and offices services and sales spread across 18 cities in the country (Business Monitor International, 2011; National Communications and Media Commission of Iraq, 2011). Below is a summary profile of each company.

1. ***Asia-Cell***

Asia-Cell is the first operator to introduce mobile phone services in the northern Iraq. It was established in the Sulaymaniyah city in 1999. It has been an important company to provide mobile phone services in middle and south of Iraq since October 2003. It has market share of about 32 %, 7,000 employees, and serves more than 9 million active mobile subscribers. Asia-Cell's network now covers all of Iraq (Report of Asia-Cell Company, 2011).

2. Korek and Sanatel

Korek is the second mobile phone operator in northern Iraq. It has been providing mobile phone services in Erbil city and Duhok city since 2000. Korek's network now covers Erbil, Duhok, Sulaymaniyah, Ninawa, Karkok, Deyala, Baghdad, Kut, Basra, Umara, Babel, Salah Al-Din, Thiqar, Karbala, Dewanea, and Anbar (Report of Korek Company, 2011). Alternatively, Sanatel is the third mobile phone operator in northern Iraq. It has been providing mobile phone services in Sulaymaniyah and Erbil since 2003. However, Sanatel has partnered with a Korek to cover all of Iraqi Kurdistan region (Report of Halabja Group, 2011). Nowadays, Korek and Sanatel have market share of about 13%, 3,850 employees, and serves more than 3.6 million active mobile subscribers (Report of Korek Company, 2011).

3. Zain Iraq (formerly MTC and Iraqna)

Zain Group (formerly MTC) is the first mobile network operator in the Middle East. It was founded in Kuwait 27 years ago. It has grown from just a single operator in Kuwait to an international operator in six countries across the Middle East like Kuwait, Kingdom of Saudi Arabia, Jordan, Bahrain, Lebanon, and Iraq. It also operates in two countries in North Africa (i.e. Sudan and Morocco). It has served over 69.5 million active subscribers (Report of Zain Group, 2011).

Atheer and Iraqna - change their names to Zain Iraq in the first half of 2008. Nowadays, Zain Iraq has been an important operator that provides mobile phone services in Iraq since 2003. It seeks to lead the Iraqi mobile telecommunications market with 43% market share, 5,000 employees, and serves over 12 million active mobile subscribers. Zain Iraq's network now covers all of Iraq (Report of Zain Group, 2011).

4. Omnnea

Omnnea has been providing wireless phone services in Iraq since 2004. Further, it has provided internet and limited mobility phone service since 2007. It has market share of about 7%, 2,350 employees, and serves more than 2 million active mobile subscribers. Omnnea's network now covers Baghdad, Kut, Basra, Umara, Babel, Thiqar, Najaf, Karbala, Dewanea, Muthana and Anbar (Report of Omnnea Company, 2011).

5. Itisaluna

Itisaluna has been providing internet and wireless phone services in Iraq since 2007. Moreover, it has been provide limited mobility phone services since 2008. It has market share of about 5%, 1,244 employees, and serves more than 1.5 million active mobile subscribers. Itisaluna's network covers now Baghdad, Basra, Najaf, Babel, Dewanea, Muthana, Umara, and Karbala (Report of Itisaluna Company, 2011).

Based on the above brief information, Table 3.2 provides a summary of the background information about each company.

Table 3.2
Summary of Background Information of the Iraqi Mobile Telecommunications Sector

Company name	Year of operation	Number of mobile subscribers	Number of employees	Market share	Coverage area
Asia-Cell	1999	9 million	7,000	32%	All of Iraq.
Korek & Sanatel	2000-2003	3.6 million	3,850	13%	Erbil, Duhok, Sulaymaniyah, Ninawa, Karkok, Deyala, Baghdad, Kut, Basra, Umara, Babel, Salah Al-deen, Thiqar, Karbala, Dewanea, and Anbar.
Zain Iraq	2003	12 million	5,000	43%	All of Iraq.
Omnnea	2004	2 million	2,350	7%	Baghdad, Kut, Basra, Umara, Babel, Thiqar, Najaf, Karbala, Dewanea, Muthana, and Anbar.
Itisaluna	2007	1.5 million	1,244	5%	Baghdad, Basra, Najaf, Babel, Dewanea, Muthana, Umara, and Karbala.

3.3.4.2 Target Population

The study population refers to the target group of employees in any sector who share similar characteristics (Sekaran & Bougie, 2010; Zikmund *et al.*, 2010). In the present study, the population refers to all mid-level managers from different functional departments working in the five private Iraqi mobile companies of Asia-Cell, Korek and Sanatel, Zain Iraq, Omnnea, and Itisaluna. In line with previous research, present study chooses mid-level managers of Iraqi MTS as target respondents because of their role in the successful KM implementation. They are known as the true "knowledge workers" of creating new knowledge in any company (Chong, 2006; Chong *et al.*, 2009; Gunther-McGrath, 2001; Huy, 2001; Janczak, 1999, 2004; Lee, 1999; Nonaka & Takeuchi, 1995; Richards, 2004). Furthermore, Anderson (2009) suggested conducting future studies to examine the role of business unit managers in successful KM implementation. In the present study, respondents' departments include accounting, auditing, information systems, sales, administration, maintenance, planning, customers services, human resources, marketing, and quality. Table 3.3

summarizes the population of mid-level managers from different functional departments of each company included in the present study.

Table 3.3
Population of Mid-level Managers from Different Functional Departments in the Iraqi Mobile Telecommunications Sector

Company name	Number of mid-level managers
Asia-Cell	135
Korek & Sanatel	131
Zain Iraq	144
Omnnea	55
Itisaluna	40
Entire target population	505

Source: Adopted From Documents of Iraqi Mobile Companies.

Based on the above, the entire population in the present study is 505 mid-level managers from various branches and offices services and sales of the mobile companies in the Iraqi MTS.

3.3.4.3 Sample Frame

A sample frame is constructed from decisions about the population elements to be selected. As such, the sample frame involves both the sample size and the sampling technique (Sekaran & Bougie, 2010).

1. ***Sample Size***

Sample size can be defined as the subset of a population required to ensure significant results (Sekaran & Bougie, 2010). According to Zikmund *et al.* (2010), researchers rarely study the entire population due to inherent difficulties in collecting data and examining all the elements in the population under study. Hence, they must choose the appropriate sample size from the population. In this regard, random probability sampling is considered to be an effective way to choose the appropriate sample size for a research survey as it seeks to reduce sampling errors and increase precision of the data collected, particularly when the number of elements results in a huge sample (Sekaran & Bougie, 2010; Zikmund *et al.*, 2010).

Choosing an appropriate sample size is essential for finding statistically significant results (Pallant, 2007; Sekaran & Bougie, 2010) as an appropriate sample size decreases the probability of error (Zikmund *et al.*, 2010). Generally, the procedures for determining the appropriate sample size are different depending on the statistical techniques used in the research (Hair, Black, Babin, & Anderson, 2010).

Regarding appropriate sample size for SEM, Barrett (2007) found that many reviewers of journal submissions regularly reject any SEM analyses with a sample size smaller than 200 except when the population studied is restricted in size. Moreover, Kline (2011) mentioned that a sample size with fewer than 200 usually leads to unstable parameter estimates and a lack of significance tests. Therefore, the sample size of 200 is considered to be the critical sample size for SEM analysis (Byrne, 2010). In addition, Hoelter (1983) proposed the critical N index to evaluate the fit of the SEM model. The critical N index refers to the need for a sample size with at least 200 at the .05 or .01 level for a significant SEM model. Hoe (2008) concluded that any sample size greater than 200 is statistically acceptable for providing significant results. However, Hair *et al.* (2010) concluded that, if the sample size exceeds 500, the SEM analysis becomes too sensitive and the goodness-of-fit measures become a poor fit. Hence, an appropriate sample size for SEM would range from no fewer than 200 and no more than 500 (i.e. 200 >N< 500).

Roscoe (1975) proposed that a sample size larger than 30 but fewer than 500 is appropriate for most research. Furthermore, based on Krejcie and Morgan's (1970) table, the number of a sample size for a population of 500 should be 217. Based on these recommendations, a sample size of more than 200 would be required to provide significant results in the present study. In order to meet the critical sample size for the present study, only 300 questionnaires were delivered personally to respondents, which spread the questionnaires across the mobile companies' branches and offices services and sales throughout Iraq.

2. *Sampling Technique*

The number of mid-level managers in the Iraqi MTS differs from one company to another company. Thus, proportionate stratified random sampling was used in the present study in order to attract the maximum number of participants from among mid-level managers from different companies, giving each company an equal chance in the research process as well as enhancing the generalisability of the statistical results (Cooper & Schindler, 2008; Sekaran & Bougie, 2010; Zikmund *et al.*, 2010). In this case, the random probability sample size of the entire target population must be divided into strata according to the number of Iraqi mobile telecommunications companies. The random probability sample size was subsequently drawn from each stratum according to the proportion of the stratum's size in the entire target population (Sekaran & Bougie, 2010; Zikmund *et al.*, 2010). Table 3.4 provides the proportionate stratified random sampling of mobile telecommunications companies in the Iraqi MTS.

Table 3.4
Proportionate Stratified Random Sampling in the Iraqi Mobile Telecommunications Sector

Company name	Population stratum	Percentage of population stratum	Proportionate stratified random sampling
Asia-Cell	135	135/505=27%	27%*300=81
Korek & Sanatel	131	131/505=26%	26%*300=78
Zain Iraq	144	144/505=28%	28%*300=84
Omnnea	55	55/505=11%	11%*300=33
Itisaluna	40	40/505=8%	8%*300=24
Total	505	100%	300

3.3.4.4 Data Collection Procedures

Data collection procedures are an essential component of quantitative research. The most common research instrument in collecting data for the quantitative research approach is using a questionnaire survey. The present study utilized a questionnaire survey as the primary tool of data collection as it is appropriate and effective. A questionnaire enables respondents to give the required data in a short time while minimizing response bias (Sekaran & Bougie, 2010; Zikmund *et al.*, 2010). Questionnaires were randomly delivered and collected in person. Personal delivery of questionnaires was used so that the researcher could explain the purpose and benefits of the study to the respondents and motivate them to give honest responses (Sekaran & Bougie, 2010). In addition, the personal delivery of questionnaires is relatively inexpensive and yields a fairly high response rate of 70 to 84% (Webster, 1998). Sekaran and Bougie (2010) argued that an excellent response rate of almost 100% can be assured using this process. Thus, personal delivery was found to be useful for the present study, which aimed to get high response rate and more than the consensual critical sample size required.

Based on an application of proportionate stratified random sampling technique, questionnaires were randomly distributed among 300 mid-level managers of the Iraqi

MTS by personal delivery and collection of questionnaires from March to June 2011. The random sample was taken from a list of all of the population members per branch of the Iraqi mobile companies. Respondents were given one week time to complete the questionnaires to ensure that they had sufficient time to fully concentrate on the best answers. The questionnaires were subsequently collected for analysis.

3.3.5 Operational Definition

The operational definition refers to the editing process of conceptual definitions of the variables and dimensions to make them measurable in a tangible way to be involved in a research process (Zikmund *et al.*, 2010). According to Sekaran and Bougie (2010), operational definition involves identifying the behavioral dimensions, facets, or properties denoted by specific concepts. In this process, the abstract notion or concepts are reduced to observable behaviors and characteristics. Accordingly, a conceptual definition can be subdivided into several obviously measurable elements through an operational definition so as to form an index of measurement of the variable or dimension. The following section explains the operational definition of each variable and dimension in the present study.

3.3.5.1 Operational Definition of Critical Success Factors of Knowledge Management

Table 3.5 provides the operational definition of the CSFs of KM, which consists of seven dimensions namely human resource management, information technology, leadership, organizational learning, organizational strategy, organizational structure, and organizational culture.

Table 3.5

Operational Definitions of the Critical Success Factors of Knowledge Management

Variable	Dimension	Operational definition
CSFs of KM		The degree of active support of the managerial and organisational factors to ensure the success of KM implementation (Choi, 2002; Chong *et al.*, 2009; Hsieh, 2007; Wong & Aspinwall, 2005).
	Human Resource Management	The degree of helpful of the human resources practices to ensure the success of KM implementation (Wong & Aspinwall, 2005).
	Information Technology	The degree of broad use of the information technology systems to ensure the success of KM implementation (Chong *et al.*, 2009).
	Leadership	The degree of support of the leadership to ensure the success of KM implementation (Chong *et al.*, 2009).
	Organisational Learning	The degree of contribution of the organisational learning activities to ensure the success of KM implementation (Choi, 2002).
	Organisational Strategy	The degree of effectiveness procedures of the organisational strategy to ensure the success of KM implementation (Chong *et al.*, 2009).
	Organisational Structure	The degree of use decentralisation within organisational structure to ensure the success of KM implementation (Hsieh, 2007).
	Organisational Culture	The degree of employees' mutual trust within an organisation to ensure the success of KM implementation (Chong *et al.*, 2009).

3.3.5.2 Operational Definition of Knowledge Management Strategies

Table 3.6 provides the operational definition of the KMSs, which consists of two dimensions namely codification strategy and personalisation strategy.

Table 3.6

Operational Definitions of Knowledge Management Strategies

Variable	Dimension	Operational definition
KMSs		The degree of extensive use of knowledge strategies to ensure the success of KM implementation (Kumar & Ganesh, 2011).
	Codification Strategy	The degree of common use of document and classification methods for documenting explicit knowledge to ensure the success of KM implementation (Kumar & Ganesh, 2011).
	Personalisation Strategy	The degree of informal transfer of the tacit knowledge at the individual level to ensure the success of KM implementation (Kumar& Ganesh, 2011).

3.3.5.3 Operational Definition of Knowledge Management Processes

Table 3.7 provides the operational definition of the KMPs, which consists of five dimensions namely knowledge creation, knowledge organisation, knowledge storage, knowledge sharing, and knowledge utilisation.

Table 3.7
Operational Definitions of Knowledge Management Processes

Variable	Dimension	Operational definition
KMPs		The degree of active application of the typical processes to ensure the success of KM implementation (Bhatt, 2000; Calantone *et al.*, 2002; Chen, 2007; Gómez & Manzanares, 2004; Lawson, 2003; Supyuenyong *et al.*, 2009).
	Knowledge Creation	The degree of the effectiveness creation of new knowledge to ensure the success of KM implementation (Gómez & Manzanares, 2004).
	Knowledge Organisation	The degree of liquidate of the useful knowledge to ensure the success of KM implementation (Bhatt, 2000; Lawson, 2003).
	Knowledge Storage	The degree of interest in storing information, documents, and experience required to ensure the success of KM implementation (Lawson, 2003; Supyuenyong *et al.*, 2009).
	Knowledge Sharing	The degree of formal efforts of the knowledge exchange at the business unit level to ensure the success of KM implementation (Calantone *et al.*, 2002).
	Knowledge Utilisation	The degree of effective use and application of the knowledge to ensure the success of KM implementation (Chen, 2007).

3.3.5.4 Operational Definition of Innovation

Table 3.8 provides the operational definition of the innovation, which consists of four dimensions namely technological innovation, administrative innovation, radical innovation and incremental innovation.

Table 3.8
Operational Definitions of Innovation

Variable	Dimension	Operational definition
Innovation		The degree of innovation capabilities development used to create new ideas, markets, and services (Darroch, 2005; Darroch & McNaughton, 2002; Herrmann *et al.*, 2007; Li *et al.*, 2006; Lin *et al.*, 2010; Salavou, 2004).
	Technological Innovation	The degree of continuity of the technological capability used to create new ideas, markets, and services (Li *et al.*, 2006).
	Administrative Innovation	The degree of continuity of the administrative capability used to create new ideas, markets, and services (Lin *et al.*, 2010).
	Radical Innovation	The degree of continuity of the essential technological capability used to create new ideas, markets, and services (Herrmann *et al.*, 2007).
	Incremental Innovation	The degree of continuity of the growing technological capability used to create new ideas, markets, and services (Darroch, 2005; Darroch & McNaughton, 2002; Salavou, 2004).

3.3.5.5 Operational Definition of Organisational Performance

Table 3.9 provides the operational definition of the OP, which consists of four dimensions namely financial perspective, customer perspective, internal process perspective, and learning and growth perspective.

Table 3.9
Operational Definitions of Organisational Performance

Variable	Dimension	Operational definition
OP		The degree of organisation's ability to achieve organisational goals (Gonzalez-Padron *et al.*, 2010; Visser & Sluiter, 2007).
	Financial Perspective	The degree of organisation's ability to achieve specific financial goals (Gonzalez-Padron *et al.*, 2010; Visser & Sluiter, 2007).
	Customer Perspective	The degree of organisation's ability to achieve customer satisfaction (Gonzalez-Padron *et al.*, 2010; Visser & Sluiter, 2007).
	Internal Process Perspective	The degree of organisation's ability to achieve effectiveness of internal process (Gonzalez-Padron *et al.*, 2010; Visser & Sluiter, 2007).
	Learning and Growth Perspective	The degree of organisation's ability to achieve the learning and growth goals (Gonzalez-Padron *et al.*, 2010; Visser & Sluiter, 2007).

3.3.6 Measurement of Variables/Instrumentation

A measurement is a tool or mechanism of describing some property of a phenomenon's variables of interest in the study by assigning numbers in a reliable and valid way (Sekaran & Bougie, 2010; Zikmund *et al.*, 2010). In the present section, full details of measurement items and measurement scale were presented.

3.3.6.1 Measurement Items

In the present study, most of 110 measurement items were detpada from previous questionnaires, with the exception of two items for KMPs, one item for innovation, and four items for OP, which were developed by researcher. All items adapted in the present study are considered to be highly reliable and have strong construct validity as the values of the original Cronbach's alpha of all items ranged from .712 to .970 (see Table 3.10). In this regard, many researchers have statistically recommended a

Cronbach’s alpha value that is equal .70 or higher, which is considered adequate for any study (Hair *et al.*, 2010; Nunnally & Bernstein, 1994).

Furthermore, as some items may drop during the processes of data analysis, it is typically necessary to choose at least five items for each construct that the researcher wishes to measure (Hatcher, 1994), which—according to Kline (2011)—will ensure that at least two items for each construct survive for the data analysis. Consequently, each dimension of the variable in the present study was measured at least by five items as proposed by Hatcher (1994), resulting in sufficient justification to adapt the previous measurement items and develop new items for the present study. Table 3.10 indicates the items’ number and Cronbach’s alpha values for the measurement instrument from the original study.

Table 3.10
The Items' Number and Cronbach's Alpha Value of Measurement Instrument by the Original Study

Variable	Dimension	Original No. of Item	Original Cronbach’s alpha Value	Sources
CSFs of KM	Human Resource Management	5	.834	Wong and Aspinwall (2005)
	Information Technology	5	.956	Chong *et al.* (2009)
	Leadership	5	.955	Chong *et al.* (2009)
	Organisational Learning	5	.896	Choi (2002)
	Organisational Strategy	5	.926	Chong *et al.* (2009)
	Organisational Structure	5	.912	Hsieh (2007)
	Organisational Culture	5	.924	Chong *et al.* (2009)
KMSs	Codification Strategy	5	.766	Kumar and Ganesh (2011)
	Personalisation Strategy	5	.712	Kumar and Ganesh (2011)
KMPs	Knowledge Creation	5	.780	Gómez and Manzanares (2004)
	Knowledge Organisation	4	.861	Lawson (2003)
		1	Developed based on the theoretical study of Bhatt (2000)	
	Knowledge Storage	4	.879	Lawson (2003)
		1	Developed based on the study of Supyuenyong *et al.* (2009)	
	Knowledge Sharing	5	.750	Calantone *et al.* (2002)
	Knowledge Utilisation	5	.868	Chen (2007)

Table 3.10 *(continued)*

Innovation	Technological Innovation	5	.730	Li *et al.* (2006)
	Administrative Innovation	5	.878	Lin *et al.* (2010)
	Radical Innovation	5	.900	Herrmann *et al.* (2007)
	Incremental Innovation	4	.860	Darroch (2005), Darroch and McNaughton (2002)
		1	Developed based on the theoretical study of Salavou (2004)	
OP	Financial Perspective	4	.970	Gonzalez-Padron *et al.* (2010)
		1	Developed based on the theoretical study of Visser and Sluiter (2007)	
	Customer Perspective	4	.930	Gonzalez-Padron *et al.* (2010)
		1	Developed based on the theoretical study of Visser and Sluiter (2007)	
	Internal Process Perspective	4	.950	Gonzalez-Padron *et al.* (2010)
		1	Developed based on the theoretical study of Visser and Sluiter (2007)	
	Learning and Growth Perspective	4	.960	Gonzalez-Padron *et al.* (2010)
		1	Developed based on the theoretical study of Visser and Sluiter (2007)	
TOTAL INSTRUMENTS		**110**		

A measurement instrument includes five sections to specifically address the five variables determined in the present study. The following explains how each variable of the study will be measured.

1. The first section is CSFs of KM. This variable consists of seven dimensions human resource management, information technology, leadership, organisational learning, organisational strategy, organisational structure, and organisational culture. The thirty five items of CSFs of KM measurement were adapted Choi (2002), Chong *et al.* (2009), Hsieh (2007), and Wong and Aspinwall (2005). Table 3.11 shows the items used to measure the CSFs of KM.

Table 3.11

The Items Used to Measure the Critical Success Factors of Knowledge Management

Dimension	Item
Human Resource Management	Our company seeks to recruit of employees for fill knowledge gaps.
	Our company seeks to hire employees who have a positive orientation toward knowledge.
	Our company seeks to provide professional development activities for employees.
	Our company seeks to retain perfect employees to work.
	Our company seeks to provide job advancement opportunities to employees.
Information Technology	In our company, information technology helps to capture information we need.
	In our company, information is keeping up-to-date.
	In our company, information technology supports the decision making process.
	In our company, technology facilitates sharing of knowledge at all organisational levels.
	In our company, a current information system is able to support future development.
Leadership	In our company, there is a stated and clear vision for managing knowledge.
	In our company, the main objectives focus on implementation of knowledge management.
	In our company, top management recognizes that knowledge management implementation can add value.
	In our company, top management is committed to knowledge management implementation.
	In our company, dedicated personnel lead and support knowledge management activities.
Organisational Learning	Our company attempts to carry out various formal training programs.
	Our company seeks to provide opportunities for informal individual development in addition to formal training.
	Our company encourages employees to take advantage from attending seminars, symposia, and so on.
	Our company provides multiple learning programs for employees.
	Our company provides job training and self-development programs.
Organisational Strategy	Our company explains the importance of knowledge management to all employees.
	Our company formulates strategic plans to acquire knowledge.
	Our company has specific objectives for knowledge management implementation.
	Our company’s mission statement reflects the importance of knowledge management implementation.
	Our company’s mission and objective are explained well at all organisational levels.
Organisational Structure	Our company employees can perform their tasks without a supervisor.
	Our company employees are encouraged to make their own decisions.
	Our company employees do not have to refer to someone else.
	Our company employees do not have to ask their supervisor before taking performance action.
	Our company employees can make decisions without permission.
Organisational Culture	In our company, communications of success stories are widely applied at all organisational levels.
	In our company, knowledge does not threaten positions in any organisational levels.
	Our company develops rewards and recognition for knowledge sharing.
	Our company seeks to create a culture of openness and mutual trust.
	Our company encourages employee empowerment and participation in decision making.

2. The second section is KMSs, which consist of two dimensions (i.e. codification and personalisation strategy). The ten items of KMSs measurement were adapted from Kumar and Ganesh (2011). Tables 3.12 shows the items used to measure the KMSs.

Table 3.12
The Items Used to Measure the Knowledge Management Strategies

Dimension	Item
Codification Strategy	Our company seeks to write down ideas and to document those gained during work.
	Our company seeks to capture the experiences that employees narrated.
	Our company seeks to record important data, drawings, and happenings for future use.
	Our company seeks to dedicate a team of employees to archive drawings, reports, and such useful information.
	Our company seeks to create a database such as an online repository for keeping project related knowledge.
Personalisation Strategy	Our company considers reviewing customer opinion in team/group meetings as a learning practice.
	Our company holds informal routine meetings to review work progress and create new ideas.
	Our company employees can share their learning and experiences with each other after returning from official trips.
	Our company attempts to form small groups or communities of employees to discuss knowledge and ideas around a particular theme.
	Our company seeks to make available a “people directory” to help employees in their search for colleagues with certain expertise.

3. The third section is KMPs, which consist of five dimensions (i.e. knowledge creation, knowledge organisation, knowledge storage, and knowledge sharing, and knowledge utilisation). The twenty three items of KMPs measurement were adapted from Calantone *et al.* (2002), Chen (2007), Gómez and Manzanares (2004), and Lawson (2003) with one item of knowledge organisation was developed based on theoretical study of Bhatt (2000) and one item of knowledge storage was developed based on study of Supyuenyong *et al.* (2009). Table 3.13 shows the items used to measure the KMPs.

Table 3.13
The Items Used to Measure the Knowledge Management Processes

Dimension	Item
Knowledge Creation	Our company seeks to use skills to acquire external knowledge to be integrated into management processes at all organisational levels.
	Our company seeks to use systematic approaches to new knowledge or experiences from business units to generate knowledge at all organisational levels.
	Our company seeks to use interdisciplinary business units with internal experts to generate knowledge at all organisational levels.
	Our company seeks to use interdisciplinary business units with external experts to generate knowledge at all organisational levels.
	Our company seeks to use simulation methods (scenarios) to generate new knowledge at all organisational levels.
Knowledge Organisation	Our company has a procedure to review knowledge on a regular basis. Employees are specially tasked to keep knowledge up-to-date.
	Our company has a filtering system, cross listing and integrating various sources and types of knowledge.
	Our company gives feedback to employees on their ideas and knowledge.
	Our company has procedures to apply knowledge learned from experiences and matches sources of knowledge to problems and challenges.
	Our company has procedures to make knowledge available to those who need it.
Knowledge Storage	Our company utilizes databases, repositories, and information technology applications of knowledge stored to give all employees easy access.
	Our company utilizes different methods to store knowledge captured from both current and departing employees.
	Our company has several publications to show captured knowledge.
	Our company has procedures of patents and copyrights to new knowledge.
	In our company everyone can put any idea into a simple central database.
Knowledge Sharing	Our company has a good deal of organisational conversation to keep alive the lessons learned from history.
	Our company always analysis unsuccessful organisational endeavors and communicates the lessons learned widely.
	Our company has a specific mechanism for sharing lessons learned in organisational activities between business units.
	In our company, top management frequently emphasizes the importance of knowledge sharing between business units.
	Our company put little effort in sharing experiences and lessons between business units (R).
Knowledge Utilisation	Our company matches sources of knowledge in an attempt to solve problems and face challenges.
	Our company uses accumulated knowledge in an attempt to solve new problems.
	Our company applies the principle of knowledge gained from mistakes.
	Our company uses shared knowledge to enhance efficiency.
	Our company is able to apply knowledge management to shifting competitive conditions.

Note: "R" indicates that the item is actually measured in a reverse fashion.

4. The fourth section is innovation, which consists of four dimensions (i.e. technological innovation, administrative innovation, radical innovation, and incremental innovation). The nineteen items of innovation measurement were detpada from Darroch (2005), Darroch and McNaughton (2002), Herrmann *et al.* (2007), Li *et al.* (2006), and Lin *et al.* (2010), with new one item of

incremental innovation was developed based on the theoretical study of Salavou (2004). Table 3.14 shows the items used to measure the innovation.

Table 3.14
The Items Used to Measure the Innovation

Dimension	Item
Technological Innovation	Our company is able to introduce frequent new services ideas.
	Our company has a high probability of success for new services being tested.
	Our company spends shorter periods in research and development of new services.
	Our company has made essential improvements in information technology.
	Our company frequently upgrades its equipment.
Administrative Innovation	Our company depends on an innovative rewards system.
	Our company depends on innovative work designs.
	Our company depends on innovative administration to develop new services.
	Our company adopts organisational reconstruction to pursue operational efficiency.
	Our company adopts reengineering of its business process.
Radical Innovation	Our company seeks to introduce new services that differ substantially from its competitors.
	Our company seeks to introduce radical service innovations into the market more frequently than competitors.
	In our company, the percentage of radical service innovations in the service range in the last year is significantly higher than the competition.
	In our company, the percentage of total sales from radical service innovations rose in the last year.
	Our company is well known by customers for radical service innovations.
Incremental Innovation	Our company seeks to add new services to its existing ones.
	Our company seeks to improve or revise existing services.
	Our company seeks to change its services in order to reduce costs.
	Our company seeks to reposition existing services.
	In our company, the introduction of new services has increased over the last year.

5. The fifth section is OP, which consist of four dimensions of financial perspective, customer perspective, internal process perspective, and learning and growth perspective. The sixteen items of OP measurement were adapted from Gonzalez-Padron *et al.* (2010) and new four items were developed based on the theoretical study of Visser and Sluiter (2007). Table 3.15 shows the items used to measure the OP.

Table 3.15
The Items Used to Measure the Organisational Performance

Dimension	Item
Financial Perspective	Our company achieved revenues above our stated objective in the last year.
	Our company achieved sales above our stated objective in the last year.
	Our company achieved return on investments above our stated objective in the last year.
	Our company achieved return on assets above our stated objective in the last year.
	Our company achieved profit margin above our stated objective in the last year.
Customer Perspective	Our company achieved a high degree of customer satisfaction in the last year.
	Our company kept a large number of existing customers in the last year.
	Our company attracted a significant number of new customers in the last year.
	Our company secured a large portion of our desired market share in the last year.
	Our company reduced the number of customer complaints significantly in the last year.
Internal Process Perspective	In our company, the speediness of our services processes improved in the last year.
	In our company, the quality of our services processes improved in the last year.
	In our company, the cost of our services processes declined in the last year.
	In our company, the flexibility of services processes improved in the last year.
	In our company, the efficiency of our services processes improved in the last year.
Learning and Growth Perspective	Our company significantly enhanced its operating and marketing strategy skills compared with last year.
	Our company significantly enhanced its operating and marketing implementation skills compared with last year.
	Our company significantly enhanced its development research skills compared with last year.
	Our company significantly enhanced its services development skills compared with last year.
	Our company significantly enhanced its employees' development skills compared with last year.

3.3.6.2 Measurement Instrument Scale

For the present study, a Likert scale was used to measure responses; this scale is a common format for business research (Garland, 1991). The Likert scale is a psychometric scale used in questionnaire surveys to get respondents' opinions regarding a specific level of agreement to a measurement statement (Sudha & Baboo, 2011). As indicated by Wolfer (2007), the Likert scale is often used to measure respondents' opinions on a five-point rating system for each specific question or statement. A typical five-point Likert scale might be strongly disagree, disagree, neutral, agree, and strongly agree. However, Likert scales with four to nine points have been used in various research fields. In relation to the number of scale points, no clear rules have been established concerning how many points should be used in the business research.

To record the response choice in the present study, each of the measurement items was measured on a five-point Likert scale, which provides sufficient discrimination and is easily understood by survey respondents (Brace, 2004; Sekaran & Bougie, 2010). In addition, a five-point Likert scale has been employed in most original studies of KM, innovation, and OP, such as Chen (2007), Chong *et al.* (2009), Darroch (2005), Jiang and Li (2009), Kumar and Ganesh (2011), and Lawson (2003). Researchers have indicated that a five-point Likert scale is just as good as any other scale and that moving from five to seven or nine points on the scoring scale does not increase the reliability of the scores (Elmore & Beggs, 1975). Finally, a five-point Likert scale is considered appropriate for the multivariate analysis techniques used in the present study, including the factor analysis and SEM (Chen, 2007).

Given the above considerations, present study seeks to measure all variables by using a 5-point Likert scale where survey question is referred to agreement degree (i.e. 1= strongly disagree, and 5= strongly agree) of core requirements of the KM implementation in the company from the respondents view, survey question is also referred to agreement degree (i.e. 1= strongly disagree, and 5= strongly agree) of respondents with innovation in the company, and survey question is referred to level of objectives achievement (i.e. 1= not at all, and 5= to a great extent) of respondents with OP in the company.

3.3.7 Questionnaire Instrument

A questionnaire was employed to obtain the required data from respondents. The questionnaire was designed, structured, and translated to get the needed data.

3.3.7.1 Design and Structure of the Questionnaire

The questionnaire for the present study was designed to be printed in a booklet format. According to Sudman and Bradburn (1982), using a booklet format questionnaire avoids pages from being missing or misplaced, makes it easier for the respondents to read and complete it, makes it possible to use a double-page layout for questions about multiple events or persons, and gives a more professional look that is easy to follow when personally delivering questionnaires.

In a highly structured questionnaire, the cover letter must be seen first. The cover letter can help ensure that the respondents provide appropriate answers. The cover letter explains the importance and objectives of the research in the context of Iraqi MTS. After reading the cover letter, respondents were asked to tick their responses for the questions that related to the particular respondent profile. For multiple choice questions related to the variables, respondents were instructed to circle all appropriate responses to the items. The questionnaire was structured into six main sections as follows (for more details, please refer to Appendix 1, parts A and B):

- Section A consists of items related to the respondent profile (gender, age, workplace, educational level, experience, and position).
- Section B is designed to determine the degree of agreement or disagreement of the CSFs of KM activities from the respondents' perspective.

- Section C is designed to determine the degree of agreement or disagreement of the KMSs activities from the respondents’ perspective.
- Section D is designed to determine the degree of agreement or disagreement of the KMPs activities from the respondents’ perspective.
- Section E is designed to determine the degree of agreement or disagreement of the innovation activities from the respondents’ perspective.
- Section F is designed to determine to determine the degree of OP achievement from the respondents’ perspective.

3.3.7.2 Translation of Questionnaire

In the present study, the questionnaire was prepared in Arabic language—after the original instrument was translated from English into Arabic—so that the respondents could understand and answer the questions. The use of Arabic language is practical because it is the lingua franca of the respondents. Sekaran and Bougie (2010) suggested that it is important to ensure that the questionnaire instrument is in the language preferred by each respondent in order to avoid response errors among the entire population. Therefore, the questionnaire was translated using the back-translation procedures. First, the English version of the questionnaire was translated into Arabic by two Arab translators who were proficient in English. The Arabic version of the questionnaire was then translated back into English by a third translator to ensure the validity of the translation (Newmark, 1988). The English and Arabic questionnaires are included in Appendix 1, part A and part B, respectively.

3.4 STATISTICAL ANALYSIS PROCEDURES

The present study depended on six important steps to statistically analyse the data collected (including preliminary analysis, preparation of the data for analysis, descriptive statistics, underlying statistical assumptions, evaluation of the measurement instrument, and testing of the hypotheses developed), which should be taken in quantitative studies (Hair *et al.*, 2010, Sekaran & Bougie, 2010; Zikmund *et al.*, 2010). Furthermore, the present study analysed the quantitative data using appropriate statistical techniques available in the SPSS v18 and AMOS v18 software. Table 3.16 summarizes the statistical analysis steps, techniques, and software employed in the present study.

Table 3.16
Statistical Analysis Steps, Techniques and Software

Analysis Step	Analysis Technique	Description	Analysis Software
Preparation of the Data for Analysis	Missing Data	It is used to confirm that all the questions in the questionnaire survey have been answered properly (Sekaran & Bougie, 2010).	SPSS v18
Preliminary Analysis	Non-response bias (independent samples t-test)	It is employed to ensure that no difference occurs between the respondents' responses and those who did not respond to the survey based on the diverse demographic factors by using the independent samples t-test (Pallant, 2007; Sax, Gilmartin, & Bryant., 2003).	SPSS v18
	Multivariate Outliers (Mahalanobis)	It is used to ensure that no extreme combinations of scores occur on two or more variables using the Mahalanobis Distance test (Hair *et al.*, 2010; Sekaran & Bougie, 2010).	SPSS v18
	Response rate	It refers to the divided number of respondents who answered the survey into the number of respondents in the sample size (Hamilton, 2009).	--------------
Descriptive Statistics	Frequencies	It is used to show the number of the repeat observations per unit of time (Sekaran & Bougie, 2010).	SPSS v18
	Mean	It is applied to compute an average of the observation numbers (Sekaran & Bougie, 2010).	SPSS v18
	Variance	A test used to measure the homogeneity degree of responses (Sekaran & Bougie, 2010).	SPSS v18
	Standard Deviation	It is used for calculating the square root of the variance (Sekaran & Bougie, 2010).	SPSS v18

Table 3.16 *(continued)*

Underlying Statistical Assumptions	Normality test	It is used to prove the normal distribution of data collected through Skewness and Kurtosis values, the Kolmogorov-Smirnov test, or the standard normal curve (Hair *et al.*, 2010).	AMOS v18 & SPSS v18
	Multicollinearity	It is applied to ensure that the independent variables are not highly correlated with each other by using Tolerance value and variance inflation factor or standardised correlations of the SEM (Hair *et al.*, 2010; Sekaran & Bougie, 2010).	AMOS v18 & SPSS v18
	Linearity	It is used to show the relationship between the independent variable and dependent variable through scatter plot (Hair *et al.*, 2010).	SPSS v18
	Homoscedasticity	It is used to show whether the variance around the dependent variable is similar for all values of the independent variable (Huang, 2007).	SPSS v18
Evaluating measurement instrument	Factor Analysis	It is used to look at the dimensionality of a measurement instrument by finding that the items of variables are correlated with each other (Colton & Covert, 2007).	SPSS v18
	Reliability	It is applied to show the stability and consistency of the measurement instruments. The reliability of measurement instruments is assessed through their Cronbach's alpha coefficient or composite reliability (Hair *et al.*, 2010; Sekaran & Bougie, 2010).	AMOS v18 & SPSS v18
	Construct Validity	It is used to determine the accuracy of measurement instruments of the variables. It is evaluated through convergent validity and discriminant validity (Hair *et al.*, 2010).	AMOS v18 & SPSS v18
Testing hypotheses developed	SEM	It is a multivariate analysis used to test the direct and indirect causal relationships among exogenous and endogenous latent variables by estimating a confirmatory factor analysis (Ellis & Webster, 1998; Kline, 2011).	AMOS v18

3.5 PRE-TEST AND PILOT STUDY

The following sections provide a detailed discussion about the pre-test and pilot study of a measurement instrument of the present study.

3.5.1 Pre-test

A pre-test is a preliminary assessment of the measurement instrument in order to look at some possible difficulties that may be encountered by the potential respondents when filling it out. In other words, pretesting entails validating the content of the measurement instrument (Tojib & Sugianto, 2006). Content validity refers to the appropriateness degree of all items to the purpose of the measurement instrument (Zikmund *et al.*, 2010). To ensure this, the expertise of 10 lecturers (Professors and Assistant Professors) from the College Administration and Economic at Kufa University (KUAE) and Othman Yeop Abdullah Graduate School of Business at Universiti Utara Malaysia (UUM OYA GSB) was solicited. Based on their feedback, improvements were made on the items asked, the sentence structure, appropriate choice of words and its arrangement. The improvements are necessary to ensure a high response rate.

3.5.2 Pilot Study

The pilot study is a primary test to assess the goodness of measure, which is the reliability, before administering the final questionnaire (Sekaran & Bougie, 2010; Zikmund *et al.*, 2010). Reliability refers to the stability and consistency of the measurement instrument. The common statistical test of reliability estimate is Cronbach's alpha (Hair *et al.* 2010; Sekaran & Bougie, 2010; Zikmund *et al.*, 2010). It is considered good when the alpha coefficient is .80, acceptable when it is .70, and poor when it is .60 (Sekaran & Bougie, 2010).

According to Cooper and Schindler (2008), the appropriate sample size of pilot study is around 25-100 respondents. Therefore, the sample size of the pilot study is conducted among 50 mid-level managers working in the middle management level of Iraqi mobile companies. The pilot questionnaires were randomly distributed out through emails. Only 29 respondents returned, and this represented 58% response rate. The SPSS v18 was employed to test Cronbach's alpha of measurement instrument. Table 3.17 shows reliability test results of the measurement instrument used.

Table 3.17
Reliability Test Results of the Measurement Instrument

Variable	Dimension	No. of Items	Original Cronbach's alpha Value ≥ .70	Pilot Cronbach's alpha Value ≥ .70
CSFs of KM	Human Resource Management	5	.834	.826
	Information Technology	5	.956	.888
	Leadership	5	.955	.856
	Organisational Learning	5	.896	.875
	Organisational Strategy	5	.926	.897
	Organisational Structure	5	.912	.865
	Organisational Culture	5	.924	.780
KMSs	Codification Strategy	5	.766	.810
	Personalisation Strategy	5	.712	.841
KMPs	Knowledge Creation	5	.780	.752
	Knowledge Organisation	5*	.861	.760
	Knowledge Storage	5*	.879	.884
	Knowledge Sharing	5	.750	.879
	Knowledge Utilisation	5	.868	.833
Innovation	Technological Innovation	5	.730	.794
	Administrative Innovation	5	.878	.881
	Radical Innovation	5	.900	.860
	Incremental Innovation	5*	.860	.774
OP	Financial Perspective	5*	.970	.886
	Customer Perspective	5*	.930	.830
	Internal Process Perspective	5*	.950	.760
	Learning and Growth Perspective	5*	.960	.758

Note: *One item in a dimension was developed by researcher.

In Table 3.9, the Cronbach's alpha coefficients indicate that all items used in the instrument are acceptable, with a range from .752 to .897. Based upon the feedback from the pre-test and the pilot study, the survey instrument is finalized, consisting of 110 items.

3.6 CHAPTER SUMMARY

This chapter includes a description of the research methodology that will be used in the present study to investigate the relationships among core requirements of KM implementation, OP and innovation in the Iraqi MTS. This chapter has presented the theoretical framework, which explains the interrelationships among the variables developed based on RBV and KBV theories' perspectives. Subsequently, relevant hypotheses were developed. To achieve the research objectives, relevant research design (including purpose of research, study approach, unit of analysis, identifying population and sample, operational definition, measurement of variables/instrumentation, and questionnaire instrument) have been presented as a master plan of present study. Furthermore, this chapter has provided a description of statistical analysis procedures, followed by the shows the results of the pre-test and pilot study.

CHAPTER FOUR

DATA ANALYSIS AND FINDINGS

4.0 INTRODUCTION

The main aim of present study is to examine the relationships among core requirements of KM implementation, innovation, and OP from RBV and KBV theories' perspectives, especially in the Iraqi MTS. According to previous chapters, the relationships among these variables are coupled with the fact that studies are scarce, and their results are mostly inconclusive. The methodology along with justification of the methods used to examine the relationships among these variables is discussed in chapter three. Accordingly, the empirical evidence on the causal relationships for these variables is presented in this chapter, using SPSS v18 and AMOS v18. For full compliance with sample size requirements of the present study, 300 questionnaires which were randomly distributed among mid-level managers of the Iraqi MTS by personal delivery and collection of questionnaires from March to June 2011. Based on the application of the proportionate stratified random sampling technique, only 233 questionnaires were returned, resulting in a response rate of 77.67%. However, only 220 questionnaires were usable, resulting in a usable response rate of 73.34%. This chapter consists of seven sections. The first presents the preparation of the data for analysis followed by the preliminary analysis in the second section. The descriptive statistics are given in the third section, and the fourth section presents the underlying statistical assumptions of the research. Testing of the goodness of measurement instrument is summarized in the fifth section. Hypothesis testing using the SEM is then explained in section six. Finally, the seventh section provides the chapter conclusion.

4.1 PREPARATION OF THE DATA FOR ANALYSIS

The main purpose of this section is to prepare sample data for further analysis. It included cleaning and screening of the sample data. Details of the procedures used to getting the sample data ready for analysis are explained in the following sections: coding and data entry and missing data.

4.1.1 Coding and Data Entry

Coding is a process used to clarify the translation of respondent information and question responses to specific categories for the analysis procedures (Kerlinger & Lee, 2000). As recommended by Sekaran and Bougie (2010), the collected sample data needs to be coded to transcribe them from the questionnaire survey before they are entered into the dataset. Furthermore, each item in the questionnaire survey must have a unique name, some of which clearly identify the information like gender, age, education, and so on (Schleicher & Saito, 2005). In the present study, the data was coded by assigning numerical values and the items were coded by assigning character symbols. The coding sheet of items and data is presented in Appendix 2 – Part A.

4.1.2 Missing Data

Missing data refers to the fact that not all respondents answered each question in the questionnaire survey. This occurred for many reasons; they did not understand the question, did not know the right answer for the question, or were not willing to answer the question (Sekaran & Bougie, 2010). Therefore, the missing data is a familiar problem in surveys (Hair *et al.*, 2010). On the other hand, it is very crucial to use AMOS because the statistical analysis techniques of the data will not run if there is any missing data (Schumacker & Lomax, 2004). Table 4.1 below provides an outline of the all procedures for missing data status.

Table 4.1
Procedures of Missing Data Status

Missing Data Status	Procedures
≤ 10%	Ignored
< 15%	Candidates for deletion
20% to 30%	Replacing missing values with mean or median by SPSS
≥ 50%	Delete

Source: Adapted from Hair *et al.* (2010)

As evident from Table 4.1, 3 cases of respondents' answers (12, 109, and 177) were deleted because the participants did not finish more than 50% of the 110 questions (see Table 4.2). As a result, the researcher could not find any missing data. Thus, a total of 230 questionnaires were used for further analysis (for more details, please refer to Appendix 2- Part B).

Table 4.2
Missing Data by Respondents' Cases (Number of Questions = 110)

Case ID	Missing Data by Case	
	Count	Percentage
12	56	51%
109	61	55%
177	58	53%

4.2 PRELIMINARY ANALYSIS

This section provides the preliminary analysis of the 230 questionnaires that were collected from mid-level managers working in the Iraqi MTS. In order to determine the suitability of sample data, further analysis was discovered in the treatment of non-response bias, multivariate outliers, and response rate.

4.2.1 Non-Response Bias

According to Sax *et al.* (2003), non-response bias refers to the prejudice that occurs when respondents' responses to the survey are different from those who did not respond due to diverse demographic factors such as (gender, age, educational level, etc.). In this case, Amstrong and Overton (1982) have argued that the respondents who respond late had similar characteristics to non-respondents. If the two groups did not differ in their responses, it is assumed that the non-response bias exists. Then, to determine whether a non-response bias exists, Pallant (2007) stated that the independent samples t-test can be used to test whether it is a non-response through comparison between the early and late responses.

The independent samples t-test provides two parts of the output. The first part, group statistics that consist of the mean, Standard Divination (SD) and Standard Error (SE) scores of responses were received before and after the reminders are sent. The second part is Levene's test that is defined as a statistical indicator used to evaluate the equality of variances in different samples (Landau & Everitt, 2004; Pallant, 2007).

As stated above, the demographic factors data of the present study were divided into two groups based on early response (i.e. those returned within one month after distribution: n = 171, 74.3 %) and late response (i.e. those returned after two month of distribution: n = 59, 25.7%). Tables 4.3 and 4.4 provide the results of the independent samples t-test.

Table 4.3

Group Statistics of Independent Samples t-test (n=230)

Construct	Response Bias	N	Mean	Std. Deviation	Std. Error Mean
Gender	Early Response	171	1.18	.386	.030
	Late Response	59	1.17	.378	.049
Age	Early Response	171	3.11	1.180	.090
	Late Response	59	3.32	1.357	.177
Workplace	Early Response	171	2.62	1.507	.115
	Late Response	59	2.51	1.478	.192
Educational Level	Early Response	171	3.20	.794	.061
	Late Response	59	3.17	.723	.094
Experience	Early Response	171	2.73	1.100	.084
	Late Response	59	2.97	1.098	.143
Position	Early Response	171	7.05	3.234	.247
	Late Response	59	7.59	3.212	.418

By using the SPSS v18, Table 4.3 above showed that there were only limited differences of the mean scores between the two groups (early response and late response) of each demographic factor. This indicates that respondents from the early and late response were free from data bias, as was also confirmed by Levene's test for equality of variances (see Table 4.4).

Table 4.4

Levene's Test of Independent Samples t-test (n=230)

Construct		**Levene's Test for Equality of Variances**	
		F	**Sig.**
Gender	Equal variances assumed	.168	.682
	Equal variances not assumed		
Age	Equal variances assumed	3.134	.078
	Equal variances not assumed		
Workplace	Equal variances assumed	.053	.818
	Equal variances not assumed		
Education	Equal variances assumed	.369	.544
	Equal variances not assumed		
Experience	Equal variances assumed	1.051	.306
	Equal variances not assumed		
Position	Equal variances assumed	.697	.405
	Equal variances not assumed		

According to Pallant (2007), when the significance level of the Levene's test is greater than .05 ($p > .05$), the equal variances assumption between the early and late response has not been violated. In this case, the results in Table 4.4 above were obtained by comparing the *p*-value to a significance level at a .05. There were no significant differences between the perceptions of the early and late response of all the demographic factors. Hence, the test results display that the sample size is free from response bias since late responses were similar to those of the early response (for more details, please refer to Appendix 2- Part C).

4.2.2 Treatment of Multivariate Outliers

Multivariate outliers can be defined simply as an observation with a unique combination of characteristics that is substantially different from other observations in the dataset (Hair *et al.*, 2010; Sekaran & Bougie, 2010). Hair *et al.* (2010) and Kline (2011) suggested that, as a rule of thumb, the criterion for recognition of multivariate outliers is Mahalanobis Distance (D^2). The maximum D^2 should not exceed the threshold chi-square (χ^2) value with a degree of freedom equal to the number of measurement items and ($p < .001$). In the present study, D^2 is evaluated as a χ^2 with a degree of freedom of 110 items of the measurement instrument. In this case, the critical value for D^2 is 149.449 (for more details, please refer to Appendix 2- Part D). Based on the result from SPSS v18, the minimum value of D^2 was 61.417 and the maximum value of D^2 was 171.796 (see Table 4.5).

Table 4.5
*Test of Mahalanobis Distance * (n=230)*

	Minimum	Maximum	Mean	Std. Deviation
Predicted Value	-16.94-	248.20	117.23	57.731
Std. Predicted Value	-2.324-	2.269	.000	1.000
Standard Error of Predicted Value	25.149	41.846	33.351	2.784
Adjusted Predicted Value	-106.79-	272.79	117.32	66.861
Residual	-105.086-	118.386	.000	34.727
Std. Residual	-2.181-	2.457	.000	.721
Stud. Residual	-3.001-	3.031	-.001-	1.010
Deleted Residual	-198.945-	191.641	-.090-	69.391
Stud. Deleted Residual	-3.109-	3.143	-.001-	1.019
Mahal. Distance	61.417	171.796	109.522	18.528
Cook's Distance	.000	.082	.009	.014
Centered Leverage Value	.268	.750	.478	.081

*Dependent Variable: ID

Furthermore, any case of respondent's answers that have a D^2 greater than 149.449 is considered as a multivariate outlier and is subsequently removed from the dataset. Thus, the researcher had to delete some cases of respondent's answers that were greater than the critical value for D^2 (see Table 4.6).

Table 4.6
List of Deleted Cases after the Treatment of Mahalanobis Distance

No.	Case Number	Count of Multivariate Outliers (Mahalanobis D^2)
1	3	151.12579
2	5	155.22973
3	14	156.99641
4	29	163.02727
5	116	161.20601
6	132	164.19690
7	143	153.12400
8	196	155.60596
9	212	167.00350
10	220	171.79616

As can be seen from the table 4.6, the treatment of D^2 identified 10 cases of respondent's answers out of the total of 230 as multivariate outliers. These were dropped from further analysis. Then, the total usable questionnaires remained at 220.

4.2.3 Response Rate

Response refers to the number of respondents who answered the survey divided into the number of respondents in the sample size (Hamilton, 2009). Of the 300 questionnaires randomly distributed among mid-level managers of the Iraqi MTS, only 233 questionnaires were returned for a response rate of 77.67%. Out of these responses, 1% of the 3 questionnaires were unusable because the respondents did not complete all of the questions. Thus, 76.67% of the 230 questionnaires were used in the analysis. After screening, 3.33% of 10 questionnaires were found to be outliers. Therefore, the final total usable response rate was 73.34% of the 220 questionnaires (see Table 4.7). In this regard, Babbie (2007) has argued that a response rate of 50% is acceptable for surveys in social research. Thus, the response rate for the present study is more than adequate. Further, the total number of usable questionnaires was considered sufficient to run all the statistical analysis techniques, particularly a SEM analysis (Byrne, 2010; Hair *et al.*, 2010; Kline, 2011).

Table 4.7
Summary of the Response Rate

Questionnaires Status	Count	Percentage
Distributed	300	100%
Not Returned	67	22.33%
Returned	233	77.67%
Unusable	3	1%
Outliers	10	3.33%
Total Usable Questionnaires	**220**	**73.34%**

4.3 DESCRIPTIVE STATISTICS

Descriptive analysis seeks to transform the raw data into usable information. Its primary function is to describe a set of variables in a situation that will make them simple to understand and interpret (Zikmund *et al.*, 2010). The main purpose of this analysis is to give a useful meaning of the data through frequency distribution, mean, SE, SD, and variance, which enable the researcher to identify differences among variables (Sekaran & Bougie, 2010). Then, full details of this analysis were given of respondents' demographic factors and variables using 220 usable questionnaires.

4.3.1 Descriptive Statistics of Respondents' Demographic Factors

The respondents' demographic factors were gathered to collect information about each respondent that participated in the survey. Respondents were asked to provide information concerning their gender, age, workplace, educational level, experience, and position. The questions were designed for the respondents to choose their answers based on categories as opposed to providing specific information. Table 4.8 below shows the profile of the respondents' demographic factors using SPSS v18.

Table 4.8
Profile of the Respondents' Demographic Factors

Construct	Category	Count	Percentage %
Gender	Male	180	81.8
	Female	40	18.2
Total		**220**	**100.0**
Age	Between 18 and 25 years	26	11.8
	Between 26 and 35 years	34	15.5
	Between 36 and 45 years	75	34.1
	Between 46 and 55 years	46	20.9
	Over 56 years	39	17.7
Total		**220**	**100.0**
Workplace	Asia-Cell	63	28.6
	Korek & Sanatel	56	25.5
	Zain Iraq	64	29.1
	Omnnea	21	9.5
	Itisaluna	16	7.3
Total		**220**	**100.0**
Educational level	High School	2	.9
	Diploma	21	9.5
	Bachelor's degree	146	66.4
	Master's degree	32	14.5
	PhD	19	8.6
Total		**220**	**100.0**
Experience	Less than 1 year	35	15.9
	Between 1 and 3 years	54	24.5
	Between 4 and 6 years	51	23.2
	Over 6 years	80	36.4
Total		**220**	**100.0**
Position	Accounting Manager	18	8.2
	Auditing Manager	15	6.8
	Information Systems Manager	12	5.5
	Sales Manager	8	3.6
	Administration Manager	12	5.5
	Quality Manager	7	3.2
	Planning Manager	9	4.1
	Customers Services Manager	34	15.5
	Human Resources Manager	41	18.6
	Marketing Manager	42	19.1
	Maintains Manager	22	10.0
Total		**220**	**100.0**

In the obtained results in Table 4.8, the final sample consisted of a total of 220 respondents from Iraqi MTS. Most of the respondents that participated in the survey were males 81.8%. There were only a small number of females 18.2%. This indicates the dominance of male in occupying mid-level managers positions. Meanwhile, the respondents whose ages were between 36 and 45 years had a highest percentage of participation 34.1%, while the respondents' age are between 18 and 25 years had a lowest percentage of participation 11.8% in the survey. This indicates that the majority of the respondents have had considerable working experience. The respondents that worked in the Zain-Iraq company had the greatest percentage of participants 29.1% in the survey, while the respondents that worked in the Itisaluna company had the lowest percentage of participants 7.3% in the survey. The educational level shows that the highest percentage of participation 66.4% was of the respondents that hold Bachelor's degrees, while .9% of the respondents that hold high school certificate. The table shows that more 6 years experience had the most percentage of participants 36.4% rather than the percentage of less 1 year experience was 15.9%. Therefore, the respondents can be considered to be familiar with the goals and operations of their companies. Finally, marketing managers had a maximum percentage of participation 19.1%, while the quality managers had a minimum percentage of participation 3.2% in the survey (for more details, please refer to Appendix 2 part E). As a result, the respondents have some characteristics that may help to achieve the overall objectives of present study.

4.3.2 Descriptive Statistics of the Variables

The descriptive statistics of the variables through mean, SE, SD, and variance can give the researcher a detailed idea of how the participants in the survey have responded to the items in the questionnaire (Sekaran & Bougie, 2010). The descriptive statistics using SPSS v18 of each variable can be seen in Table 4.9 (for more details, please refer to Appendix 2 part F).

Table 4.9
Descriptive Statistics of all Variables (n=220)

Variable	Mean	SE	SD	Variance
CSFs of KM	2.649	.038	.570	.326
KMSs	2.912	.053	.794	.631
KMPs	2.801	.042	.623	.389
Innovation	2.615	.048	.716	.513
OP	2.788	.043	.652	.426

Monavvarian and Khamda (2010) have claimed that the performance of any organisation is under the acceptable amount if the mean value of all the variable items is under the average value of the measurement scale on the basis of respondents' opinions. Table 4.9 depicts that the all items of the CSFs of KM, KMSs, KMPs, innovation and OP had mean values 2.649, 2.912, 2.801, 2.615, and 2.788, respectively, below the average five-point Likert scale of 3. As a result, the researcher can find that on the basis of respondents' opinions the CSFs of KM, KMSs, and KMPs are below the acceptable level of implementation. Meanwhile, on the basis of respondents' opinions the innovation and OP are below satisfactory level.

Alternatively, all the SE, SD and variance scores of the variables are on a satisfactory level. Particularly, if the SD of the sample data is less than the mean values, the sample data is more uniform while less dispersed and spread. It is then, easier to analyse and control (Saliu, 2004). As a result, the sample data is meaningful for achieving the present study's objectives.

4.4 UNDERLYING STATISTICAL ASSUMPTIONS

Using the underlying statistical assumptions that include: normality, multicollinearity, linearity, and homoscedasticity, it can be useful for multivariate analysis. It is helpful to accommodate multiple variables in an attempt to identify and understand the complex relationship between them (Hair *et al.*, 2010). Hence, the researcher will explain the assumptions of normality, multicollinearity, linearity, and homoscedasticity in the present section using 220 usable questionnaires.

4.4.1 Normality Assumptions

Normality refers to the bell-shaped curve of the data distribution for an individual metric variable and its correspondence to a normal distribution (Hair *et al.*, 2010). A normality distribution of sample data is depicted as a symmetrical bell-shaped curve that has the highest range of frequency in the middle with smaller range of frequencies towards the extremes (Gravetter & Wallnau, 2000).

Indeed, checking the normality distribution of a variable is critical for each multivariate analysis, such as factor analysis, multiple regression, and SEM. It is considered a benchmark for evaluating other statistical methods (Hair *et al.*, 2010). Non-normality distribution is the main cause of distorted relationships among variables and the significance tests of results (Hulland, 1999). Thus, it is important before any analysis of sample data to check for normal distribution.

Skewness and Kurtosis are the main tests that can be used to validate normality assumptions (Pallant, 2007). Skewness refers to the measure of normality assumptions by describing the balance of the sample data distribution, that is, is it unbalanced and shifted to right, left or centered side and symmetrical with about the same shape on both sides, while the Kurtosis refers to the measure of normality assumptions by comparing them with a "peakedness" or "flatness" of the sample data distribution (Hair *et al.*, 2010).

As conservative rule of thumb, Hair *et al.* (2010) have argued that sample data is considered normal if the test of Skewness values and test of Kurtosis values are between ±1.96 at the significant level .05, and ±2.58, at the significant level .01. Tabachink and Fiedell (2007) also argued that the rule of thumb for checking normality can be based on a test if Skewness values are within ±2.00 and a test to see if the Kurtosis values are within ±7.00. Moreover, Kline (2011) stated that the Skewness values should be within ±3.00 and Kurtosis values should be within ±10.00. By examining the Skewness and Kurtosis using AMOS v18, the analysis found that none of the variable items had Skewness values greater than (.684) and Kurtosis values greater than (-1.180). These results indicate that the sample data is consistent with a normality assumption required for further use in multivariate analysis (for more details, please refer to Appendix 3- Part A).

Alternatively, Kolmogorov-Smirnov and Shapiro-Wilk tests can also be used to explore the statistical distribution of sample data (Coakes & Ong, 2011; Hair *et al.*, 2010). The Kolmogorov-Smirnov test can be used when the sample size is greater than or equal 50 cases and the Shapiro-Wilk test can used when the sample size is less than or equal 50 cases (D'Agostino, 1971). If the significance level of the Kolmogorov-Smirnov test is above than .05, then the normality distribution is assumed (Coakes & Ong, 2011). Like the above, the Kolmogorov-Smirnov test can also be used to provide evidence of the normality distribution of the present study that is used for usable questionnaires (n=220), please refer to Table 4.10.

Table 4.10
Kolmogorov-Smirnov Test of Normality Distribution (n=220)

Variable	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
CSFs of KM	.060	220	.059	.989	220	.099
KMSs	.053	220	.200*	.988	220	.056
KMPs	.055	220	.200*	.992	220	.308
Innovation	.055	220	.098	.988	220	.055
OP	.049	220	.200*	.988	220	.059

a. Lilliefors Significance Correction
*. This is a lower bound of the true significance.

Based on the Kolmogorov-Smirnov results using SPSS v18 shown in Table 4.10, the significance levels of all the variables were greater than .05, which indicated that their distribution was normal (for more details, refer to Appendix 3- Part B).

Furthermore, most statisticians are recommended to use both the graphical plots and statistical tests to evaluate the accurate degree of normality distribution (Hair *et al.*, 2010; Tabachnick & Fidell, 2007). Apart from that, the bell-shaped curve cannot be as useful if the sample size is less than 50, but the bell-shaped curve for the distribution becomes quite sensitive if the sample size is 200 or above (Hair *et al.*, 2010). This is consistent with the sample size that was used in the analysis of the present study. Thus the present study also uses graphical methods to show the normality distribution for all the variables (for more details, please refer to Appendix 3- Part B).

4.4.2 Multicollinearity Assumptions

Multicollinearity refers to a problem that occurs when the independent variable is highly correlated with other independent variables within a correlation matrix. The problem leads to a complexity within to determine the specific contribution of each independent variable that predicts the dependent variable (Hair *et al.*, 2010; Sekaran & Bougie, 2010). As strongly recommended by Hair *et al.* (2010), multicollinearity assumptions among independent and dependent variables are necessary before performing the hypotheses testing of the model.

As generally agreed, the multicollinearity assumptions can be accomplished through testing the Tolerance value and Variance Inflation Factor (VIF) value (Pallant, 2007). Tolerance value is the indicator of determining the dependent variable prediction by other independent variables in the regression variate, while VIF is an indicator of the other independent variables that have impact on the standard error of a regression coefficient. It is Tolerance's inverse (Hair *et al.*, 2010). Multicollinearity exists when the results show Tolerance values below or equal 0.10 and VIF values higher or equal 10 (Hair *et al.*, 2010; Sekaran & Bougie, 2010). Table 4.11 below presents the results of the multicollinearity test using SPSS v18.

Table 4.11
*Test of Multicollinearity**

Variable	Collinearity Statistics	
	Tolerance	**VIF**
CSFs	.680	1.471
KMSs	.680	1.471
KMPs	.675	1.481
Innovation	.590	1.694

*Dependent Variable: OP

One important point observed from the results in Table 4.11, were that the results of Tolerance values were in the range between .590 to .680, and VIF values were in the range from 1.471 to 1.694. Hence, the results confirmed that the multicollinearity issue was absent in the interaction among the variables of the present study (for more details, please refer to Appendix 3- Part C).

4.4.3 Linearity Assumptions

Linearity shows the degree of change in the dependent variable related with the predictor variable being constant across the values range for the dependent variable (Hair *et al.*, 2010). However, it is considered as an implicit assumption of all multivariate analysis, such as multiple regression, logistic regression, factor analysis, and SEM, based on the correlation of the relationship. Since correlations represent only the linear relationships among variables, nonlinear effects will not be represented in the correlation value (Stamatis & Raton, 2003).

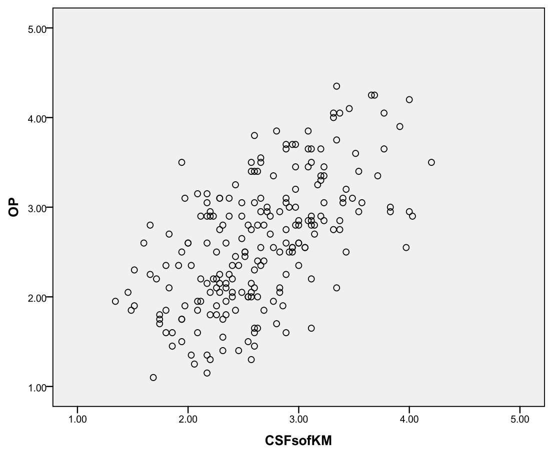


Figure 4.1
Random Pattern of the Relationship between OP and CSFs of KM

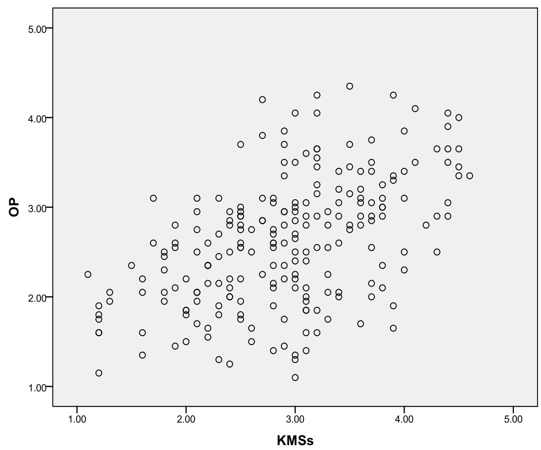


Figure 4.2
Random Pattern of the Relationship between OP and KMSs

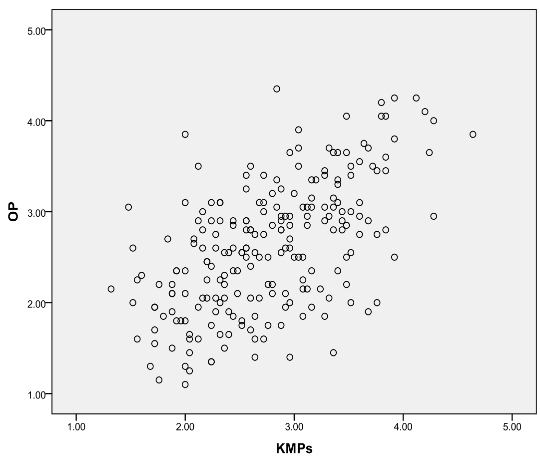


Figure 4.3
Random Pattern of the Relationship between OP and KMPs

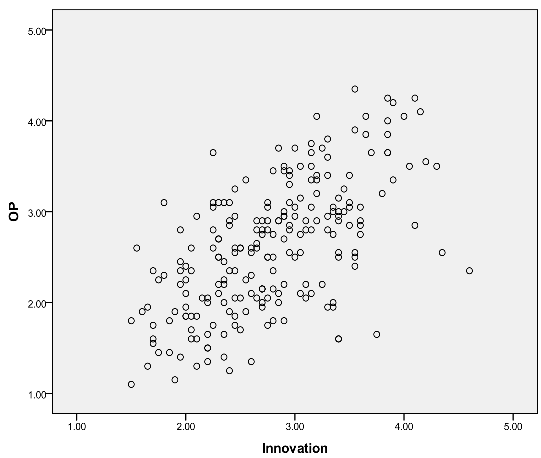


Figure 4.4
Random Pattern of the Relationship between OP and Innovation

Because a linear assumption is appropriate for multivariate analysis, the researchers must assess the linearity of the relationship between the independent variable and the dependent variable by identifying residuals and examining residual plots (Hair *et al.*, 2010; Sheather, 2009). A residual plot is a graph that shows the residuals on the vertical axis and the independent variable on the horizontal axis. If the residual plot shows a random scatter of the points around the horizontal axis, the linear assumption is present in the sample data (Hsu & Poole, 2011).

As can be seen from figures 4.1, 4.2, 4.3, and 4.4, the residual scatter-plot using SPSS v18 shows four patterns. The patterns are generally random in distribution and evenly dispersed throughout the residual scatter-plot, which indicates that the linearity assumptions of the all relationships among the variables are present.

4.4.4 Homoscedasticity Assumptions

Homoscedasticity refers to the assumption of the predicted dependent variable displays similar amounts variance across the range of values for an independent variable (Huang, 2007). It is essential in multivariate analysis to avoid the opposite effects of heteroscedasticity, which lead to decreases in the correlation between variables (Hair *et al.*, 2010). It can be checked by looking at the scatter-plot between dependent variables and independent variables. If the residual scatter-plot is captured approximately equal in width for all values of the predicted dependent variable, then the sample data is homoscedastic (Tabachnick & Fidell, 2007).

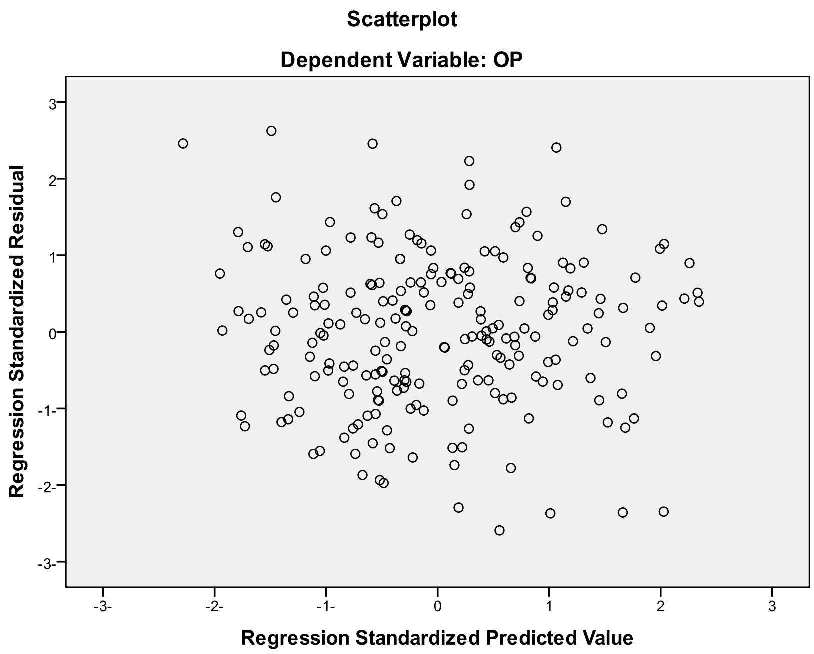


Figure 4.5
The Residual Scatter-Plot of Homoscedastic Assumptions

Based on the results from SPSS v18, Figure 4.5 above confirmed that the sample data is assumed to be homoscedastic. This is because the residual scatter-plot has the approximately equal width for all values of the predicted dependent variable. Furthermore, it also confirmed that the sample data meets the assumptions of normality and linearity.

4.5 TESTING GOODNESS OF THE MEASUREMENT INSTRUMENT

As mentioned in Chapter 3, most of the items that are used to measure the variables have been adapted from prior studies, with the exception of two items for KMPs, one item for innovation, and four items for OP, which were developed by the researcher. Even though the borrowed measurement instrument has been confirmed of its stability and consistency, it is necessary to re-examine the exactness of the measurement instruments because the previous studies were done in different business environment and organisational culture. In fact, this first study seeks to define empirical evidence of the current measurement instrument in the Iraqi MTS context, where the business environment and organisational culture are entirely different from the international organisations. According to Sekaran and Bougie (2010), the goodness of measurement instrument is used to ensure there are stability, consistency, and accuracy between items of each variable. Any researcher can examine the goodness of measurement instrument through the Exploratory Factor Analysis (EFA), reliability, and construct validity. Hence, they were established, as described below.

4.5.1 Dimensionality of the Measurement Instrument Using Exploratory Factor Analysis

EFA is used to look at the dimensionality of a measurement instrument through finding the minimum number of interpretable factors required to explain the correlations among overall variables (Colton & Covert, 2007). Then, EFA is a useful tool for understanding the factor structure of a measure instrument and to confirm that the items are suitable for each variable. It is extremely helpful for the primary purpose in the development of a set of measurement items as all factor loadings are free to vary across groups (Dobni, 2008; Hair *et al.*, 2010). Generally, an important tool in achieving a simplified factor structure is Varimax rotation. It is used to assure that all the correlational relationships between variable items are presented in the same factor loadings. Furthermore, if the variable items in a scale of measurement are loaded on more than one factor, Varimax rotation is used (Field, 2000; Hair *et al.*, 2010). Before EFA can be applied, the following requirements should be fulfilled.

1. Sample Size is generally should not be less than 50 cases, and the preferable size should be 100 or above (Hair *et al.*, 2010). Furthermore, Coakes and Ong (2011) have emphasized that a sample size of 100 cases is acceptable, but a

sample size of 200 or above is preferable. Hence, the sample size of 220 cases in the present study is sufficient to conduct factor analysis.

2. Factor Loadings of ±.30 or ±.40 are considered to meet the minimum level for interpretation of structure and factor loadings of ±.50 or greater are considered more significant (Hair *et al.*, 2010). Further, each item should load ≥ .50 on a specific factor and a loading ≤ .35 on other factors (Igbaria, Iivari, & Maragahh, 1995).
3. Eigenvalue refers to the variance of the new factors that will successively be extracted by principal component analysis (Kakkar & Narag, 2007). It must be greater than 1 (Hair *et al.*, 2010; Tabachnick & Fidell, 2007).
4. Kaiser Meyer Olkin (KMO) is an index for determining the sampling adequacy (Field, 2000). Table 4.12 below provides the assessment and description of the sampling adequacy.

Table 4.12
Assessment and Description of the Sampling Adequacy

Assess	**Describe**
.90	Marvelous
.80	Meritorious
.70	Middling
.60	Mediocre
.50	Miserable
Below .50	Unacceptable

Source: Adapted from (Kaiser, 1974).

5. Bartlett test of Sphericity is statistical test to determine the significant of all correlations within correlation matrix (Hair *et al.*, 2010). Following Pallant's (2007) rules of thumb, the value of this test should be significant at ($p < .05$).
6. Scree plot is a plot of the eigenvalue beside the factors number to extract (Hair *et al.*, 2010).

Based on the above, the EFA of each variable using SPSS v18 can be seen in Tables 4.13,4.14,4.15,4.16, and 4.17 (for more details, please refer to Appendix 4 part A).

Table 4.13
Factor Loadings of the Critical Success Factors of Knowledge Management (n=220)

Dimension	**Item**	**Factor Loading 1**	**Factor Loading 2**	**Factor Loading 3**	**Factor Loading 4**	**Factor Loading 5**	**Factor Loading 6**	**Factor Loading 7**
OC	**OC1**	.669						
	OC2	.841						
	OC3	.801						
	OC4	.839						
	OC5	.772						
IT	**IT1**		.740					
	IT2		.736					
	IT3		.686					
	IT4		.687					
	IT5		.806					
OS	**OS1**			.775				
	OS2			.763				
	OS3			.631				
	OS4			.716				
	OS5			.740				
HR	**HR1**				.734			
	HR2				.769			
	HR3				.781			
	HR4				.694			
	HR5				.601			
OL	**OL1**					.791		
	OL2					.612		
	OL3					.593		
	OL4					.827		
	OL5					.678		
LE	**LE1**						.706	
	LE2						.740	
	LE3						.790	
	LE4						.676	
	LE5						.704	
OT	**OT1**							.624
	OT2							.564
	OT3							.732
	OT4							.834
	OT5							.627
Eigenvalue		8.559	3.621	2.538	2.006	1.923	1.715	1.573
% of Variance		24.455	10.344	7.251	5.730	5.494	4.901	4.493
Total variance Explained:								62.669
Kaiser-Meyer-Olkin Measurement:								.837
Bartlett's Test of Sphericity:								3,723.819
df:								595
Sig.:								.000

Based on the Varimax rotation method, the outputs of Table 4.13 showed all thirty five items were known as an accurate tool to measure CSFs of KM. They were categorized in seven factor loadings. The factor analysis had indicated that (i) the correlation of all items above the recommended cutoffs .50, which refers to the correlation matrix that provided sensible basis for factor analysis; (ii) seven factor loadings had an eigenvalue greater than one and these factor loadings captured 62.669 percent of the total variance of the items; (iii) KMO measure of sampling adequacy index was at .837, which is very sufficient; (iv) Bartlett test of Sphericity was very large significant at χ^2 = 3,723.819, with a p < .000. In addition, the Scree plot (see Figure 4.6) indicated that factor loadings of each item on the seven dimensions as the curve began to flatten after the seventh factor. Therefore, all these have statistically confirmed that factors loadings of the CSFs of KM items were very suitable for the present study.

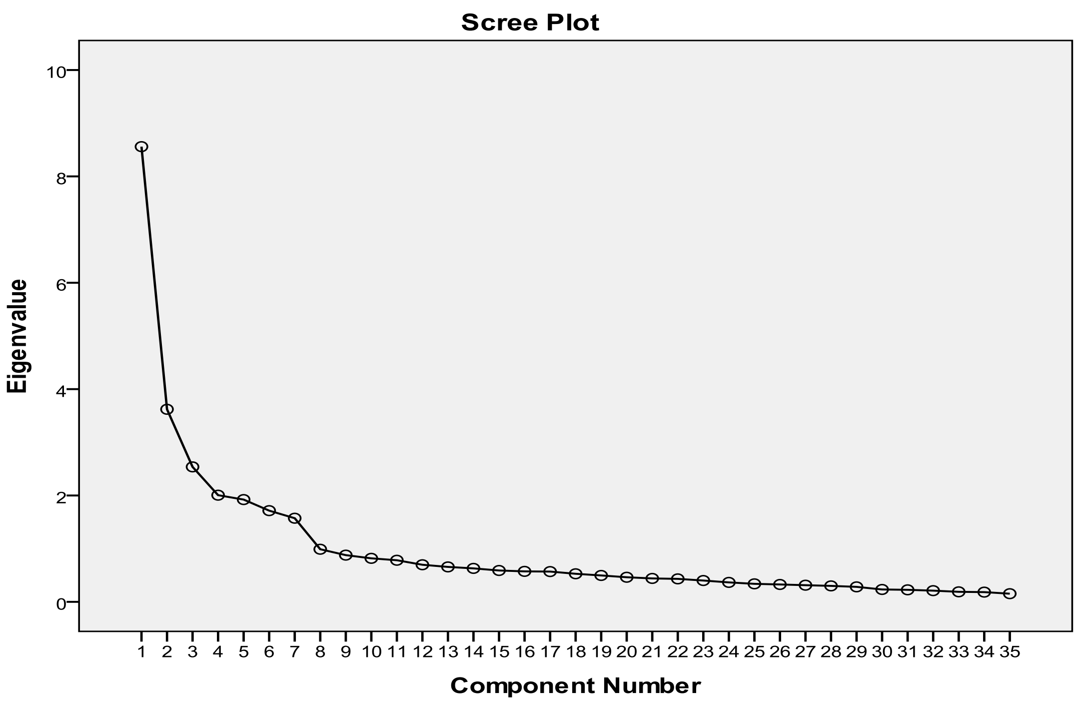


Figure 4.6
Scree Plot of the CSFs of KM

The same procedure of the Varimax rotation method was conducted on the KMSs. The outputs of Table 4.14 show that all ten items were suitable tools for the measurement of KMSs. They were grouped in two factor loadings. The factor analysis had indicated that (i) the correlation of all items exceeded the recommended cutoffs .50, which refers to the correlation matrix provided reasonable basis for factor analysis, (ii) two factors had an eigenvalue greater than one and these factor loadings captured 62.217 percent of the total variance of the items, (iii) KMO measure of sampling adequacy was at .873, which is very adequate, and (iv) Bartlett test of Sphericity was significant at χ^2 = 930.455, with a $p < .000$.

Table 4.14

Dimension	**Item**	**Factor Loading 1**	**Factor Loading 2**
PS	**PS1**	.790	
	PS2	.750	
	PS3	.804	
	PS4	.708	
	PS5	.770	
CS	**CS1**		.762
	CS2		.735
	CS3		.788
	CS4		.615
	CS5		.799
Eigenvalue		4.607	1.615
% of Variance		46.069	16.148
Total variance Explained:			62.217
Kaiser-Meyer-Olkin Measurement:			.873
Bartlett's Test of Sphericity:			930.455
df:			45
Sig.:			.000

Moreover, the Scree plot (see Figure 4.7) indicated that factor loadings of each item on the two dimensions as the curve began to flatten after the second factor. Hence, all these have statistically confirmed that factor loadings of KMSs items were very appropriate for the present study.

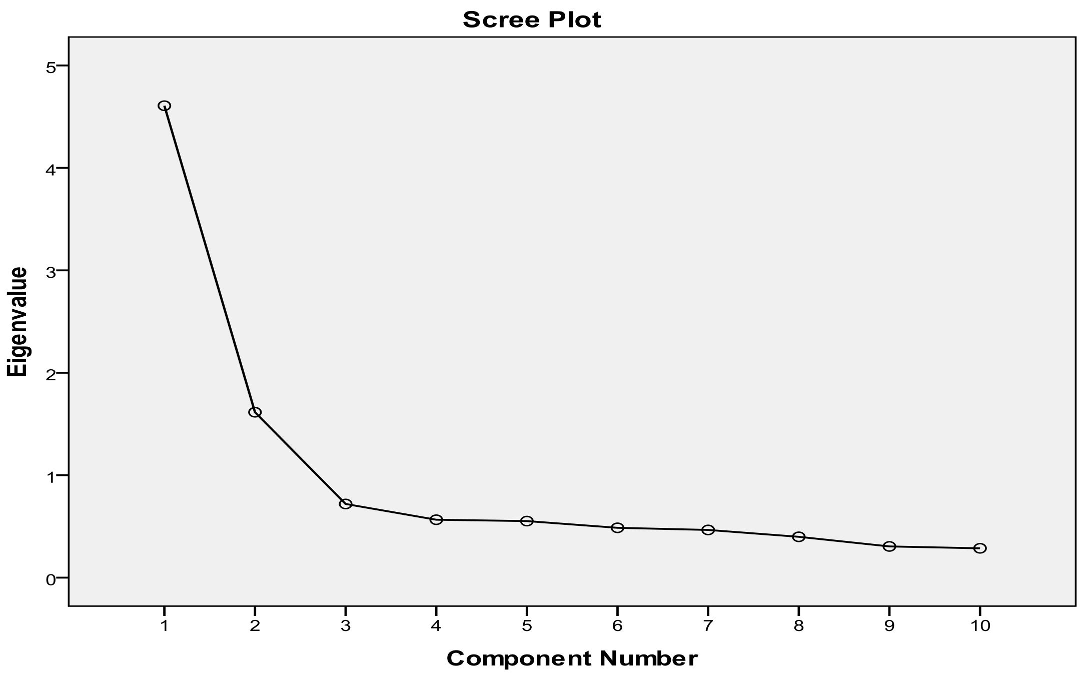


Figure 4.7
Scree Plot of KMSs

In the context of Varimax rotation method, the outputs of Table 4.15 displays that all twenty five items were appropriate tools for the measurement of KMPs. They were classified in five factor loadings. The factor analysis had indicated that (i) the correlation of all items greater than the recommended cutoffs .50, which refers to the correlation matrix provided reasonable basis for factor analysis, (ii) five factors had an eigenvalue greater than one and these factor loadings captured 62.171 percent of the total variance of the items, (iii) KMO measure of sampling adequacy was at .842, which is very satisfactory, (iv) Bartlett test of Sphericity was very large significant at χ^2 = 2,493.203, with a $p < .000$.

Table 4.15

Factor Loadings of Knowledge Management Processes (n=220)

Dimension	Item	Factor Loading 1	Factor Loading 2	Factor Loading 3	Factor Loading 4	Factor Loading 5
KU	KU1	.732				
	KU2	.807				
	KU3	.841				
	KU4	.809				
	KU5	.636				
KH	KH1		.777			
	KH2		.765			
	KH3		.791			
	KH4		.788			
	RECOKH5*		.683			
KO	KO1			.825		
	KO2			.620		
	KO3			.792		
	KO4			.751		
	KO5			.740		
KC	KC1				.775	
	KC2				.719	
	KC3				.727	
	KC4				.642	
	KC5				.774	
KS	KS1					.742
	KS2					.735
	KS3					.707
	KS4					.698
	KS5					.597
Eigenvalue		6.701	2.860	2.280	2.180	1.522
% of Variance		26.803	11.441	9.122	8.718	6.087
Total variance Explained:						62.171
Kaiser-Meyer-Olkin Measurement:						.842
Bartlett's Test of Sphericity:						2,493.203
df:						300
Sig.:						.000

Note: * indicates that the item is actually measured in a reverse fashion.

Furthermore, the Scree plot (see Figure 4.8) indicated that factor loadings of each item on the five dimensions as the curve began to flatten after the fifth factor. Thus, all these have statistically confirmed that factor loadings of KMPs items were very proper for present study.

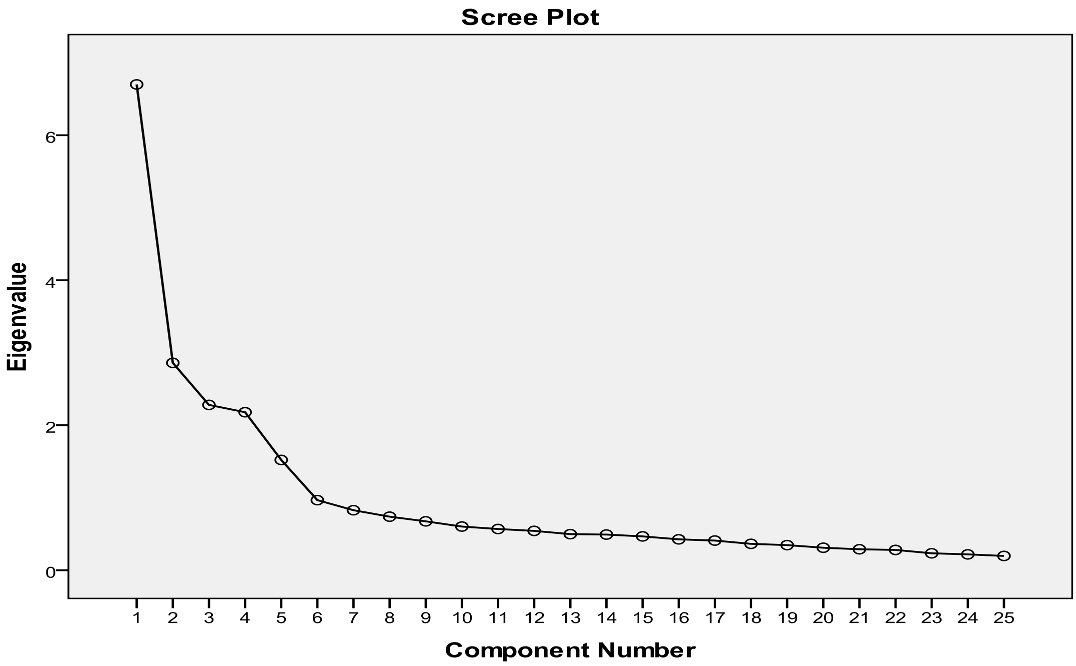


Figure 4.8
Scree Plot of KMPs

Following the same statistical method, Table 4.16 depicts that all twenty items were appropriate tools for the measurement of innovation. They were categorized in four factor loadings. The factor analysis had indicated that (i) the correlation of all above the recommended cutoffs .50, which refers to the correlation matrix provided a reasonable basis for factor analysis, (ii) four factors had an eigenvalue greater than one and these factor loadings captured 62.456 percent of the total variance of the items, (iii) KMO measure of sampling adequacy was at .870, which is very acceptable, and (iv) Bartlett test of Sphericity was significant at $\chi^2 = 2{,}042.073$, with a $p < .000$.

Table 4.16

Factor Loadings of Innovation (n=220)

Dimension	Item	Factor Loading 1	Factor Loading 2	Factor Loading 3	Factor Loading 4
TI	TI1	.658			
	TI2	.785			
	TI3	.742			
	TI4	.754			
	TI5	.755			
NI	NI1		.751		
	NI2		.762		
	NI3		.678		
	NI4		.772		
	NI5		.714		
AI	AI1			.782	
	AI2			.742	
	AI3			.740	
	AI4			.663	
	AI5			.843	
RI	RI1				.764
	RI2				.702
	RI3				.776
	RI4				.726
	RI5				.703
Eigen Value		6.449	2.865	1.775	1.402
% of Variance		32.245	14.327	8.876	7.008
Total variance Explained:					62.456
Kaiser-Meyer-Olkin Measurement:					.870
Bartlett's Test of Sphericity:					2,042.073
df:					190
Sig.:					.000

Also the Scree plot (see Figure 4.9) indicated that factor loadings of each item on the four dimensions as the curve began to flatten after the fourth factor. Then, all these have statistically confirmed that factor loadings of the innovation items were very fit for the present study.

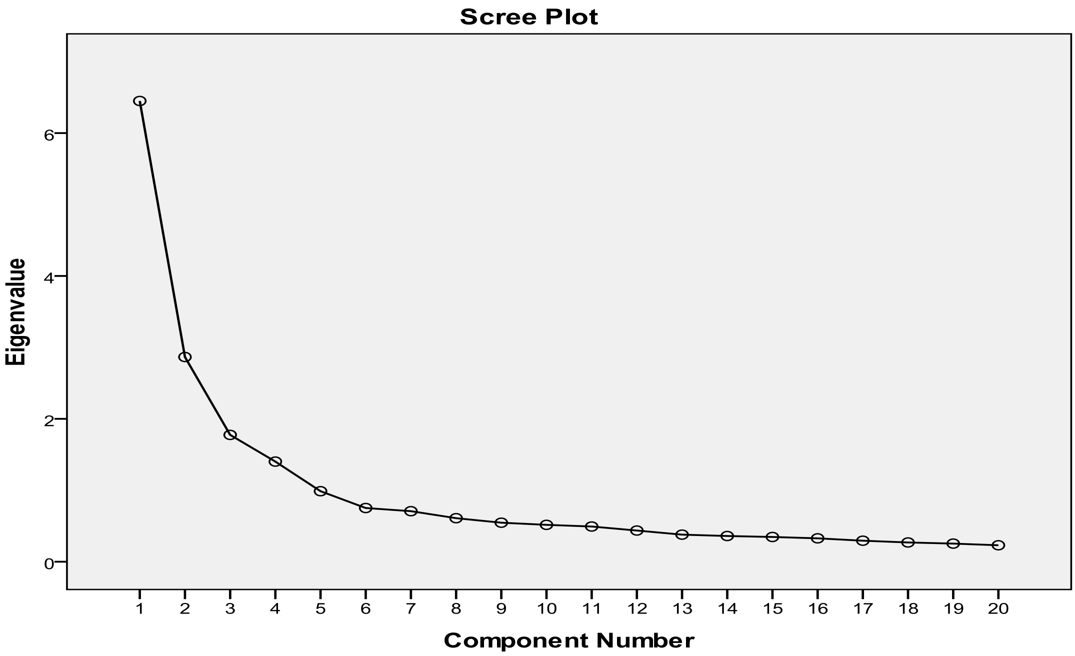


Figure 4.9
Scree Plot of Innovation

As shown in Table 4.17 shows the all twenty items were known as a right tool for measure OP as dependent variable. They were grouped in four factor loadings. The factor analysis had indicated that (i) the correlation of all more than the recommended cutoffs .50, which refers to the correlation matrix provided reasonable basis for factor analysis, (ii) four factors had an eigenvalue greater than one and these factor loadings captured 64.804 percent of the total variance of the items, (iii) KMO measure of sampling adequacy was at .883, which is extremely adequate, (iv) Bartlett test of Sphericity was very significant at χ^2 = 2,344.877, with a $p < .000$.

Table 4.17
Factor Loadings of Organisational Performance (n=220)

Dimensions	**Items**	**Factor Loading 1**	**Factor Loading 2**	**Factor Loading 3**	**Factor Loading 4**
	GP1	.721			
	GP2	.773			
GP	**GP3**	.670			
	GP4	.735			
	GP5	.707			
	CP1		.731		
	CP2		.771		
CP	**CP3**		.828		
	CP4		.685		
	CP5		.787		
	IP1			.724	
	IP2			.697	
IP	**IP3**			.763	
	IP4			.780	
	IP5			.752	
	FP1				.800
	FP2				.740
FP	**FP3**				.673
	FP4				.755
	FP5				.722
Eigen Value		7.192	2.605	1.752	1.412
% of Variance		35.958	13.027	8.759	7.060
Total variance Explained:					64.804
Kaiser-Meyer-Olkin Measurement:					.883
Bartlett's Test of Sphericity:					2,344.877
df:					190
Sig.:					.000

Also the Scree plot (see Figure 4.10) indicated that factor loadings of each item on the four dimensions as the curve began to flatten after the fourth factor. As a result, all these have statistically confirmed that factor loadings of the OP items were very appropriate for the present study.

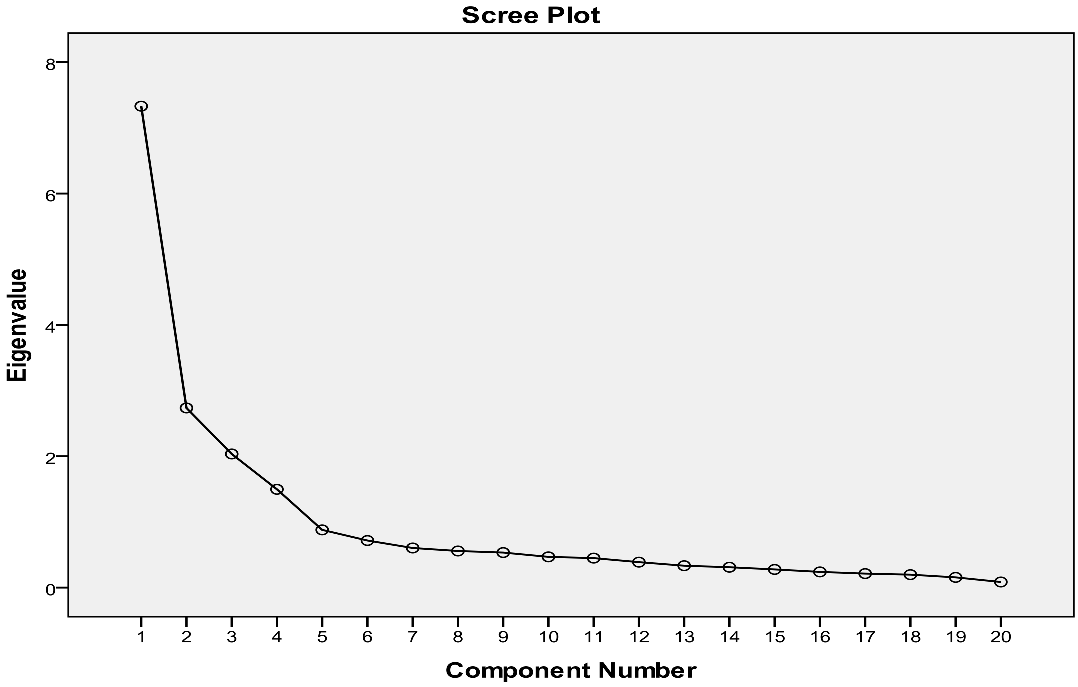


Figure 4.10
Scree Plot of OP

Similarly to these findings, no items were dropped. All five of the variables (CSFs of KM, KMSs, KMPs, innovation, and OP), and their related measurement instruments were further used in multivariate analysis.

4.5.2 Reliability of the Measurement Instrument

Reliability refers to the stability and consistency of the measurement instrument. Cronbach's alpha coefficient is adequate to estimate the reliability of the measurement instrument (Hair *et al.*, 2010; Sekaran & Bougie, 2010; Zikmund *et al.*, 2010). Sekaran and Bougie (2010) stated that the value of Cronbach's alpha is considered good when it is .80, acceptable when it is .70 and poor when it is .60. Typically, many authors have statistically recommended a Cronbach's alpha value that is equal .70 or above is considered adequate (Hair *et al.*, 2010; Nunnally & Bernstein, 1994). Therefore, a Cronbach alpha value of .70 is considered the cut-off value. Table 4.18 below displays the reliability test results of the measurement instrument using SPSS v18.

Table 4.18
Reliability Test Results of the Measurement Instrument (n=220)

Variable	**Dimension**	**No. of Items**	**Original Cronbach's alpha Value ≥ .70**	**Final Cronbach's alpha Value ≥ .70**
CSFs of KM	HR	5	.834	.794
	IT	5	.956	.845
	LE	5	.955	.815
	OL	5	.896	.828
	OS	5	.926	.797
	OT	5	.912	.796
	OC	5	.924	.880
KMSs	CS	5	.766	.826
	PS	5	.712	.855
KMPs	KC	5	.780	.811
	KO	5*	.861	.820
	KS	5*	.879	.815
	KH	5	.750	.847
	KU	5	.868	.875
Innovation	TI	5	.730	.839
	AI	5	.878	.837
	RI	5	.900	.822
	NI	5*	.860	.856
OP	FP	5*	.970	.832
	CP	5*	.930	.861
	IP	5*	.950	.865
	GP	5*	.960	.849

Note: *One item in a dimension was developed by researcher.

As shown in Table 4.18, the results of the Cronbach's alpha values exceeded the required level of .70 (for more details, please refer to Appendix 4 part B). These results suggest that the theoretical variables display a good internal stability and consistency. Moreover, these results are consistent with the measures used in prior studies.

4.5.3 Construct Validity of the Measurement Instrument

Validity determines the accuracy of measurement instruments of the variables (Hair *et al.*, 2010). Specifically, construct validity makes certain the degrees of measurement instruments represent the theoretical variables that they are designed to measure (Hair *et al.*, 2010). According to Friedman, Goldman, and Srivastava (2004), Lohr, Aaronson, Alonso, Burnam, Patrick, Perrin, and Roberts (1996), and Stewart (1990), construct validity can be assessed by examining the Pearson's correlation coefficient between the variables.

Pearson's correlation coefficient indicates the extent to which each variable relates to the construct measured by the final value. Increasing the total value occurs by removing the item of interest which prevents spuriously high values due to item overlap. Then, the high correlation between variables indicates the construct validity of measurement instrument (Norman, Sloan, & Wyrwich, 2003; Puhan, Gaspoz, Bridevaux, & Schindler, 2008).

As a general rule of thumb, Pearson's correlation coefficient is interpreted as "poor" when it is less than .30, "fair" between .31-.50, "moderate" between .51-.60, "moderately strong" between .61-.80, and "very strong" between .81-1.0 (Chan, 2003). In this regard, as the recommended minimum value here is .30, the correlation coefficients of the mutual relationship between variables should be over .30 (Robinson, 1991; Streiner & Norman, 1998). If all variables being measured are drawn from the domain of a single construct, responses to those variables should also be highly correlated (see Table 4.19):

Table 4.19
Construct Validity as Measured by Pearson Inter-Item Correlation Coefficients (n = 220)

Variable	CSFs of KM	KMSs	KMPs	Innovation	OP
CSFs of KM	1				
KMSs	.362**	1			
KMPs	.393**	.448**	1		
Innovation	.578**	.508**	.540**	1	
OP	.492**	.468**	.405**	.633**	1

**. Correlation is significant at the 0.01 level (2-tailed).

As shown from Table 4.19 above, the Pearson inter-item correlation coefficients using SPSS v18 were ranged from .362 to .633 (for more details, please refer to Appendix 4 part C). These correlations of all variables were mostly close to .60, which shows fair to moderate construct validity. Additionally, it was decided to not delete any item of measurement instrument at this point.

Furthermore, construct validity is divided into two types, convergent validity and discriminant validity (Hair *et al.*, 2010; Sekaran & Bougie; 2010). Then, the present study used both in further analysis of SEM. This is because convergent validity and discriminant validity should be computed of final structural model in SEM analysis before hypotheses testing. It is because it provides evidence as to the goodness of fit of the final SEM (Fornell & Larcker, 1981).

Based on the results of the measurement instrument's goodness, there was no concern about the goodness of the measurement instrument for the present study to be used for further analysis.

4.6 HYPOTHESES TESTING USING STRUCTURAL EQUATION MODEL

SEM is a multivariate analysis used to test the causal direct and indirect relationships among variables by estimating a series of separate, still interdependent, multiple regression equation simultaneously (Ellis & Webster, 1998). Indeed, the main objective of SEM analysis is to determine the extent to which the proposed model for observed and latent variables is supported by sample data collection (Anderson & Gerbing, 1988; Schumacker & Lomax, 2004). Specifically, SEM is used to examine the co-variation structure among the observed variables. In order to reduce the number of those variables into a smaller number of latent variables (Schreiber, Nora, Stage, Barlow, & King, 2006), the observed variables are a set of variables that researchers use for defining or inferring the latent variable or construct (Schumacker & Lomax, 2004). While the latent variables are known as constructs or unobserved variables, which are required two or more measured indicators (Ullman, 2006).

SEM analysis was evaluated by using maximum likelihood estimates, which is the most common estimation method for generating estimates of the overall SEM analysis (Kline, 2011; Schumacker & Lomax, 2004). According to Tarling (2008), there are two main steps of SEM analysis. The first step combines Confirmatory Factor Analysis (CFA) with the measurement model, and the second step specifies the structural relationships among latent variables in the measurement model using a path diagram. CFA can be used to know how the latent variables related to the observed variables (Baker & Kim, 2004). CFA is a measurement model estimation used to validate proposed models and to test emergent factor solutions from EFA and to find an excellent fit model (Byrne, 2010). In contrast, CFA is different from EFA. It allows for the explicit constraint of certain loadings to be zero (Dobni, 2008).

Exclusively, the researcher utilized a CFA approach to build structural models of exogenous and endogenous latent variables (Kline, 2011). Exogenous latent variables are synonymous with the independent variable. It is a main source of causes and effects of the fluctuations in the values of other latent variables in the measurement model. While an endogenous latent variable is synonymous with the dependent variable, it is influenced by the exogenous variables in the measurement model, both directly and indirectly (Byrne, 2010). After building a structural model of exogenous and endogenous latent variables, it can use the path diagrams to show how those variables are related (Hair *et al.*, 2011).

Within the context of SEM, there are several indicators of goodness-of-fit such as χ^2, χ^2 to df ratio, *p*-value, Goodness of Fit Index (GFI), Comparative Fit Index (CFI), Tucker Lewis Index (TLI) and Root mean square error of approximation (RMSEA). Most scholars recommend evaluating the SEM by observing more than one of those indicators (Byrne, 2010; Hair *et al.*, 2010, Kline, 2011; Schumacker & Lomax, 2004). Goodness-of-fit indicators of SEM are interpreted as follows:

1. To have confidence in the goodness of fit test, a sample size of 200 or above is generally recommended (Byrne, 2010; Hair *et al.*, 2010, Kline, 2011).
2. χ^2 is a test used to assess sample data and estimated covariance matrix. If the theory is supported then the χ^2 value that computed from the sample data must be statistically non-significance (*P*-value > .05). Then, non-significance means that there is no significant difference between the sample data and estimated covariance matrix. The χ^2 is highly sensitive to sample size especially if the observations are greater than 200 (Bagozzi & Yi, 1988; Hair *et al.*, 2010; Hoe, 2008).

3. χ^2 to df ratio, its degrees of freedom does not exceed 3.0 (Kline, 2011).

4. GFI is indices for assessing the fit of SEM. According to Kelloway (1998), it is used to evaluate the fit through comparing proposed model (there is causal relationships between variables) against to null model (there is no causal relationships between variables). It is should be exceed .90 as recommended by Hair *et al.* (2010) for a good model. GFI is estimated by using the following equation (Schumacker & Lomax, 2004):

$$\mathbf{GFI} = \mathbf{1} - (\chi 2_{model} \ / \ (\chi 2_{null})$$

5. CFI is an incremental index evaluating the fit of a proposed model to data relative to a null model (Raykov & Marcoulides, 2000). The CFI value should be close to or greater than 0.95 (Hu & Bentler, 1999; Schumacker & Lomax, 2004). CFI is estimated by using the following equation (Schumacker & Lomax, 2004):

$$\mathbf{CFI} = \mathbf{1} - \left[(\chi 2_{model} - df_{model}) / (\chi 2_{null} - df_{null})\right]$$

6. TLI indicators of relative fit of a specified model. TLI value should be greater than .90 to indicate a reasonably good fit of the sample data (Hu & Bentler, 1999). TLI is estimated by using the following equation (Schumacker & Lomax, 2004):

$$\mathbf{TLI} = \left[(\chi 2_{null} - df_{null}) - (\chi 2_{model} - df_{model})\right] / \left[(\chi 2_{null} - df_{null}) - \mathbf{1}\right]$$

7. RMSEA refers to a well-fitting model when the lower limit is close to 0 and the upper limit is less than .08 (Hooper *et al.*, 2008), best if less than .05 (Schumacker & Lomax, 2004). RMSEA is estimated by using the following equation (Schumacker & Lomax, 2004):

$$\mathbf{RMSEA} = \sqrt{[\chi 2_{model} - df_{model}] / [(N - \mathbf{1})\, df_{model}]}$$

In addition, to assess the parameter estimates in SEM, they should be following:

1. The standardised factor loadings or Standardised Regression Weights (SRW) values of latent to observed variables should be .50 or above (Byrne, 2010). Meanwhile, Hair *et al.* (2010) suggested that the SRW value should be at least .50 or higher, and ideally 0.7 or higher.
2. The square of the standardised factor loadings or Squared Multiple Correlation (SMC) is the value for representing the extent to which an observed variable's variance is explained by a latent variable (Hair *et al.*, 2010). Following Cohen's (1988) rules of thumb, a cut-off SMC value less than .20 is considered weak, SMC value between .20 and .50 is considered moderate, and SMC value of .50 or above is considered strong.
3. Critical Ratio (C.R.) is an important indicator of significance of the parameter estimates for each model. The parameter estimate is significant at $p = .05$ if C.R. value is $> \pm 1.96$ (Byrne, 2010; Kline, 2011).
4. Standardised path coefficient should be up to .10 to have practical significance (Asher, 1983; Hair *et al.*, 2010).

Briefly, SEM was used to test the hypotheses developed for present study because it presents several advantages compared to other commonly used techniques. First, SEM seeks to get the most accurate results estimations from the measurement model by decreasing measurement error of the observed variables. Second, SEM provides superior precision in model estimation through the testing of an entire model simultaneously instead of testing each bivariate relationship in a step-by-step method. Third, SEM offers an estimate of the total effects (both direct and indirect) of each exogenous latent variable on the endogenous latent variable. Fourth, SEM is able to provide important statistical analysis techniques by which to resolve the problem of multicollinearity, which is often a complex deal while using other statistical analysis techniques (Ahmed, 2007).

4.6.1 Confirmatory Factor Analysis of Evaluating a Measurement Instrument

First of all, the CFA was used to determine the construct validity of measurement instrument. The results indicated that all the measurement items were met the necessary statistically assumption and provide important evidence in the case of construct validity, which possessed the values of >.50 (for more details, please refer to Appendix 5 part A).

4.6.2 Confirmatory Factor Analysis Model of Exogenous and Endogenous Latent Variables

In the present study, the five latent variables consist of three exogenous latent variables and two endogenous latent variables. The exogenous latent variables are CSFs of KM, KMSs, and KMPs, which measured by 35, 10, and 25 items, respectively, while the endogenous latent variables are innovation and OP, which were measured with 20 items of each variable. In this section, CFA using AMOS v18 was used to see if the number of factors and the loadings of observed latent variables conform to what is expected on the basis of pre-established theory on proposed model. Certainly, it was used to remove items for substantive and statistical reasons.

4.6.2.1 Confirmatory Factor Analysis Model of Exogenous Latent Variable 1: CSFs of KM

The CFA model to the exogenous latent CSFs of KM variable was conducted by evaluating the original 35 items. Only 17 items were remained, which were revealed a relatively good fit. Accordingly, the other 18 items were not included in the final CFA model of CSFs of KM. The goodness-of-fit test indicates that measurement model fits the data well (p = .175, GFI = .946, CFI = .988, TLI = .983, and RMSEA = .025). Moreover, the Chi-square index being significant (χ^2 = 110.984, df = 98, χ^2/df = 1.132). The CFA model of the CSFs of KM is shown in Figure 4.11 below:

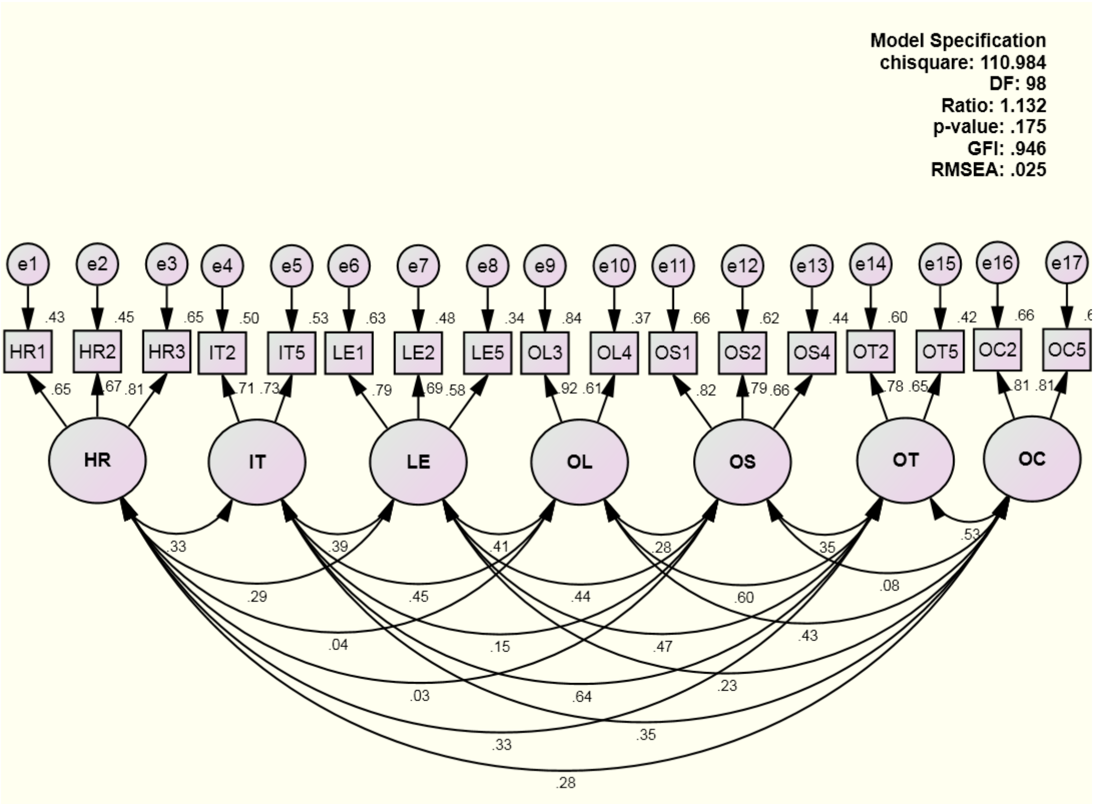


Figure 4.11
CFA Model of the CSFs of KM

Table 4.20 involves the results of CFA estimations of the CSFs of KM items; the research concludes all 17 items were valid. It is shown through the SRW which is all values greater than .50 and SMC show the donation of each item to the variable. Table 4.20 also mentions that the C.R. values were greater than 1.96. Besides, all the estimations were statistically significant at the $p < .001$ level (for more details, please refer to Appendix 5 part B).

Table 4.20
CFA Estimates of the CSFs of KM

Path			**SRW**	**SMC**	**Estimate**	**S.E.**	**C.R.**	**P**	**Status**
HR1	<---	HR	.652	.426	.872	.112	7.770	***	Sig
HR2	<---	HR	.668	.446	.732	.097	7.510	***	Sig
HR3	<---	HR	.809	.654	.504	.116	4.345	***	Sig
IT2	<---	IT	.709	.503	.701	.122	5.766	***	Sig
IT5	<---	IT	.729	.531	.640	.120	5.319	***	Sig
LE1	<---	LE	.794	.630	.604	.117	5.152	***	Sig
LE2	<---	LE	.694	.482	.834	.112	7.458	***	Sig
LE5	<---	LE	.580	.336	.963	.109	8.818	***	Sig
OL3	<---	OL	.918	.844	.534	.124	4.295	***	Sig
OL4	<---	OL	.612	.374	.843	.106	7.957	***	Sig
OS1	<---	OS	.815	.665	.440	.080	5.536	***	Sig
OS2	<---	OS	.788	.621	.549	.087	6.289	***	Sig
OS4	<---	OS	.660	.436	.659	.077	8.555	***	Sig
OT2	<---	OT	.776	.602	.565	.111	5.071	***	Sig
OT5	<---	OT	.647	.419	.847	.107	7.932	***	Sig
OC2	<---	OC	.814	.663	.422	.117	3.590	***	Sig
OC5	<---	OC	.808	.653	.469	.126	3.729	***	Sig

4.6.2.2 Confirmatory Factor Analysis Model of Exogenous Latent Variable 2: KMSs

The CFA model of the exogenous latent KMSs variable was computed to constrain the original 10 items. Then, only 7 items continued, which were shown to be a completely good fit. The other 3 items were deleted and it was not comprised in the final CFA model of KMSs. The goodness-of-fit test indicates that the sample data fits the measurement model perfectly (p = .313, GFI = .982, CFI = .996, TLI = .994, and RMSEA = .026). Furthermore, the Chi-square index is significant (χ^2 = 14.916, df = 13, χ^2/df = 1.147). The CFA model of KMSs is shown in Figure 4.12:

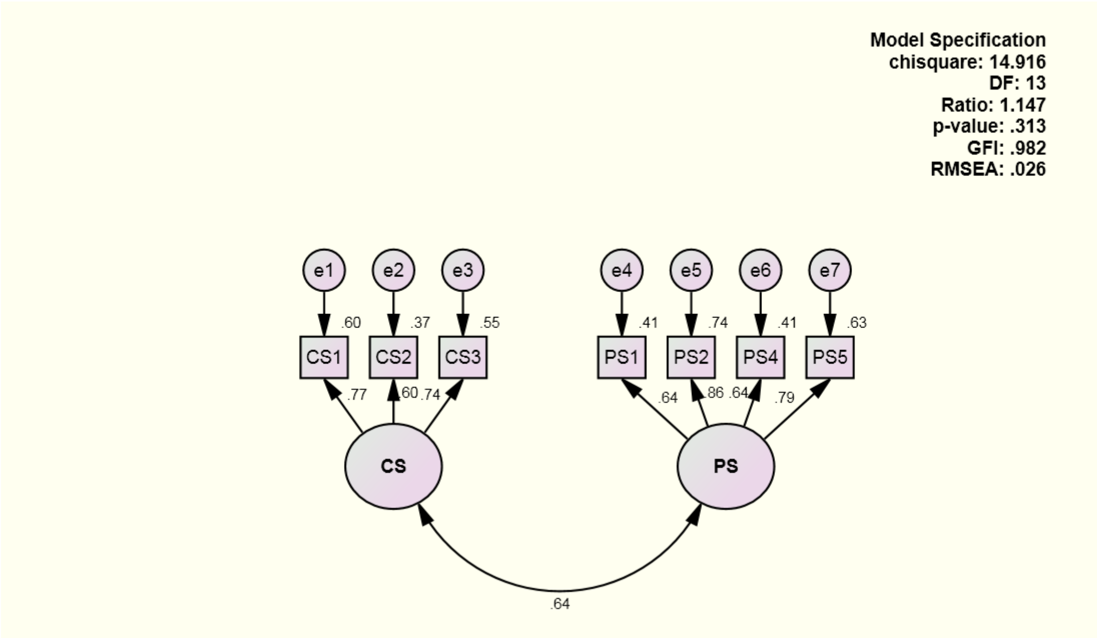


Figure 4.12
CFA Model of KMSs

From CFA estimations in Table 4.21 below, all the 7 items of KMSs were appropriate. It is pointed through the SRW that all values more than .50 and SMC show the good contribution of each item to the variable. All the C.R. values were greater than 1.96. Moreover, all the estimations were statistically significant at the $p < .001$ level (for more details, please refer to Appendix 5 part C).

Table 4.21
CFA Estimates of KMSs

Path			SRW	SMC	Estimate	S.E.	C.R.	P	Status
CS1	<---	CS	.773	.597	.523	.085	6.130	***	Sig
CS2	<---	CS	.605	.366	.864	.098	8.784	***	Sig
CS3	<---	CS	.742	.551	.538	.079	6.846	***	Sig
PS1	<---	PS	.642	.413	.798	.087	9.220	***	Sig
PS2	<---	PS	.858	.736	.382	.069	5.509	***	Sig
PS4	<---	PS	.637	.405	.847	.092	9.223	***	Sig
PS5	<---	PS	.793	.629	.588	.080	7.326	***	Sig

4.6.2.3 Confirmatory Factor Analysis Model of Exogenous Latent Variable 3: KMPs

The CFA model was of the exogenous latent KMPs variable performed through evaluating the original 25 items. Then, only 15 items reflected a perfectly good fit and the other 10 items were not included in the CFA model. Accordingly, the 10 items were deleted and only 15 items were remained. The overall fit of the measurement model was in satisfactory level (p = .251, GFI = .949, CFI = .992, TLI = .990, and RMSEA = .021). Additionally, the Chi-square index being significant (χ^2 = 88.084, df = 80, χ^2/df = 1.101). The CFA model of KMPs is shown in Figure 4.13 below:

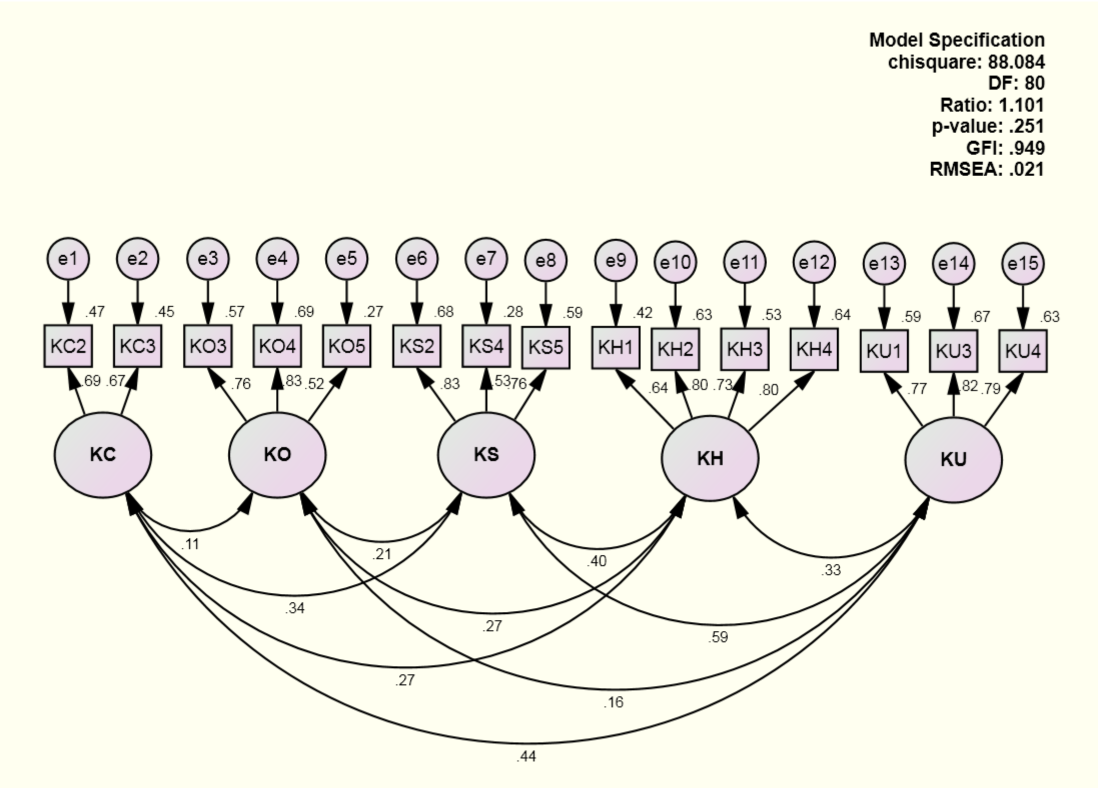


Figure 4.13
*CFA Model of KMP*s

The estimations of CFA, in Table 4.22, provide only 15 items that were suitable for KMPs. It is indicated through the SRW which is all value greater than .50 and SMC show the fine contribution of each item to the variable. All the C.R. values were greater than 1.96. Furthermore, all the estimations were statistically significant at the $p < .001$ level (for more details, please refer to Appendix 5 part D).

Table 4.22
CFA Estimates of KMPs

Path			SRW	SMC	Estimate	S.E.	C.R.	P	Status
KC2	<---	KC	.687	.472	.798	.210	3.795	***	Sig
KC3	<---	KC	.671	.450	.875	.214	4.094	***	Sig
KO3	<---	KO	.757	.573	.676	.127	5.316	***	Sig
KO4	<---	KO	.834	.695	.511	.148	3.455	***	Sig
KO5	<---	KO	.521	.271	1.209	.129	9.400	***	Sig
KS2	<---	KS	.825	.681	.542	.111	4.878	***	Sig
KS4	<---	KS	.525	.276	.970	.102	9.516	***	Sig
KS5	<---	KS	.765	.585	.749	.115	6.502	***	Sig
KH1	<---	KH	.645	.416	.623	.069	8.985	***	Sig
KH2	<---	KH	.796	.634	.464	.067	6.893	***	Sig
KH3	<---	KH	.727	.529	.556	.068	8.178	***	Sig
KH4	<---	KH	.802	.643	.431	.063	6.801	***	Sig
KU1	<---	KU	.769	.592	.746	.099	7.554	***	Sig
KU3	<---	KU	.820	.672	.519	.081	6.419	***	Sig
KU4	<---	KU	.795	.632	.615	.086	7.116	***	Sig

4.6.2.4 Confirmatory Factor Analysis Model of Endogenous Latent Variable 1: Innovation

The CFA model of the endogenous latent innovation variable was accomplished during assessment the original 20 items. Then, the 11 items were not included in the final CFA model of innovation and these items were deleted. Only 9 items that had a reasonable good fit were retained. The review of the goodness-of-fit measures indicates that they exceeded the cut-off values (p = .395, GFI = .979, CFI = .998, TLI = .997, and RMSEA = .015). In addition, the Chi-square index being significant (χ^2 = 22.075, df = 21, χ^2/df = 1.051). The CFA model of innovation is shown in Figure 4.14:

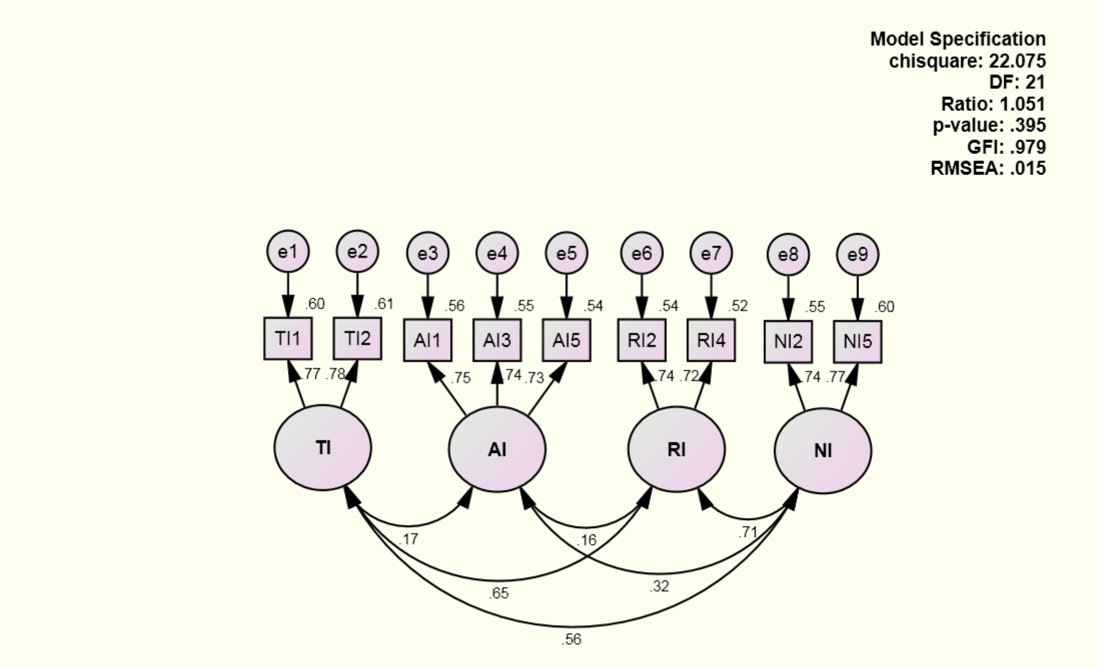


Figure 4.14
CFA Model of Innovation

Table 4.23 below exhibits the results of CFA estimations of the innovation. All the 9 items of innovation were valid because the SRW values were greater than .50, and SMC shows the good contribution of each item to the variable. Additionally, all the C.R. values were greater than 1.96 and the estimations were statistically significant at the $p < .001$ level (for more details, please refer to Appendix 5 part E).

Table 4.23
CFA Estimates of Innovation Items

Path			SRW	SMC	Estimate	S.E.	C.R.	P	Status
TI1	<---	TI	.775	.600	.578	.114	5.064	***	Sig
TI2	<---	TI	.783	.613	.535	.110	4.856	***	Sig
AI1	<---	AI	.746	.557	.591	.091	6.522	***	Sig
AI3	<---	AI	.740	.547	.703	.106	6.597	***	Sig
AI5	<---	AI	.732	.536	.750	.109	6.903	***	Sig
RI2	<---	RI	.736	.542	.583	.096	6.089	***	Sig
RI4	<---	RI	.719	.517	.750	.116	6.487	***	Sig
NI2	<---	NI	.744	.553	.652	.107	6.109	***	Sig
NI5	<---	NI	.773	.597	.571	.106	5.392	***	Sig

4.6.2.5 Confirmatory Factor Analysis Model of Endogenous Variable 2: OP

The CFA model of the endogenous latent OP was computed by evaluating the original 20 items. Then, CFA model of latent OP variable revealed a relatively good fit. The 9 items were not included in the final CFA of OP. Hence, these items were deleted and only 11 items were remained. The results depict that the goodness-of-fit for the model was met (p = .324, GFI = .968, CFI = .996, TLI = .994, and RMSEA = .020). Additionally, the Chi-square index being significant (χ^2 = 41.403, df = 38, χ^2/df = 1.090). The CFA model of OP is shown in Figure 4.15 below:

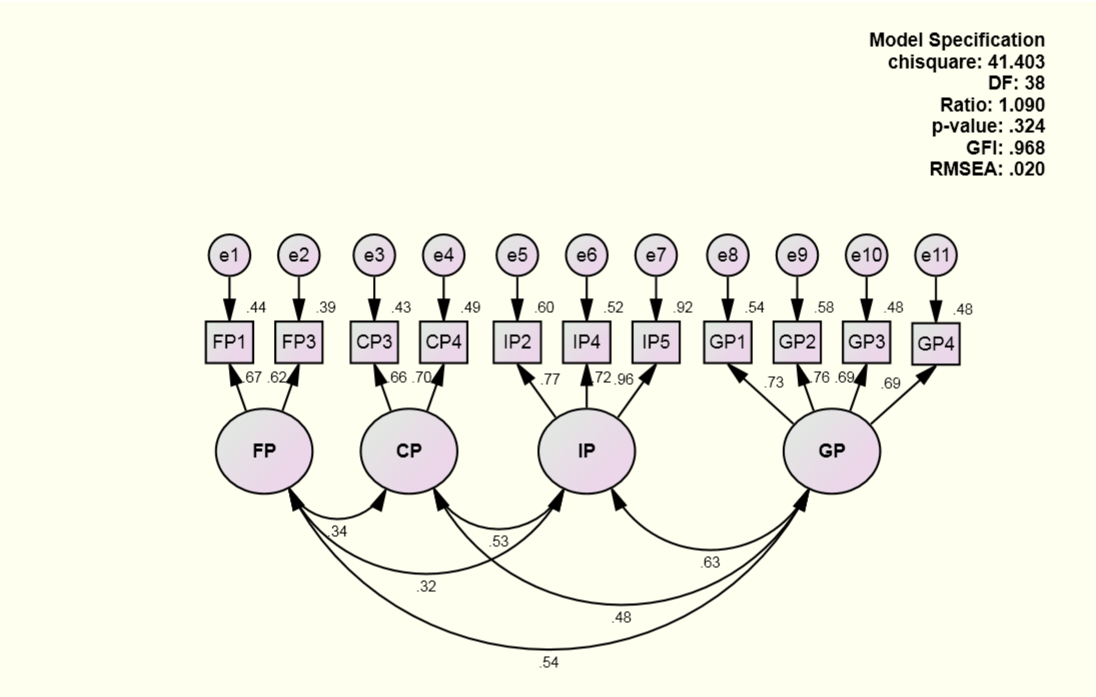


Figure 4.15
CFA Model of OP

Based on the CFA estimations of OP items in Table 4.24, the research concludes that 11 items of OP were applicable. This is because the total values of SRW were greater than .50 and SMC shows the contribution of each item to the variable. Besides, all the C.R. values were greater than 1.96 and all the estimations were statistically significant at the $p < .001$ level (for more details, please refer to Appendix 5 part F).

Table 4.24
CFA Estimates of OP

Path			SRW	SMC	Estimate	S.E.	C.R.	P	Status
FP1	<---	FP	.666	.444	.833	.166	5.004	***	Sig
FP3	<---	FP	.622	.387	.866	.146	5.933	***	Sig
CP3	<---	CP	.658	.432	.684	.117	5.849	***	Sig
CP4	<---	CP	.699	.489	.689	.139	4.952	***	Sig
IP2	<---	IP	.773	.598	.581	.070	8.305	***	Sig
IP4	<---	IP	.722	.522	.659	.071	9.263	***	Sig
IP5	<---	IP	.959	.919	.921	.100	9.249	***	Sig
GP1	<---	GP	.732	.535	.748	.093	8.066	***	Sig
GP2	<---	GP	.765	.585	.710	.094	7.551	***	Sig
GP3	<---	GP	.692	.479	.808	.095	8.538	***	Sig
GP4	<---	GP	.694	.482	.824	.096	8.547	***	Sig

4.6.3 Confirmatory Factor Analysis of Exogenous and Endogenous Models

In the present section, the exogenous model of latent variables includes CSFs of KM, KMSs, and KMPs, which were measured by 17, 7 and 15 items, respectively. While the endogenous model of latent variables includes innovation and OP, which were measured with 9 items and 11 items, respectively. It was presented as follows:

4.6.3.1 Confirmatory Factor Analysis of Exogenous Model

The present study was performed with exogenous models and some fitness indicators in order to analyse whether relationships exist among exogenous latent variables (CSFs of KM, KMSs, and KMPs). Only 28 items of overall exogenous latent variables were presented in this model. Furthermore, all these items were retained. This is because the results of CFA confirmed that the sample data had satisfactory fit to the exogenous model (p = .399, GFI = .905 , CFI = .996, TLI = .996, and RMSEA = .009). Additionally, the Chi-square index was significant (χ^2 = 338.952, df = 333, χ^2/df = 1.018). The remaining items of exogenous model were used for running the final SEM model. The exogenous model is shown in Figure 4.16:

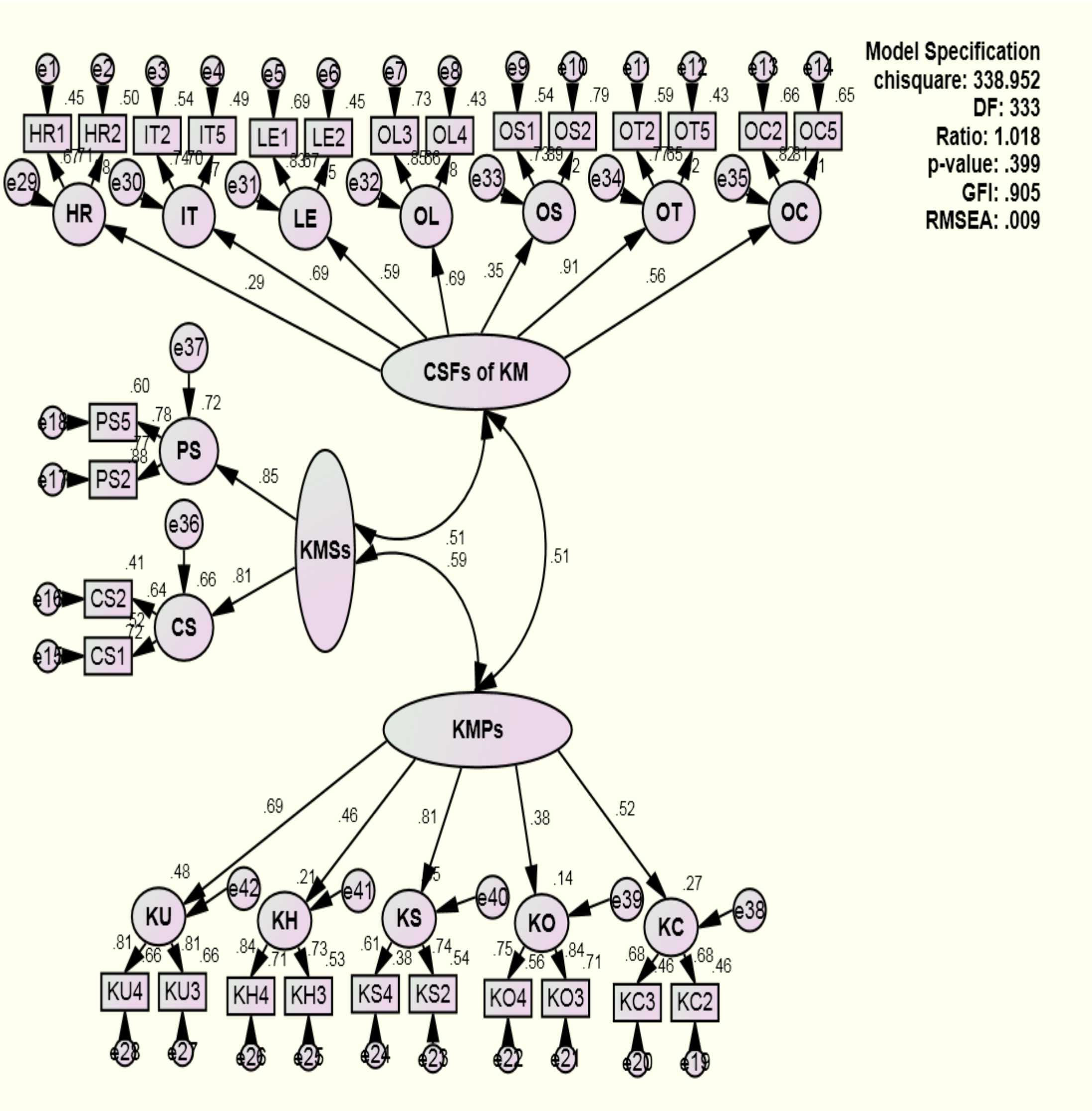


Figure 4.16
CFA of Exogenous Model

As evident in Table 4.25, all results of CFA estimations of the exogenous model showed that all the 28 items were at an appropriate level. This is because all values of SRW were above .50 and SMC show the suitable contribution of each item to the exogenous variable. Moreover, all the C.R. values were greater than 1.96 and all the 28 items loadings and structural relationships are significant at the $p < .001$ level (for more details, please refer to Appendix 5 part G).

Table 4.25
CFA Estimates of the CSFs of KM, KMSs, and KMPs

Path			SRW	SMC	Estimate	S.E.	C.R.	P	Status
HR1	<---	HR	.673	.453	.750	.227	3.299	***	Sig
HR2	<---	HR	.706	.498	.657	.118	5.560	***	Sig
IT2	<---	IT	.738	.545	.642	.125	5.147	***	Sig
IT5	<---	IT	.700	.491	.696	.116	6.015	***	Sig
LE1	<---	LE	.833	.694	.436	.116	3.753	***	Sig
LE2	<---	LE	.668	.446	.892	.140	6.357	***	Sig
OL3	<---	OL	.852	.726	.430	.117	3.674	***	Sig
OL4	<---	OL	.659	.434	.762	.105	7.282	***	Sig
OS1	<---	OS	.733	.537	.608	.168	3.621	***	Sig
OS2	<---	OS	.888	.788	.571	.161	3.555	***	Sig
OT2	<---	OT	.767	.588	.584	.106	5.484	***	Sig
OT5	<---	OT	.654	.428	.833	.105	7.974	***	Sig
OC2	<---	OC	.815	.665	.419	.115	3.654	***	Sig
OC5	<---	OC	.807	.652	.471	.123	3.844	***	Sig
CS1	<---	CS	.718	.516	.628	.113	5.585	***	Sig
CS2	<---	CS	.643	.413	.799	.111	7.226	***	Sig
PS2	<---	PS	.876	.767	.501	.091	5.485	***	Sig
PS5	<---	PS	.777	.603	.629	.104	6.031	***	Sig
KC2	<---	KC	.679	.461	.816	.181	4.516	***	Sig
KC3	<---	KC	.679	.461	.857	.190	4.509	***	Sig
KO3	<---	KO	.844	.712	.810	.116	6.967	***	Sig
KO4	<---	KO	.745	.556	.744	.225	3.304	***	Sig
KS2	<---	KS	.737	.543	.777	.160	4.847	***	Sig
KS4	<---	KS	.614	.377	.834	.111	7.480	***	Sig
KH3	<---	KH	.730	.533	.552	.131	4.197	***	Sig
KH4	<---	KH	.840	.705	.763	.227	3.369	***	Sig
KU3	<---	KU	.811	.658	.543	.126	4.302	***	Sig
KU4	<---	KU	.814	.663	.562	.133	4.213	***	Sig

4.6.3.2 Confirmatory Factor Analysis of Endogenous Model

In the present study, the researcher has compared the endogenous model of the endogenous latent variables (innovation and OP) and some fitness indicators to determine the weather relationships exist between them. Based on the CFA analysis, all the 9 items of innovation and 11 items of OP were retained. The retained items of the endogenous model were used for running the final SEM model. The endogenous model shown in Figure 4.17, refers to that all the items demonstrated satisfactory fit were consistent with the indicators of fitness (p = .284, GFI = .931, CFI = .994, TLI =

.992, and RMSEA = .017). In addition, the Chi-square index was significant (χ^2 = 170.774, df = 161, χ^2/df = 1.061). Then, the remaining items of endogenous model were used for running the final SEM model.

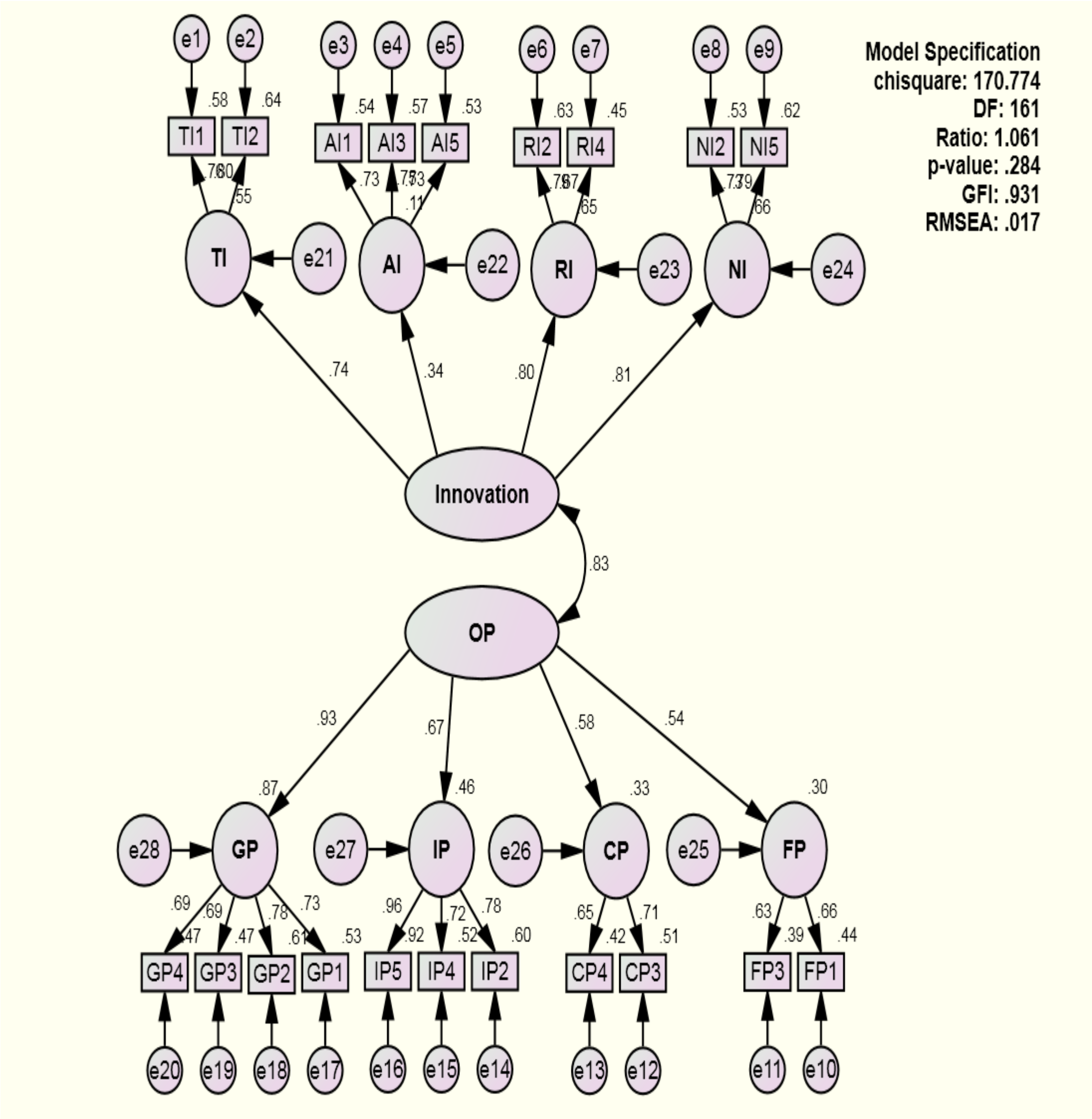


Figure 4.17
CFA of Endogenous Model

Likewise, Table 4.26 implies the results of CFA estimations of the endogenous model, and the researcher found all the 20 items were valid. All the values of SRW were larger than .50, and SMC shows the fine contribution of each item to the variable. Additionally, all the C.R. values were greater than 1.96 and all the 20 items loadings and structural relationships are significant at the $p < .001$ level (for more details, please refer to Appendix 5 part H).

Table 4.26
CFA Estimates of the Innovation and OP

Path			**SRW**	**SMC**	**Estimate**	**S.E.**	**C.R.**	**P**	**Status**
TI1	<---	TI	.760	.578	.610	.103	5.905	***	Sig
TI2	<---	TI	.798	.637	.501	.102	4.916	***	Sig
AI1	<---	AI	.734	.538	.616	.090	6.867	***	Sig
AI3	<---	AI	.752	.565	.674	.108	6.251	***	Sig
AI5	<---	AI	.731	.534	.753	.110	6.868	***	Sig
RI2	<---	RI	.792	.627	.474	.101	4.696	***	Sig
RI4	<---	RI	.668	.447	.859	.114	7.566	***	Sig
NI2	<---	NI	.729	.531	.684	.101	6.793	***	Sig
NI5	<---	NI	.789	.622	.535	.101	5.294	***	Sig
FP1	<---	FP	.661	.437	.844	.167	5.052	***	Sig
FP3	<---	FP	.627	.393	.857	.149	5.764	***	Sig
CP3	<---	CP	.711	.505	.596	.128	4.655	***	Sig
CP4	<---	CP	.647	.418	.784	.130	6.032	***	Sig
IP2	<---	IP	.775	.601	.577	.070	8.200	***	Sig
IP4	<---	IP	.722	.522	.659	.071	9.271	***	Sig
IP5	<---	IP	.957	.916	.599	.129	4.633	***	Sig
GP1	<---	GP	.726	.526	.762	.090	8.437	***	Sig
GP2	<---	GP	.778	.605	.674	.088	7.653	***	Sig
GP3	<---	GP	.689	.474	.816	.093	8.810	***	Sig
GP4	<---	GP	.688	.474	.837	.095	8.808	***	Sig

4.6.4 Structural Relationships Among Exogenous and Endogenous Latent Variables (Final Structural Model)

In order to test the substantive hypotheses, a final structural model was developed. It was run with 48 items to assess three exogenous latent variables (CSFs of KM, KMSs, and KMPs) and two endogenous latent variables (innovation and OP). Only 45 items of overall exogenous and endogenous latent variables were presented in this model. This is because the overall results presented evidence of a good model fit (p = .369, GFI = .903, CFI = .995, TLI = .995, and RMSEA = .008) and the Chi-square index was significant (χ^2 = 926.711, df = 913, χ^2/df = 1.015). Furthermore, all dimensions in final structural model were measured at least by two items as proposed by Kline (2011). Hence, it can be concluded that these conditions meet the requirement of an acceptable model (for more details, please refer to Appendix 5 part I). The final structural model is shown in Figure 4.18 below:

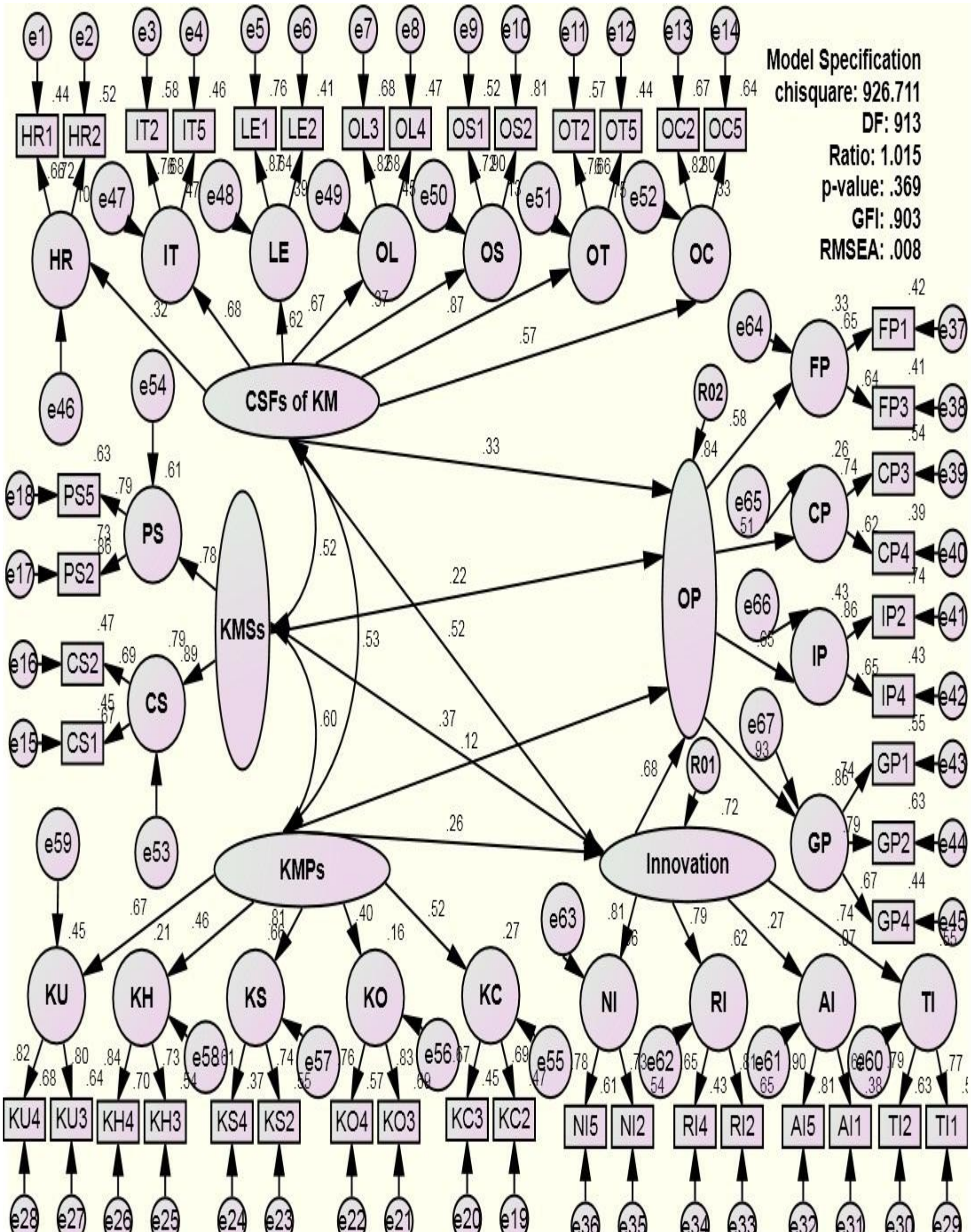


Figure 4.18
Final Structural Model

According to Falk and Miller (1992), the R^2 for the any endogenous variables in the structural model should be equal to or greater than .10 in order to be at satisfactory level. Likewise, Chin (1998) argued that the R^2 values of .67, .33, and .19 for any endogenous latent variables in any structural model can be defined as “substantial”, “moderate” and “weak”. In the present study, the values of R^2 for the endogenous variables (innovation and OP) are greater than the suggested cut off criterion of .10 and substantial, namely: innovation ($R^2 = .72$) and OP ($R^2 = .84$).

In SEM analysis, the multicollinearity issue can be identified based on standardised correlations. Multicolinearity is a problem that occurs when two or more exogenous variables are too correlated to as high as .90 or above. They will contribute to increase the size of standard error that reflected on the analysis weakened (Tabachnich & Fidell, 2007). Table 4.27 shows the results of assess multicollinearity from SEM.

Table 4.27
Multicolinearity of the Exogenous Variables

Causal Path			**Correlation**
CSFs of KM	<-->	KMSs	.522
CSFs of KM	<-->	KMPs	.527
KMSs	<-->	KMPs	.600

Based on the results in Table 4.27 above, all correlations among exogenous variables were less than .90, indicating the variables interactions are free from multicollinearity problem. As could be seen in Table 4.28, SEM results show all the 45 items were suitable. The evaluation results show that majority of the remaining measurement items were all above .50 for SRW and SMC show the good contribution of each item to the variables. Furthermore, all the C.R. values were greater than 1.96 and all the estimations were statistically significant at the $p < .001$ level.

Table 4.28
CFA Estimates of the Final Structural Model

Path			SRW	SMC	Estimate	S.E.	C.R.	P	Status
HR1	<---	HR	.660	.435	.857	.247	3.464	***	Sig
HR2	<---	HR	.720	.518	.903	.172	5.257	***	Sig
IT2	<---	IT	.762	.581	.592	.129	4.601	***	Sig
IT5	<---	IT	.678	.460	.737	.113	6.516	***	Sig
LE1	<---	LE	.871	.759	.455	.072	6.336	***	Sig
LE2	<---	LE	.639	.408	.953	.133	7.194	***	Sig
OL3	<---	OL	.822	.675	.431	.124	3.469	***	Sig
OL4	<---	OL	.684	.467	.718	.107	6.696	***	Sig
OS1	<---	OS	.722	.521	.630	.158	3.988	***	Sig
OS2	<---	OS	.902	.813	.455	.072	6.336	***	Sig
OT2	<---	OT	.755	.571	.609	.107	5.719	***	Sig
OT5	<---	OT	.664	.441	.814	.105	7.734	***	Sig
OC2	<---	OC	.820	.673	.409	.112	3.639	***	Sig
OC5	<---	OC	.802	.643	.482	.118	4.079	***	Sig
CS1	<---	CS	.670	.449	.715	.101	7.092	***	Sig
CS2	<---	CS	.689	.475	.715	.107	6.685	***	Sig
PS2	<---	PS	.856	.733	.385	.096	3.988	***	Sig
PS5	<---	PS	.794	.631	.585	.101	5.785	***	Sig
KC2	<---	KC	.687	.471	.799	.179	4.457	***	Sig
KC3	<---	KC	.671	.451	.874	.183	4.769	***	Sig
KO3	<---	KO	.830	.688	.567	.158	3.580	***	Sig
KO4	<---	KO	.758	.575	.712	.211	3.375	***	Sig
KS2	<---	KS	.739	.546	.771	.154	4.992	***	Sig
KS4	<---	KS	.612	.375	.837	.109	7.709	***	Sig
KH3	<---	KH	.734	.538	.545	.131	4.156	***	Sig
KH4	<---	KH	.836	.698	.587	.136	4.325	***	Sig
KU3	<---	KU	.802	.643	.566	.126	4.496	***	Sig
KU4	<---	KU	.823	.678	.538	.136	3.948	***	Sig
TI1	<---	TI	.766	.587	.597	.103	5.807	***	Sig
TI2	<---	TI	.792	.627	.515	.100	5.139	***	Sig
AI1	<---	AI	.616	.379	.828	.205	4.048	***	Sig
AI5	<---	AI	.900	.810	.444	.128	3.470	***	Sig
RI2	<---	RI	.809	.655	.439	.106	4.141	***	Sig
RI4	<---	RI	.654	.428	.889	.115	7.720	***	Sig
NI2	<---	NI	.734	.538	.673	.100	6.715	***	Sig
NI5	<---	NI	.783	.613	.547	.100	5.483	***	Sig
FP1	<---	FP	.647	.419	.871	.152	5.727	***	Sig
FP3	<---	FP	.641	.411	.833	.142	5.865	***	Sig
CP3	<---	CP	.736	.542	.552	.148	3.717	***	Sig
CP4	<---	CP	.624	.390	.823	.136	6.030	***	Sig
IP2	<---	IP	.859	.738	.502	.092	5.449	***	Sig
IP4	<---	IP	.655	.429	.787	.105	7.460	***	Sig
GP1	<---	GP	.742	.551	.723	.088	8.188	***	Sig
GP2	<---	GP	.793	.628	.635	.087	7.313	***	Sig
GP4	<---	GP	.665	.443	.886	.099	8.990	***	Sig

4.6.5 Convergent Validity/ Discriminant Validity of Final Measurement Model

Convergent validity refers to the degree to which an item is related with other items of one construct (Allison & Baskin, 2009). In SEM, convergent validity can be assessed by computing Composite Reliability (CRI) and Average Variance Extracted (AVE). Then, convergent validity in the present study was examined by evaluating the values of CRI and AVE (Fornell & Larcker, 1981; Hair *et al.*, 2010).

CRI refers to internal consistency between items, depicting the extent to which they indicate the common latent variable (Hair *et al.*, 2010). As a rule of thumb, Hair *et al.* (2010) have suggested that the .70 or greater is considered a good level for accepting CRI of variables. CRI value that is lower than .70 indicates that the items do not satisfactorily and consistently measure the theoretical latent variable. In the present study, CRI was estimated by using the following equation (Fornell & Larcker, 1981):

$$P_\eta = \frac{\left(\sum_{i=1}^{p} \lambda_{yi}\right)^2}{\left(\sum_{i=1}^{p} \lambda_{yi}\right)^2 + \sum_{i=1}^{p} \mathrm{Var}(\varepsilon_i)}$$

Where:

P_η = Composite Reliability (CRI)

$\left(\sum_{i=1}^{p} \lambda_{yi}\right)^2$ = Squared sum of Standardised Regression Weights (SRW)

$\sum_{i=1}^{p} \mathrm{Var}(\varepsilon_i)$ = Sum of Standard Error (S.E.)

AVE is described as a summary measure of convergent validity among a set of items representing a latent variable. Indeed, it's the average percentage of variance extracted among the items of a latent variable (Hair *et al.*, 2010). AVE measures the variance captured by the indicators relative to measurement error (Barclay, Thompson and Higgins, 1995), which should be higher than .50 to justify using a variable (Fornell-Larcker-Criteria). Notably, if the value of AVE is closed to .50 that indicates to accrue more error remains in the items than variance explained by the latent factor structure imposed on the measure. In the present study, AVE was estimated by using the following equation (Fornell & Larcker, 1981):

$$P_{VC(\eta)} = \frac{\sum_{i=1}^{p} \lambda_{yi}^{2}}{\sum_{i=1}^{p} \lambda_{yi}^{2} + \sum_{i=1}^{p} \mathrm{Var}(\varepsilon_i)}$$

Where:

$P_{VC(\eta)}$ = Average Variance Extracted (AVE)

$\sum_{i=1}^{p} \lambda_{yi}^{2}$ = Sum of Squared Multiple Correlation (SMC)

Table 4.29 shows the calculation of the CRI and AVE of the final structural model.

Table 4.29

Convergent Validity of the Final Structural Model

Variable	Dimension	Items	SRW	SMC	S.E.	CRI ≥ .70	AVE ≥ .50
CSFs of KM	HR	HR1	.660	.435	.247	**.855**	**.818**
		HR2	.720	.518	.172		
	IT	IT2	.762	.581	.129		
		IT5	.678	.460	.113		
	LE	LE1	.871	.759	.072		
		LE2	.639	.408	.133		
	OL	OL3	.822	.675	.124		
		OL4	.684	.467	.107		
	OS	OS1	.722	.521	.158		
		OS2	.902	.813	.072		
	OT	OT2	.755	.571	.107		
		OT5	.664	.441	.105		
	OC	OC2	.820	.673	.112		
		OC5	.802	.643	.118		
Σ			**10.501**	**7.965**	**1.769**		
KMSs	CS	CS1	.670	.449	.101	**.881**	**.849**
		CS2	.689	.475	.107		
	PS	PS2	.856	.733	.096		
		PS5	.794	.631	.101		
Σ			**3.009**	**2.288**	**.405**		
KMPs	KC	KC2	.687	.471	.179	**.831**	**.788**
		KC3	.671	.451	.183		
	KO	KO3	.830	.688	.158		
		KO4	.758	.575	.211		
	KS	KS2	.739	.546	.154		
		KS4	.612	.375	.109		
	KH	KH3	.734	.538	.131		
		KH4	.836	.698	.136		
	KU	KU3	.802	.643	.126		
		KU4	.823	.678	.136		
Σ			**7.492**	**5.663**	**1.523**		
Innovation	TI	TI1	.766	.587	.103	**.863**	**.828**
		TI2	.792	.627	.100		
	AI	AI1	.616	.379	.205		
		AI5	.900	.810	.128		
	RI	RI2	.809	.655	.106		
		RI4	.654	.428	.115		
	NI	NI2	.734	.538	.100		
		NI5	.783	.613	.100		
Σ			**6.054**	**4.637**	**0.957**		
OP	FP	FP1	.647	.419	.152	**.858**	**.812**
		FP3	.641	.411	.142		
	CP	CP3	.736	.542	.148		
		CP4	.624	.390	.136		
	IP	IP2	.859	.738	.092		
		IP4	.655	.429	.105		

Table 4.29 *(continued)*

GP	GP1	.742	.551	.088
	GP2	.793	.628	.087
	GP4	.665	.443	.099
∑		**6.362**	**4.551**	**1.049**

When we consider the results in Table 4.29, it was shown that all the variables (CSFs of KM, KMSs, KMPs, innovation, and OP) had generally exhibited acceptable level of CRI with values (.855, .881, .831, .863, and .858) respectively, which are more than the recommended cutoff value .70. Additionally, Table 4.29 displayed all the variables (CSFs of KM, KMSs, KMPs, innovation, and OP) had generally exhibited acceptable level of AVE with values (.818, .849, .788, .828, and .812) respectively, all above the recommended minimum level of .50. Jointly, these tests suggest adequate convergent validity of the final structural model.

Moreover, discriminant validity examines the extent to which an exogenous latent validity examines the extent to which an exogenous latent variable is really different from other exogenous latent variables in predicting the endogenous latent variable (Hair *et al.*, 2010). Discriminant validity of the final structural model can be confirmed when the square root of the AVE of each variable is larger than all SMC between the one variable and other variables (Chin, 1998; Wixom & Todd, 2005). Table 4.30 obtained the discriminant validity of the final structural model.

Table 4.30
Discriminant Validity of the Final Structural Model

Variable	No. of Final Items	CRI	AVE	CSFs of KM	KMSs	KMPs	Innovation	OP
CSFs of KM	14	.855	.818	.904				
KMSs	4	.881	.849	r=.522** r^2=.272	.921			
KMPs	10	.831	.788	r=.527** r^2=.277	r=.600** r^2=.360	.877		
Innovation	8	.863	.828	r=.643** r^2=.413	r=.614** r^2=.376	r=.598** r^2=.357	.909	
OP	9	.858	.812	r=.512** r^2=.262	r=.402** r^2=.161	r=.325** r^2=.105	r=.803** r^2=.644	.901

** Correlation is significant at the .01 level (2-tailed).

As indicated in Table 4.30, the square root of AVE for the reflective measurement instrument is shown above the diagonal of matrix, and the squared correlations are shown below the diagonal. The square root of AVE is larger than all squared correlations in the respective column and row for each variable. This test further confirms the discriminant validity of the intended final structural in the present study.

Based on the results of the convergent validity and discriminant validity, there was no concern about the goodness of the final structural model for the present study to be used for hypotheses testing.

4.6.6 Hypotheses Testing

SEM analysis was used to test the ten hypotheses proposed in the present study. The result of this analysis is used to accept or reject the hypotheses based on the significance of the standardised path coefficient of the relationships and C.R. value. The test of these hypotheses is presented as follows:

4.6.6.1 Direct Relationships

The direct relationships in SEM are the relations that go directly from one exogenous latent variable to endogenous latent variable. Below, Table 4.31 shows the status of seven hypotheses in final structural model:

Table 4.31
Direct Relationships in Final Structural Model

Hypothesis	Causal Path			Sta. Path Coefficient	Estimate	S.E.	C.R.	P	Status
H1	Innovation	<---	CSFs of KM	.522	1.169	.212	5.504	.000***	Significantly Positively Related
H2	Innovation	<---	KMSs	.371	1.158	.459	2.525	.012**	Significantly Positively Related
H3	Innovation	<---	KMPs	.264	.315	.154	2.049	.041**	Significantly Positively Related
H4	OP	<---	CSFs of KM	.329	1.448	.618	2.343	.019**	Significantly Positively Related
H5	OP	<---	KMSs	.221	.332	.163	2.031	.042**	Significantly Positively Related
H6	OP	<---	KMPs	.123	.088	.105	.840	.401	Non-Significantly Positively Related
H7	OP	<---	Innovation	.681	.624	.146	4.276	.000***	Significantly Positively Related

Note: **Significant at .05 level and *** Significant at .001 level.

Table 4.31 shows that six direct relationships of the paths are statistically significant, and one was not significant. Comparing these results with the hypotheses, the standardised path coefficient of .522 seems to indicate that CSFs of KM have a positive and statistically significant effect on innovation use (H1). Also, the standardised path coefficient of .371 suggests that KMSs also have a positive and statistically significant effect on innovation use (H2). The path between KMPs and innovation was .264, suggesting that KMPs have a positive and statistically significant effect on innovation use (H3). The standardised path coefficient between the CSFs of KM and OP was .329. This finding seems to suggest that CSFs of KM have a positive and statistically significant effect on OP use (H4). Additionally, the results point to a positive and statistically significant effect of KMSs on OP use (H5) with a standardised path coefficient of .221. The path between KMPs and OP was .123, indicating that the result did not has a statistically significant positive effect use (H6). Finally, the standardised path coefficient between innovation and OP was .681. This result appears to suggest that innovation has a positive and statistically significant effect on OP use (H7).

4.6.6.2 Indirect Relationships (Mediating Relationships)

Indirect relationship or mediating relationship is formed when a third variable mediates between two exogenous latent variables. The mediating effect were tested among CSFs of KM, KMSs, and KMPs mediated by innovation with OP (see Table 4.32).

Table 4.32

Indirect Relationships of Final Structural Model

Hypothesis	**Causal Path**	**Indirect Relation Estimate**	**Direct Relation Estimate**	**Status**
H8	CSFs of KM ⟶ Innovation ⟶ OP	.355	.329	Partial Mediating
H9	KMSs ⟶ Innovation ⟶ OP	.252	.221	Partial Mediating
H10	KMPs ⟶ Innovation ⟶ OP	.179	.123	Partial Mediating

Table 4.32 shows that the indirect relationship between exogenous latent variable and endogenous latent variable through the mediating variable had a higher degree of relationships than the direct relationship between them (see Table 4.31). However, when there is any direct relationship between exogenous latent variable and

endogenous latent variable. Then, the results supports partial mediation of H8, H9, and H10 with indirect relationship estimates (.355, .252, and .179) respectively.

Within three alternatives of significance level that are available for *p* value, the present study used .05 level of significant as the critical level for deciding the acceptability or rejection of the hypotheses. In that case, the overall hypotheses testing both direct and indirect relationships as conceptualized in chapter three are summarized in Table 4.33 below:

Table 4.33

No. of Hypothesis	Hypothesis Statement	Status
H1	CSFs of KM have a significant and positive effect on innovation.	Accepted
H2	KMSs have a significant and positive effect on innovation.	Accepted
H3	KMPs have a significant and positive effect on innovation.	Accepted
H4	CSFs of KM have a significant and positive effect on OP.	Accepted
H5	KMSs have a significant and positive effect on OP.	Accepted
H6	KMPs have a significant and positive effect on OP.	Rejected
H7	Innovation has a significant and positive effect on OP.	Accepted
H8	Innovation has a significant and positive mediating effect on the relationship between CSFs of KM and OP.	Partially Accepted
H9	Innovation has a significant and positive mediating effect on the relationship between KMSs and OP.	Partially Accepted
H10	Innovation has a significant and positive mediating effect on the relationship between KMPs and OP.	Partially Accepted

Furthermore, the statistical result of a hypothesis test can be accepted or rejected based on C.R. values. The results above mentioned that the C.R. values were more than 1.96 of the H1, H2, H3, H4, H5, H7, H9, H8, and H10. Subsequently, these hypotheses were accepted. While the C.R. value of H6 was less than 1.96. Then, it was rejected within the selected .05 significant level.

4.7 CHAPTER SUMMARY

This chapter presented the data analysis and findings from the use of different statistical analysis techniques, namely, SPSS v18 and AMOS v18. of the 300 questionnaires randomly distributed among mid-level managers working in the Iraqi MTS, only 233 questionnaires were returned for a response rate of 77.67%. Then, 3 respondents' answers were deleted because these participants did not finish all the questions on the questionnaire. In addition, a test of non-response bias found no statistically significant difference between early and late responses. Therefore, the issue of non-response bias did not significantly affect the generalization of the results for present study. This was followed by a deletion of 10 respondent answers as multivariate outliers. As a result, the total usable questionnaires remained at 220 providing a usable response rate of 73.34%. Generally, this rate was considered adequate to run all of the statistical analysis techniques, particularly SEM analysis.

Further, descriptive statistics of respondent demographic factors and variables confirmed that the sample data was meaningful for achieving study objectives. Then, the researcher tested the assumptions of normality, multicollinearity, linearity and homoscedasticity, and these results showed that the designated assumptions were generally met. The measurements that were adapted and developed to test the hypothesised model were then verified through factor analysis, reliability, and construct validity. Factor analysis was performed to test the dimensionality of the variables measured. Reliability was tested for all interval scales of variables to see how 'free from error' it was. Apart from that, construct validity was conducted to determine research measures. The results of these tests provided evidence of the appropriateness of the measurement instrument used for the present study.

SEM analysis provided more accurate estimates of causal relationships among the latent variables. A final structural model was evaluated using CFA analysis under a maximum likelihood approach. After checking for the assumptions of SEM analysis, the major empirical findings of present study was demonstrated in the Iraqi MTS context. It was shown that the KM implementation (including CSFs of KM, KMSs, and KMPs) had a statistically significant and direct positive effect on innovation. In addition, the findings showed that the KM implementation (including CSFs of KM and KMSs) had a statistically significant and direct positive effect on OP. While the direct relationship of KMPs with OP was positively affected, but not statistically significantly. Moreover, the findings showed that innovation had a positive and statistically significant effect on OP. Further, the findings showed that the KM implementation (including CSFs of KM, KMSs, and KMPs) had a positive and statistically significant effect on OP through the partial mediation effect of innovation. To recap, these results provide evidence of mutually beneficial for both the theoretical and practical implications of the study and will help both academics and the practitioners in the KM area.

CHAPTER FIVE

DISCUSSIONS AND CONCLUSIONS

5.0 INTRODUCTION

The overall purpose of the present study has been to understand the relationships among core requirements of KM implementation, innovation, and OP in the Iraqi MTS. Thus, this last chapter seeks to verify and summarize the achievement of the main presuppositions of the whole study. Indeed, this chapter represents the overview of the discussions, conclusions, and recommendations based on the empirical evidences of the research findings. To this end, there are main six sections. The first section provides a summary of research findings that includes main indicators of findings and a discussion of hypotheses testing followed by completion of the research questions and objectives in the second section. Then, the research contributions from the theoretical, methodological, and practical perspectives are explained in the third section. The fourth section gives details of the assumptions and limitations of the present study. This is followed by the fifth section, which outlines the recommendations for managers and future research. Finally, the sixth section delivers the conclusion of study.

5.1 SUMMARY OF RESEARCH FINDINGS

This section provides the main indicators of findings and a discussion of hypotheses testing performed in the present study.

5.1.1 Main Indicators of Findings

From the 300 questionnaires which were randomly distributed among mid-level managers working in the Iraqi MTS, only 233 questionnaires were returned for a response rate of 77.67%. Then, three cases of respondents' answers (12, 109, and 177) were deleted because they did not finish all the questions within the questionnaire. To illustrate the effects of a possible non-response bias, the demographic factors data of the present study were divided into two groups based on their response wave (first: n = 171, 74.3 % and second: n = 59, 25.7%). The significance (*p* value) of Levene's test was greater than .05. Therefore, there were no significant differences in the two groups' perceptions of the agreement of the various items. Test results suggested that non-response bias was not a problem in the present study since late respondents' responses were similar to those of the first wave respondents. Afterward, treatment of D^2 identified 10 cases of respondents' answers as being a multivariate outlier. Therefore, they were deleted. As a result, the final total of usable questionnaires was 220 for a usable response rate of 73.34%. It was considered adequate to run all of the statistical analysis techniques, particularly the SEM analysis technique.

Under descriptive statistics, the results show that the demographic factors of respondents may help to fulfill the overall objectives of the present study. As a part from that, all items of the CSFs of KM, KMSs, KMPs, innovation, and OP had mean values of 2.649, 2.912, 2.801, 2.615, and 2.788, respectively, below the average five-point Likert scale of 3. Therefore, the basis of respondents' opinions on all variables is considerably below a satisfactory level of acceptance. Likewise, all the SE, SD, and variance values of the variables are on an acceptable level. As a result, the sample data is suitable for completing the present study's objectives.

To identify and understand the complex relationship between variables of the present study, the assumptions of normality, multicollinearity, linearity, and homoscedasticity were explored. First, the values of Skewness and Kurtosis were less than (.684) and (-1.180), respectively. Moreover, the results of the Kolmogorov-Smirnov test showed that the significance level of all variables was greater than .05. Thus, the sample data is consistent with a normality assumption required for further use in multivariate analysis. Second, the results of Tolerance values were in the range between .590 to .680, and VIF values were in the range from 1.471 to 1.694. Hence, the results confirmed that the multicollinearity problem was absent in the interaction among the variables of the present study. Third, the residual plot of variables showed a random scatter of the points around the horizontal axis. Thus, the linear assumption is present in the sample data. Finally, the residual scatter plot had the approximately equal width for all values of the predicted dependent variable, which assumes the data is homoscedastic. In sum, the results confirmed that the sample data meets the assumptions of normality, multicollinearity, linearity, and homoscedasticity.

Based on the results of the measurement instrument's goodness, all the results of factor analysis confirmed that the CSFs of KM, KMSs, KMPs, innovation, and OP items were very fit for the present study and no items were dropped. Moreover, these values of Cronbach's alpha suggest that the theoretical constructs display a good internal stability and consistency. This is because all the values exceeded the required level of .70. Besides, the construct validity showed that all the Pearson inter-item correlation coefficients of measurement instrument items were larger than .30. As a result, there was no concern about the use of the measurement instrument for further analysis in the present study.

In order to test the hypotheses, the CFA measurement model was estimation. Table 5.1 exhibits that all exogenous and endogenous latent variables subjected to the CFA measurement model show a reasonably good fit as indicate by *p*-value > .05, GFI > .90, CFI > 0.95, TLI > .90, RMSEA < .05, and χ^2/df < 3.0.

Table 5.1
CFA of all Measurement and Structured Models (Goodness-of-Fit indices)

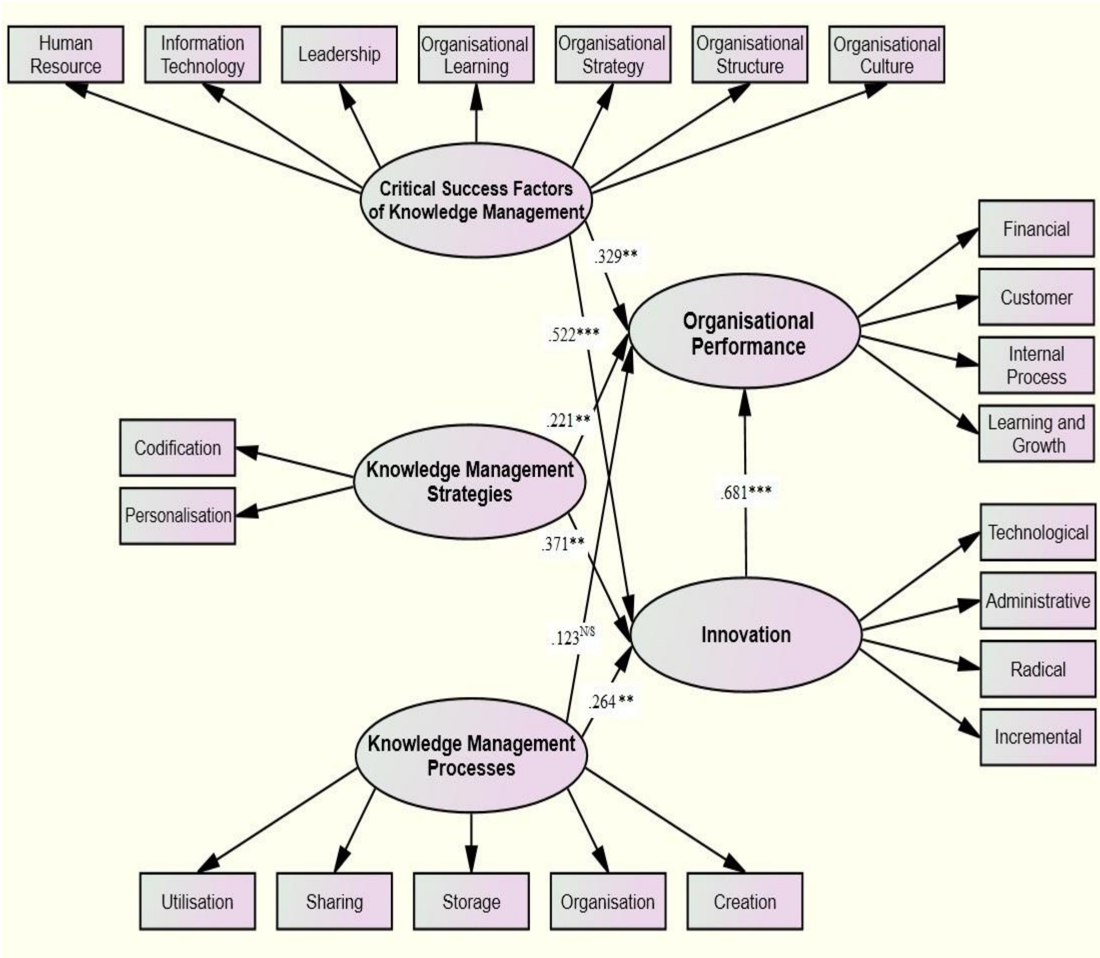
CFA Model	Original Items	CFA Items	P-value	GFI	CFI	TLI	RMSEA	χ^2/df
CSFs of KM	35	17	.175	.946	.988	.983	.025	1.132
KMSs	10	7	.313	.982	.996	.994	.026	1.147
KMPs	25	15	.251	.949	.992	.990	.021	1.101
Innovation	20	9	.395	.979	.998	.997	.015	1.051
OP	20	11	.324	.968	.996	.994	.020	1.090
Exogenous Model (CSFs of KM, KMSs, and KMPs)	70	28	.399	.905	.996	.996	.009	1.018
Endogenous Model (Innovation and OP)	40	20	.284	.931	.994	.992	.017	1.061
Final Structural Model	110	45	.369	.903	.995	.995	.008	1.015

In SEM analysis, all the correlations among exogenous variables (CSFs of KM, KMSs, and KMPs) were less than .90, indicating the variables' interactions are free from the problem of multicollinearity. Furthermore, in order to test the convergent validity and discriminant validity of the final structural model, the results show that all the exogenous and endogenous variables (CSFs of KM, KMSs, KMPs, innovation, and OP) had generally exhibited acceptable levels of CRI with values .855, .881, .831, .863, and .858, respectively, more than the recommended cutoff value of .70. Moreover, the results also indicated that all the exogenous and endogenous variables (CSFs of KM, KMSs, KMPs, innovation, and OP) had generally exhibited acceptable levels of AVE with values .818, .849, .788, .828, and .812, respectively, all above the recommended minimum level of .50. Additionally, the square root of AVE is larger than all squared correlations in the respective column and row for each variable. Thus, these tests further confirm the convergent validity and discriminant validity of the intended final structural in the present study.

5.1.2 Discussion of Hypotheses Testing

There has been limited research on KM implementation issues, especially in mobile telecommunications companies, due to lack of an integrated framework of KM implementation, particularly in developing countries (Chong *et al.*, 2009; Daud & Hassan, 2008; Kasim, 2008; Kim, 2009; Shahrokhi, 2010; Wong & Aspinwall, 2005). Hence, the present study focused on Iraq as an example of a developing country to address the lack of attention given to the KM implementation issue and how it can enhance innovation and improve OP.

Direct and indirect relationships in the present study were shown through the standardised path coefficient of the variables. Figure 5.1 shows a standardised path coefficient for three exogenous variables, which are CSFs of KM, KMs, and KMPs, and their interactions with innovation as the mediating variable and as a cause of OP as an endogenous variable. Furthermore, a discussion of the study's direct and indirect hypotheses is presented in the following sections.



Note: **Significant at .05 level, ***Significant at .001 level, N/S not significant

Figure 5.1
Standardised Paths Coefficient

5.1.2.1 Discussion of Direct Hypotheses

As clearly indicated in the results for the present study, the most important factors that lead to enhanced innovation and improved OP are three core requirements of KM implementation (including CSFs of KM, KMSs, and KMPs). This section provides theoretical justification and empirical evidence of the direct relationships among core requirements of KM implementation, innovation (including technological innovation, administrative innovation, radical innovation, and incremental innovation), and OP (including financial perspective, customer perspective, internal process perspective, and learning and growth perspective) in line with previous studies.

H1: CSFs of KM have a significant and positive effect on innovation

Based on previous works, it appears that CSFs of KM implementation are important to create more innovation (Chang & Lee, 2008; Brachos *et al.*, 2007; Jantunen, 2005; Sáenz *et al.*, 2009). However, there is a lack of empirical studies that examined the relationship between CSFs of KM and innovation (Brachos *et al.*, 2007; Lin, 2007; Rhodes *et al.*, 2008; Sáenz *et al.*, 2009). Therefore, further research is required to investigate the relationship between CSFs of KM and innovation (Brachos *et al.*, 2007; Chang & Lee, 2008; Chen & Huang, 2009; Donate & Guadamillas, 2011; Gloet & Terziovski, 2004; Liao & Wu, 2010; Lin, 2007; Rhodes *et al.*, 2008; Sáenz *et al.*, 2009; Sanz-Valle *et al.*, 2011). Accordingly, the researcher is particularly interested in investigating how CSFs contribute to successful KM implementation, which may lead to enhanced innovation. The intensive review of literature on KM implementation shows that most CSFs of KM explored by the researchers mentioned in human resource management, information technology, leadership, organisational learning, organisational strategy, organisational structure, and organisational culture. Hence, the present study attempted to investigate the relationship between these CSFs of KM and innovation in the Iraqi MTS.

In examining the hypothesis of the relationship between CSFs of KM and innovation, the results of the SEM analysis imply that the present study practically tested the relationship between CSFs of KM and OP under the adequate fit: p = .369, GFI = .903, CFI = .995, TLI = .995, RMSEA = .008, and χ^2/df = 1.015. In this regard, the results indicate that CSFs of KM have a positive and statistically significant effect on innovation (H1) with a standardised path coefficient of .522. Therefore, hypothesis H1 was accepted (please refer to Figure 5.1).

The findings of the present study reinforce the work by Chang and Lee (2008), who argued that organisational culture is considered an important source of knowledge accumulation capability in order to enhance organisational innovation. In this regard, the results show that pairing between organisational culture and knowledge accumulation capability has a significant and positive effect on administrative and technological innovation. Additionally, Chen and Huang (2009) found that soft human resource management practices have a significant positive effect on KM capacity. They also revealed a significant positive relationship between KM capacity and innovation performance (administrative and technological innovation).

H2: KMSs have a significant and positive effect on innovation

According to Darroch and McNaughton (2002), successful innovations are often due to different knowledge resources and, hence, different KMSs. However, there is still a lack of empirical studies that have investigated the relationship between KMSs and innovation. Thus, further research is required to investigate the relationship between these variables (Rhodes *et al.*, 2008), particularly in the MTS (Chong *et al.*, 2009). Likewise, further research is required to investigate the relationship between KMSs and innovation (Majchrzak *et al.*, 2004; Rhodes *et al.*, 2008). In the present study, the researcher identified two strategies of KM, which are codification strategy and personalisation strategy. More exclusively, the present study attempts to investigate the relationship between these strategies and innovation in the Iraqi MTS.

As shown from the results of the SEM analysis, the present study empirically tested the relationship between KMSs and innovation under the adequate fit: p = .369, GFI = .903, CFI = .995, TLI = .995, RMSEA = .008, and χ^2/df = 1.015. In addition, the results pointed to KMSs have a positive and statistically significant effect on innovation (H2) with a standardised path coefficient of .371. Thus, hypothesis H2 was accepted (please refer to Figure 5.1).

These findings support the similar findings by Chong *et al.* (2007), Darroch and McNaughton (2002), Majchrzak *et al.* (2004), and Rhodes *et al.* (2008). Based on an exploratory study of KMSs, there are only a few studies that have looked at the relationship between KMSs and innovation. However, the results of the present study support the view of Rhodes *et al.* (2008), who argued that the codification and personalisation strategies have a positive effect on innovation capabilities. Furthermore, Majchrzak *et al.* (2004) found that explicit knowledge reuses (which is considered a codification strategy) and has a positive and significant effect on radical innovation.

H3: KMPs have a significant and positive effect on innovation

Several studies have revealed that KMPs are important for innovation (Darroch, 2005; Tan & Nasurdin, 2010; Wei & Xie, 2008). More broadly, research is also needed to determine the relationship between KMPs and innovation (Jantunen, 2005; Jiang & Li, 2009). Therefore, a number of empirical studies addressing this issue have re-examined the relationship between KMPs and innovation, such as Chang and Lee (2008), Deyong *et al.* (2007), Huang and Li (2009), Lin (2007), Tan and Nasurdin (2010), and Wei and Xie (2008). For that reason, one of the major objectives of the present study is to investigate the relationship between KMPs and innovation. In this regard, these previous studies have provided multiple sets of KMPs. Despite the differences in the view and practice of KMPs, the essential concepts of these processes are not different (Alavi & Leidner, 2001; Benbya *et al.*, 2004). Accordingly, the present study has employed five processes of KM (including creation, organisation, storage, sharing, and utilisation). Then, the present study attempts to investigate the relationship between these KMPs and innovation in the Iraqi MTS.

From the results of the SEM analysis, the present study experimentally tested the relationship between KMPs and innovation. The results of the final structural model indicated an adequate fit: p = .369, GFI = .903, CFI = .995, TLI = .995, RMSEA = .008, and χ^2/df = 1.015. In addition, the standardised path coefficient between KMPs and innovation was .264, which appears to recommend that KMPs have a positive and statistically significant effect on innovation. Thus, hypothesis H3 was accepted (please refer to Figure 5.1).

Several studies have provided evidence that KMPs positively affect innovation (e.g. Chang & Lee, 2008; Darroch, 2005; Huang & Li, 2009; Jantunen, 2005; Jiang & Li, 2009; Liao & Wu, 2010; Tan & Nasurdin, 2010; Wei & Xie, 2008). For example, Huang and Li (2009) indicated that KMPs, which include acquisition, sharing, and application, have a significant and positive related to administrative and technological innovation. Additionally, Darroch (2005) examined the relationship between KMPs and innovation types from the RBV perspective. The knowledge acquisition, dissemination, and responsiveness were measured as KMPs, while radical innovation and incremental innovation were measured as innovation types. The results indicated that KMPs have a significantly positively effect on innovation.

H4: CSFs of KM have a significant and positive effect on OP

Many previous empirical studies have shown that the CSFs of KM are essential to improve OP (Anderson, 2009; Asoh *et al.*, 2007; Gold *et al.*, 2001). Likewise, many studies recommended to re-test the relationship between CSFs of KM and OP (Asoh *et al.*, 2007; Ho, 2008; Lin & Kuo, 2007; Tsai & Li, 2007; Yang *et al.*, 2009b; Zheng *et al.*, 2010), particularly in the MTS context (Chong *et al.*, 2009). Accordingly, the researcher is particularly interested in investigating how CSFs contribute to successful KM implementation, which may lead to improved OP. Indeed, the present study attempts to examine the relationship between CSFs of KM and OP in the Iraqi MTS.

In examining the hypothesis related to the relationship between CSFs of KM and OP, the results of the SEM analysis imply that the present study practically tested the relationship between CSFs of KM and OP under an adequate fit: p = .369, GFI = .903, CFI = .995, TLI = .995, RMSEA = .008, and χ^2/df = 1.015. In this regard, the results indicate that CSFs of KM have a positive and statistically significant effect on OP (H4) with a standardised path coefficient of .329. Therefore, hypothesis H4 was accepted (please refer to Figure 5.1).

This result is in line with previous empirical studies. Many previous empirical studies have shown that there is a positive relationship between CSFs of KM and OP, such as Anderson (2009), Asoh *et al.* (2007), Gold *et al.* (2001), Ho (2008), Lin and Kuo (2007), Tsai and Li (2007), Yang *et al.* (2009b), and Zheng *et al.* (2010). For example, Gold *et al.* (2001) found there are three main CSFs of KM (including technology, organisational culture, and organisational structure) that have a significant positive effect on OP. Furthermore, Zheng *et al.* (2010) explored that structure, culture, and strategy have a significant positive effect on OP. The results of Asoh *et al.*'s (2009) study highlighted the significant positive relationship of technology, leadership, culture, and measurement with OP. Furthermore, Ho (2008) found that organisational learning (including information-sharing patterns, inquiry climate, learning practices, and achievement mindset) has a significant positive effect on OP. Moreover, Lin and Kuo (2007) found that human resource management practices have significant and positive indirect effects on OP through KM capabilities.

H5: KMSs have a significant and positive effect on OP

The results of most prior studies confirmed that the KMSs could play a main role in superior OP (Bierly & Daly, 2007; Schulz & Jobe, 2001). However, there is still limited research focused on this area (Bierly & Daly, 2007; Choi *et al.*, 2008), particularly in the MTS context (Chong *et al.*, 2009). Therefore, further research is required to investigate the relationship between KMSs and OP (Bierly & Daly, 2007; Choi & Lee, 2003; Choi *et al.*, 2008; Chong *et al.*, 2009; Keskin, 2005; Schulz & Jobe, 2001; Yu *et al.*, 2006). More specifically, the present study attempted to investigate the relationship between KMSs and OP in the Iraqi MTS.

As shown from the results of the SEM analysis, the present study empirically tested whether the relationship between KMSs and OP are an adequate fit: p = .369, GFI = .903, CFI = .995, TLI = .995, RMSEA = .008, and χ^2/df = 1.015. In addition, the results pointed to the KMSs have a positive and statistically significant effect on OP (H5) with a standardised path coefficient of .221. Thus, hypothesis H5 was accepted (please refer to Figure 5.1).

This result is in line with previous studies' findings. Some previous empirical studies have shown that there is a positive relationship between KMSs and OP (Choi & Lee, 2003; Choi *et al.*, 2008; Keskin, 2005; Yu *et al.*, 2006). For example, Yu *et al.* (2006) mentioned that the codification strategy has a significant positive effect on OP improvement, while Bierly and Daly (2007) revealed that exploration strategy (personalisation strategy) has a positive relation to OP. In Choi *et al.* (2008) and Keskin's (2005) research, the authors argued that both codification and personalisation strategies have a significant positive effect on OP.

H6: KMPs have a significant and positive effect on OP

KMPs efforts typically focus on improving OP from various perspectives. Previous studies have generally shown that there is a strong relationship between KMPs and OP (Asoh *et al.*, 2007; Fugate *et al.*, 2009; Tsai & Li, 2007). However, the relationship between KMPs and OP is still indistinct (Darroch, 2005). Therefore, many empirical studies suggested re-examining the causal relationship between KMPs and OP, such as Asoh *et al.* (2007), Chang and Chuang (2011), Darroch (2005), Fugate *et al.* (2009), Gold *et al.* (2001), Ho (2008), Lee and Lee (2007b), Liao and Wu (2009), Omerzel (2010), and Zack *et al.* (2009), particularly in the MTS context (Chong *et al.*, 2009). For that reason, one of the major objectives of the present study is to investigate the relationship between KMPs and OP in the Iraqi MTS.

Under the results of the SEM analysis, the present study experimentally tested the relationship between KMPs and OP. The results of the final structural model indicate an adequate fit: p = .369, GFI = .903, CFI = .995, TLI = .995, RMSEA = .008, and

$\chi^2/df = 1.015$. In addition, the standardised path coefficient between KMPs and OP was .123, which indicates there is not a significant positive relationship of (H6). Centralisation of KMPs was hypothesised to be a significant positive effect on OP and while the path was positive, as posited, it was not statistically significant within the selected .05 significant level. Thus, hypothesis H6 was not accepted (please refer to Figure 5.1).

Previous empirical studies recommended that KMPs should play a critical role in achieving higher levels of OP. In the final structural model, the relationship between KMPs and OP was positive, but not statistically significant, thus it was not accepted (H6). The present study tries to find the reason why (H6) is not significantly supported. According to Liao and Wu (2009), there are still some different results in the relationship between KMPs and OP. Hence, it requires being proven very carefully. In Darroch's (2005) study, the author found that both acquisition and dissemination negatively affected OP, while knowledge responsiveness positively affected OP. Anderson (2009) argued that the results of KMPs (including acquisition and application) were significantly positive related to organisational effectiveness. Meanwhile, the results of KMPs (conversion and protection) were positively related to organisational effectiveness, but did not appear to be significant. In the same vein, Zack *et al.* (2009) also mentioned that KMPs' capabilities refer to the ability to locate and share existing knowledge, the ability to experiment and create new knowledge, a culture that encourages knowledge creation and sharing, and a regard for the strategic value of knowledge and learning. All of them had a positive related to financial performance, but were not statistically significant. Furthermore, the results of Mills and Smith's (2011) study highlighted that the knowledge conversion capability has a positive related to OP, but not a statistically significant. As a search result, even though several empirical studies have presented that KMPs are essential for OP improvement; the results to date have been mixed. There are many different results in the literature that declare KMPs affect OP some significantly positive, some significantly negative, and some not significantly positive. Thus, there are still some confusing relationships between KMPs and OP.

H7: Innovation has a significant and positive effect on OP

Several prior empirical studies shed light on the relationship between innovation and OP. According to Neely *et al.* (2001), examining the relationship between OP and innovation is the most important key to a business organisation's success. However, more research is warranted to assess the relationship between innovation and OP (Damanpour *et al.*, 2009; Eshlaghy & Maatofi, 2011; García-Morales *et al.*, 2008; Li *et al.*, 2006; Salim & Sulaiman, 2011). According to Damanpour *et al.* (2009), contemporary organisations seek to reduce the performance gap between actual performance and expected performance through investigation of the relationship between innovation and OP. Based on the previous arguments, the present study seeks to test the role of innovation (including technological innovation, administrative innovation, radical innovation, and incremental innovation) in determining OP in the Iraqi MTS.

The SEM is also capable of performing analyses of the investigation of the relationship between innovation and OP. The results of the final structural model showed an adequate fit: p = .369, GFI = .903, CFI = .995, TLI = .995, RMSEA = .008, and χ^2/df = 1.015. Moreover, the value of the standardised path coefficient between innovation and OP was .681. This appears to recommend that innovation has a positive and statistically significant effect on OP. Thus, hypothesis H7 was accepted (please refer to Figure 5.1).

With these findings, previous studies have provided empirical evidence of the significant positive relationship between innovation and OP (Chen *et al.*, 2009; Damanpour *et al.*, 2009; Eshlaghy & Maatofi, 2011; García-Morales *et al.*, 2008; Ho, 2010; Li *et al.*, 2006; Lin & Chen, 2007). This result is very much in line with the findings of Chen *et al.* (2009) and Lin and Chen's (2007) studies. Chen *et al.* (2009) found that both technological innovation and administrative innovation have a significant positive related to OP. While Lin and Chen (2007) explored that both radical innovation and incremental innovation have a significant positive related to OP, which was measured as company sales.

5.1.2.2 Discussion of Indirect Hypotheses

A careful analysis of the existing literature showed that the gap in the relationships among KM, innovation, and OP is still serious (Darroch, 2005; Darroch & McNaughton, 2003; Lopez-Cabrles *et al.*, 2009; Rhodes *et al.*, 2008). Likewise, there is still an existing gap in the determination of the critical factors that directly impact innovation to improve OP (Akgün *et al.*, 2009; Aragón-Correa *et al.*, 2007; Calantone *et al.*, 2002; Camisón & López, 2010; García-Morales *et al.*, 2007). Indeed, no previous empirical study has examined the relationships among core requirements of KM implementation (including CSFs of KM, KMSs, and KMPs) and OP (including financial perspective, customer perspective, internal process perspective, and learning and growth perspective) through innovation (including technological innovation, administrative innovation, radical innovation, and incremental innovation) within a single study. As an original contribution, the present study proposes that innovation plays a significant positive mediating role in the relationship between the core requirements of KM implementation and OP under RBV and KBV theories' perspectives. Thus, the mediating effects were tested among CSFs of KM, KMSs, and KMPs mediated by innovation with OP through three hypotheses as follows:

H8: Innovation has a significant positive mediating effect on the relationship between CSFs of KM and OP.

H9: Innovation has a significant positive mediating effect on the relationship between KMSs and OP.

H10: Innovation has a significant positive mediating effect on the relationship between KMPs and OP.

Based on the results of the SEM analysis, the present study examined the relationships among core requirements of KM implementation, innovation, and OP. The results of the final structural relationship indicate an adequate fit: p = .369, GFI = .903, CFI = .995, TLI = .995, RMSEA = .008, and χ^2/df = 1.015. Furthermore, the results show there is significant positive effects of innovation on the relationship between core requirements of KM implementation and OP. The values of the indirect path coefficient of the H8, H9, and H10 were .355, .252, and .179, respectively. Thus, hypothesis H8, H9, and H10 were partially accepted (please refer to Figure 5.1).

As revealed from the above research results, the present study could represent the first empirical investigation of the partial mediating role of innovation in the relationship between core requirements of KM implementation and OP under RBV and KBV theories' perspectives, especially in the Iraqi MTS. This was indicated in the results of the present study that the three core requirements of KM implementation (including CSFs of KM, KMSs, and KMPs) are the most important factors that lead to improved OP (including financial perspective, customer perspective, internal process perspective, and learning and growth perspective) through innovation (including technological innovation, administrative innovation, radical innovation, and incremental innovation).

5.2 COMPLETION OF RESEARCH QUESTIONS AND OBJECTIVES

Considering the issues mentioned in chapter one, the present study follows up on the literatures gaps and practical problems in an attempt to shed light on the successful KM implementation that lead to enhanced innovation and improved OP in the Iraqi MTS context. Hence, the study outlined in this section was designed to provide answers and achievement of the research's questions and objectives.

5.2.1 Answers of Research Questions

As indicated in chapter one, the present study has focused on the following questions in the context of Iraqi MTS:

1. What is the relationship between core requirements of KM implementation and innovation?
2. What is the relationship between core requirements of KM implementation and OP?

3. What is the relationship between innovation and OP?
4. How does innovation mediate the relationship between core requirements of KM implementation and OP?

In response to the first question of the present study, the empirical evidence of the three hypotheses (H1, H2, and H3) under this research question found that KM implementation (including CSFs of KM, KMSs, and KMPs) had a positive and statistically significant effect on innovation. Thus, they were accepted. In the case of answering research question two, the present study empirically found that out of the three hypotheses (H4, H5, and H6), only two hypotheses (H4 and H5) were accepted. The hypotheses (H4 and H5) concerning the relationships of the CSFs of KM and KMSs have a positive and statistically significant effect on OP. Thus, they were accepted. However, a hypothesis (H6) concerning the relationship between KMPs and OP was rejected. Indeed, it is found to be positively affected, but not statistically significant within the selected .05 significant level. Meanwhile, there is existing theoretical support for this outcome. In support of research question three, the empirical evidence of the present study had provided answers of this research question when the hypothesis (H7) concerning the relationship between innovation and OP, which had a positive and statistically significant effect. Thus, it was accepted. Finally, the present study answers research question four by exploring empirically the three mediation hypotheses (H8, H9, and H10). It was found that innovation has a partial mediation effect on the relationship between KM implementation (including CSFs of KM, KMSs, and KMPs) and OP. Consequently, they were accepted. Generally speaking, the present study answers the research questions proposed in chapter one.

5.2.2 Achievement of Research Objectives

The present study empirically concludes that the answers of the research questions have validated the objectives in the Iraqi MTS context that are outlined in chapter one, which are:

1. To investigate the relationship between core requirements of KM implementation and innovation.
2. To examine the relationship between core requirements of KM implementation and OP.
3. To determine the relationship between innovation and OP.
4. To investigate the mediating effect of innovation on the relationship between core requirements of KM implementation and OP.

To explore the first objective, the empirical results have been presented for this objective. In fact, the present study has provided an understanding of the core requirements of KM implementation to be considered in enhancing innovation. The results suggested that core requirements of KM implementation play paramount roles in enhancing innovation. Therefore, Iraqi mobile companies should consider enhancing innovation by increasing effectiveness of KM implementation (including CSFs of KM, KMSs, and KMPs). As far as the second objective is considered, the present study has also provided empirical results to get an understanding of how the core requirements of KM implementation should be considered in improving OP. These results also imply that the intensity of OP improvement can be increased through manipulating the core requirements of KM implementation (including CSFs of KM, KMSs, and KMPs). As such, this result suggests that Iraqi mobile companies could incorporate in their strategies how to improve OP. The third objective of the present study was meant to identify the importance of innovation of the mobile telecommunications environment in order to improve OP. There are also empirical results that indicate that innovation has the strongest relationship with OP. Moreover, this result shows that innovation appears to be a key predictor of OP in the Iraqi MTS. For the last objective, it is very important to note under this objective that innovation plays a vital mediating role between the core requirements of KM implementation (including CSFs of KM, KMSs, and KMPs) and OP. Practically, this means that Iraqi mobile companies are able to improve their OP by giving more attention to enhanced innovation that will help KM implementation to improve OP. Overall, the present study achieves the research objectives proposed in chapter one.

5.3 RESEARCH CONTRIBUTIONS

In the present study, the contributions are discussed in terms of their theoretical, methodological, and practical contributions in the context of the Iraqi MTS.

5.3.1 Theoretical Contributions

The contributions to the body of theoretical research in the present study are made by addressing the gap in KM implementation, innovation, and OP as follows:

1. In the KM literature, there are very few empirical studies that focus on the relationships among KM implementation (CSFs of KM, KMSs, and KMPs), innovation, and OP from RBV and KBV theories' perspectives (Asoh *et al.*, 2007; Darroch & McNaughton, 2002; Kiessling *et al.*, 2009). Furthermore, there is no comprehensive and integrative framework for those variables. Thus, one of the main contributions of the present study is proposed theoretical framework which investigates the relationships between KM

implementation (CSFs of KM, KMSs, and KMPs), innovation, and OP from the RBV and KBV theories' perspectives (please refer to Figure 3.1). Furthermore, it is commensurate with empirical reality, as determined through the research findings outlined in chapter four.

2. Even though the KM is playing an increasingly large role in organisational development, there is a very limited amount of empirical studies that look at the core requirements of KM implementation (CSFs of KM, KMSs, and KMPs) in the MTS context (Chong *et al.*, 2009). Besides these, the researcher provides a broad picture of the dimensions covered under CSFs of KM (including human resource management, information technology, leadership, organisational learning, organisational strategy, organizational structure, and organizational culture), KMSs (including codification strategy and personalisation strategy), and KMPs (including knowledge creation, knowledge organisation, knowledge storage, knowledge sharing, and knowledge utilisation). As the main contribution in the present study, the empirical evidence provided a better understanding of the core requirements of KM implementation (CSFs of KM, KMSs, and KMPs), which lead to enhanced innovation and improved OP. Certainly, the present study empirically confirmed that the core requirements of KM implementation are considered key issues in the future development of MTS, particularly in the Iraqi context.

3. Previous studies, such as Chen and Mohamed (2008), Lee and Lee (2007b), and Yu and Liying (2009), indicated that there are very few studies that have uncovered the indicators of BSC (consisting of financial perspective, customer perspective, internal process perspective, and learning and growth perspective)

to evaluate KM implementation and innovation activities, particularly in the MTS context (Visser & Sluiter, 2007). According to Hongmei and Yujun (2010), further studies are needed to understand whether and how BSC provides indicators for evaluating KM implementation and innovation. In response to the above, the present study has provided the BSC as a very accurate way of evaluating KM implementation and innovation.

4. The present study could not find any published academic literature on the relationships among KM implementation (including CSFs of KM, KMSs, and KMPs) and OP (including financial perspective, customer perspective, internal process perspective, and learning and growth perspective) as well as indirect relationship between KM and OP by investigating the mediating role of innovation (including technological innovation, administrative innovation, radical innovation, and incremental innovation), particularly in the MTS context (Chong *et al.*, 2009; Darroch, 2005; Rhodes *et al.*, 2008). Hence, it is very hard to find empirical studies supported by evidence that focus on the mediating role of innovation on the relationships among core requirements of KM implementation and OP, particularly in the MTS context.

In bringing this gap, the present study contributes to the knowledge by investigating the direct and indirect relationships among those variables. Indeed, the mediating role of innovation on the relationship between KM implementation (CSFs of KM, KMSs, and KMPs) can be considered an original contribution of the present study. In this regard, the results of the present study contribute to the literature by investigating and supporting the mediating role of innovation on the relationship between KM implementation

(CSFs of KM, KMSs, and KMPs) and OP. In fact, the results from the present study have revealed that the outcome of the research was furthered by the partial mediating role of innovation on the relationship between core requirements of KM implementation and OP.

5.3.2 Methodological Contributions

The methodological contributions in the present study are as follows:

1. This could be the first study that has adapted the measurement instruments, which were empirically tested by Calantone *et al.* (2002), Chen (2007), Choi (2002), Chong *et al.* (2009), Darroch (2005), Darroch and McNaughton (2002), Herrmann et al. (2007), Hsieh (2007), Gómez and Manzanares (2004), Gonzalez-Padron *et al.* (2010), Kumar and Ganesh (2011), Lawson (2003), Li *et al.* (2006), Lin *et al.* (2010), and Wong and Aspinwall (2005), with the exception of seven items (two items for KMPs, one item for innovation, and four items for OP) and were developed based on the theoretical studies of Bhatt (2000), Salavou (2004), Supyuenyong *et al.* (2009), and Visser and Sluiter (2007), respectively, in order to investigate the relationships among KM implementation, innovation, and OP in the Iraqi MTS. Indeed, the present study has contributed of the methodological perspective by empirically establishing dimensionality, reliability, and validity of the measurement instruments in the Iraqi business environment. Thus, the present study has significantly contributed of the methodological perspective.
2. The application of the SEM analysis in the present study is also considered to be a methodological contribution. This is because the SEM analysis promotes better quality and gives useful features of research with more accurate results,

especially in modeling multivariate methods. Furthermore, to date there are only a few previous studies in the KM field that used SEM analysis for testing hypotheses.

5.3.3 Practical Contributions

The practical contributions in the present study are as follows:

1. The present study contributes to developing and Arab countries by choosing Iraq, which is considered as developing Arab country. Accordingly, the present study could be the first of its kind in the Iraqi organization, which investigates the relationships among KM implementation, innovation, and OP in Iraqi MTS context.
2. The findings of the present study were important to the Iraqi MTS to implement KM. In addition, the findings of the present study provided useful suggestions and directions for the government and companies to better understand the role of KM implementation in enhancing innovation and improving the OP of the MTS.

5.4 ASSUMPTIONS AND LIMITATIONS

The research driven assumptions and limitations of the present study are as follows:

5.4.1 Assumptions

The present study was focused on the middle management departments of six private mobile companies in Iraq. Furthermore, it was assumed that the mid-level managers of those companies do not provide adequate support of KM implementation. This is because these Iraqi mobile telecommunications companies have not been able to implement KM due to a lack of understanding of the core requirements of KM. It was also assumed that the KM implementation of those companies wasn't built around goals and objectives consistent with each organisation's mission, vision, and strategy.

5.4.2 Limitations

Even though it can be said that the empirical evidences of the present study are interesting, they should be considered in light of the research processes inherently methodological and generalisability limitations.

5.4.2.1 Methodological Limitations

The methodological limitations of the present study are connected as follows:

1. Regarding the research purpose, the present study is limited to explore the relationships among core requirements of KM implementation, innovation, and OP in the MTS, particularly in the Iraqi context.
2. Regarding the study approach, the present study only employed the quantitative approach.
3. Regarding the measurement instrument, the questionnaire survey contained too many items compared to prior studies in the KM field. Therefore, the researcher spent more time collecting data and explaining the questionnaire items to respondents in order to increase the response rate and get accurate answers from them.
4. Regarding the hypothesis testing, the results were mixed and full acceptance was not obtained for all the hypotheses. From the results of the present study, a significant relationship could not be observed between the KMPs and OP.

5.4.2.2 Generalisability Limitations

The study results are limited to Iraqi MTS, which was chosen as an area of research in the present study. This means that the empirical evidence of the present study may have differed if the research was conducted in another country or another sector. Therefore, generalizing the empirical evidence of the present study to another country or another sector may lead to invalid conclusions. However, the findings are valuable for mid-level managers' reference, particularly for those whose conditions are similar to those in Iraq.

5.5 RECOMMENDATIONS

In view of the results of the present study, the following recommendations are made for managers and future research.

5.5.1 Direction for Managers

Based on the results of the present study, the researcher provided four specific recommendations for managers as follows:

1. They can use the present study to better understand the importance of KM implementation in organisations and ways to apply it.
2. They need to understand the complementary nature of CSFs of KM, KMSs, and KMPs, and be able to determine the optimal values of each under different circumstances in order to achieve successful KM implementation.
3. The results of the present study recommend that managers must first consider the underlying KM implementation of the company before setting milestones and expectations for the KM efforts.

4. They should pay close attention to the potential side effects of KM implementation on enhancing innovation with spatial consideration of OP improvement in a company.

5.5.2 Direction for Future Research

On the basis of the present study, the following specific recommendations have been made for further studies in the KM area. Most importantly, the researcher proposed four recommendations for future research as follows:

1. The present study was limited to the Iraqi MTS. Therefore, the study can be replicated in different countries or sectors, as this would most likely strengthen and validate the findings of some of the hypotheses.
2. The researcher used a quantitative approach for investigating the relationships between the variables of the present study. Further research should be done using both quantitative and qualitative approaches in order to determine other factors that can lead to successful KM implementation to enhance innovation and improve the OP of any organisation.
3. Future studies may add other variables into the relationships in addition to the variables of the present study. For example, the investigation of how the KM team's motivation impacts the relationships for KM implementation, innovation, and OP not previously examined. Hence, the relationships among those variables should be explored in future studies.
4. While KMPs are sensational at improving the OP of any organisation, the results of the present study indicated that there was a positive direct relationship between KMPs and OP, but it was not statistically significant. This is consistent with several empirical studies that examined the relationship

between KMPs and OP; the results to date have been mixed. Accordingly, it is necessary to re-examine the relationship between KMPs and OP in future research.

5.6 CONCLUSION OF STUDY

The present study has sought to investigate the mediating role of innovation in the relationships between core requirements of KM implementation and OP in the Iraqi MTS context. It has met all the questions and objectives as outlined in chapter one. Certainly, it augments our understanding of the core requirement of KM implementation (CSFs of KM, KMSs, and KMPs) in enhancing innovation (technological innovation, administrative innovation, radical innovation, and incremental innovation) and improving OP (financial perspective, customer perspective, internal process perspective, and learning and growth perspective). Based on the RBV and KBV theories' perspectives, the results of the present study provided evidence that all the core requirements of KM implementation have a significant and positive effect on innovation and OP, except the KMPs, which has a positive but not significant effect on OP. Furthermore, the results indicated that innovation has a significant and positive effect on OP. The results also show that the KM implementation (CSFs of KM, KMSs, and KMPs) has a positive and statistically significant effect on OP through the partial mediating role of innovation.

Consequently, the present study has contributed to the KM implementation field. The findings of the present study have theoretical, methodological, and practical contributions. As such, the current attempt has managed to fill in gaps that existed in the KM implementation literature. However, the present study faced methodological and generalisability limitations. In this case, further studies are necessary to confirm these results and incorporate the other variables that may have influenced the results. Therefore, the future is wide open for further empirical research in this area.

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APPENDIX 1
PART A

ENGLISH QUESTIONNAIRE

Knowledge Management Implementation, Innovation, and Organisational Performance: An empirical study in the Iraqi mobile telecommunications sector

Dear Respondent,

I am a doctoral student from Universiti Utara Malaysia (UUM) under the supervision of Assoc. Prof. Dr. Shahizan Hassan. I am currently conducting an academic questionnaire survey which attempts to explore the relationships among knowledge management implementation, innovation, and organisational performance in the Iraqi mobile telecommunications sector. The questionnaire is divided into six sections, namely, section A (respondent profile), section B (critical success factors of knowledge management), section C (knowledge management strategies), section D (knowledge management processes), section E (innovation), and section F (organizational performance). It is hoped that the results of this survey will provide important information on the development of the Iraqi mobile telecommunications sector in the context of my study. I sincerely hope that you would spare me a little of your time (not more than 30 minutes) to answer this questionnaire. Your answers are very valuable to the accuracy of present study. Please be rest assured that all your responses will be kept strictly confidential and I will keep your identity anonymous. All the data will be aggregated and will be strictly used for academic purposes only. I look forward to receiving the feedback from you at your convenience.

Thank you for your assistance and support

Yours truly,

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Section A: Respondent profile

Particular	**Please tick (✓) the appropriate box**	
Gender	Male ❑	Female ❑
Age	18-25 ❑ 26-35 ❑ 36-45 ❑ 46-55 ❑ Over 56 years ❑	
Workplace	Asia-Cell ❑ Korek & Sanatel ❑ Zain Iraq ❑ Omnnea ❑ Itisaluna ❑	
Educational level	High School ❑ Diploma ❑ Bachelor's degree ❑ Master's degree ❑ PhD ❑	
Experience	Less than 1year ❑ 1-3 ❑ 4-6 ❑ Over 6 years ❑	
Position	Accounting Manager ❑ Auditing Manager ❑ Information Systems Manager ❑ Sales Manager ❑ Administration Manager ❑ Maintains Manager ❑ Planning Manager ❑ Customers Services Manager ❑ Human Resources Manager ❑ Marketing Manager ❑ Quality Manager ❑	

Section B: Critical successes factors of knowledge management: Please indicate the degree of your **agreement** with the following statements on a five-point Likert scale (Please circle your chosen answer).

No.	**Statement**	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1	Our company seeks to recruit of employees for fill knowledge gaps.	1	2	3	4	5
2	Our company seeks to hire employees who have a positive orientation toward knowledge.	1	2	3	4	5
3	Our company seeks to provide professional development activities for employees.	1	2	3	4	5
4	Our company seeks to retain perfect employees to work.	1	2	3	4	5
5	Our company seeks to provide job advancement opportunities to employees.	1	2	3	4	5
6	In our company, information technology helps to capture information we need.	1	2	3	4	5
7	In our company, information is keeping up-to-date.	1	2	3	4	5
8	In our company, information technology supports the decision making process.	1	2	3	4	5
9	In our company, technology facilitates sharing of knowledge at all organisational levels.	1	2	3	4	5
10	In our company, a current information system is able to support future development.	1	2	3	4	5
11	In our company, there is a stated and clear vision for managing knowledge.	1	2	3	4	5
12	In our company, the main objectives focus on implementation of knowledge management.	1	2	3	4	5
13	In our company, top management recognizes that knowledge management implementation can add value.	1	2	3	4	5
14	In our company, top management is committed to knowledge management implementation.	1	2	3	4	5
15	In our company, dedicated personnel lead and support knowledge management activities.	1	2	3	4	5
16	Our company attempts to carry out various formal training programs.	1	2	3	4	5
17	Our company seeks to provide opportunities for informal individual development in addition to formal training.	1	2	3	4	5
18	Our company encourages employees to take advantage from attending seminars, symposia, and so on.	1	2	3	4	5
19	Our company provides multiple learning programs for employees.	1	2	3	4	5
20	Our company provides job training and self-development programs.	1	2	3	4	5
21	Our company explains the importance of knowledge management to all employees.	1	2	3	4	5

22	Our company formulates strategic plans to acquire knowledge.	1	2	3	4	5
23	Our company has specific objectives for knowledge management implementation.	1	2	3	4	5
24	Our company's mission statement reflects the importance of knowledge management implementation.	1	2	3	4	5
25	Our company's mission and objective are explained well at all organisational levels.	1	2	3	4	5
26	Our company employees can perform their tasks without a supervisor.	1	2	3	4	5
27	Our company employees are encouraged to make their own decisions.	1	2	3	4	5
28	Our company employees do not have to refer to someone else.	1	2	3	4	5
29	Our company employees do not have to ask their supervisor before taking performance action.	1	2	3	4	5
30	Our company employees can make decisions without permission.	1	2	3	4	5
31	In our company, communications of success stories are widely applied at all organisational levels.	1	2	3	4	5
32	In our company, knowledge does not threaten positions in any organisational levels.	1	2	3	4	5
33	Our company develops rewards and recognition for knowledge sharing.	1	2	3	4	5
34	Our company seeks to create a culture of openness and mutual trust.	1	2	3	4	5
35	Our company encourages employee empowerment and participation in decision making.	1	2	3	4	5

Section C: Knowledge management strategies: Please indicate the degree of your **agreement** with the following statements on a five-point Likert scale (Please circle your chosen answer).

No.	Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Our company seeks to write down ideas and to document those gained during work.	1	2	3	4	5
2	Our company seeks to capture the experiences that employees narrated.	1	2	3	4	5
3	Our company seeks to record important data, drawings, and happenings for future use.	1	2	3	4	5
4	Our company seeks to dedicate a team of employees to archive drawings, reports, and such useful information.	1	2	3	4	5
5	Our company seeks to create a database such as an online repository for keeping project related knowledge.	1	2	3	4	5
6	Our company considers reviewing customer opinion in team/group meetings as a learning practice.	1	2	3	4	5
7	Our company holds informal meetings to review work progress and create new ideas.	1	2	3	4	5
8	Our company employees can share their learning and experiences with each other after returning from official trips.	1	2	3	4	5
9	Our company attempts to form small groups or communities of employees to discuss knowledge and ideas around a particular theme.	1	2	3	4	5
10	Our company seeks to make available a "people directory" to help employees in their search for colleagues with certain expertise.	1	2	3	4	5

Section D: Knowledge management processes: Please indicate the degree of your **agreement** with the following statements on a five-point Likert scale (Please circle your chosen answer).

No.	Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Our company seeks to use skills to acquire external knowledge to be integrated into management processes at all organisational levels.	1	2	3	4	5
2	Our company seeks to use systematic approaches to new knowledge or experiences from business units to generate knowledge at all organisational levels.	1	2	3	4	5
3	Our company seeks to use interdisciplinary business units with internal experts to generate knowledge at all organisational levels.	1	2	3	4	5
4	Our company seeks to use interdisciplinary business units with external experts to generate knowledge at all organisational levels.	1	2	3	4	5
5	Our company seeks to use simulation methods (scenarios) to generate new knowledge at all organisational levels.	1	2	3	4	5
6	Our company has a procedure to review knowledge on a regular basis. Employees are specially tasked to keep knowledge up-to-date.	1	2	3	4	5
7	Our company has a filtering system, cross listing and integrating various sources and types of knowledge.	1	2	3	4	5
8	Our company gives feedback to employees on their ideas and knowledge.	1	2	3	4	5
9	Our company has procedures to apply knowledge learned from experiences and matches sources of knowledge to problems and challenges.	1	2	3	4	5
10	Our company has procedures to make knowledge available to those who need it.	1	2	3	4	5
11	Our company utilizes databases, repositories, and information technology applications of knowledge stored to give all employees easy access.	1	2	3	4	5
12	Our company utilizes different methods to store knowledge captured from both current and departing employees.	1	2	3	4	5
13	Our company has several publications to show captured knowledge.	1	2	3	4	5
14	Our company has procedures of patents and copyrights to new knowledge.	1	2	3	4	5
15	In our company everyone can put any idea into a simple central database.	1	2	3	4	5
16	Our company has a good deal of organisational conversation to keep alive the lessons learned from history.	1	2	3	4	5
17	Our company always analysis unsuccessful organisational endeavors and communicate the lessons learned widely.	1	2	3	4	5
18	Our company has a specific mechanism for sharing lessons learned in organisational activities between business units.	1	2	3	4	5
19	In our company, top management frequently emphasizes the importance of knowledge sharing between business units.	1	2	3	4	5
20	Our company put little effort in sharing experiences and lessons between business units.	1	2	3	4	5
21	Our company matches sources of knowledge in an attempt to solve problems and face challenges.	1	2	3	4	5
22	Our company uses accumulated knowledge in an attempt to solve new problems.	1	2	3	4	5
23	Our company applies the principle of knowledge gained from mistakes.	1	2	3	4	5
24	Our company uses shared knowledge to enhance efficiency.	1	2	3	4	5
25	Our company is able to apply knowledge management to shifting competitive conditions.	1	2	3	4	5

Section E: Innovation: Please indicate the degree of your **agreement** with the following statements on a five-point Likert scale (Please circle your chosen answer).

No.	**Statement**	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1	Our company is able to introduce frequent new services ideas.	1	2	3	4	5
2	Our company has a high probability of success for new services being tested.	1	2	3	4	5
3	Our company spends shorter periods in research and development of new services.	1	2	3	4	5
4	Our company has made essential improvements in information technology.	1	2	3	4	5
5	Our company frequently upgrades its equipment.	1	2	3	4	5
6	Our company depends on an innovative rewards system.	1	2	3	4	5
7	Our company depends on innovative work designs.	1	2	3	4	5
8	Our company depends on innovative administration to develop new services.	1	2	3	4	5
9	Our company adopts organisational reconstruction to pursue operational efficiency.	1	2	3	4	5
10	Our company adopts reengineering of its business process.	1	2	3	4	5
11	Our company seeks to introduce new services that differ substantially from its competitors.	1	2	3	4	5
12	Our company seeks to introduce radical service innovations into the market more frequently than competitors.	1	2	3	4	5
13	In our company, the percentage of radical service innovations in the service range in the last year is significantly higher than the competition.	1	2	3	4	5
14	In our company, the percentage of total sales from radical service innovations rose in the last year.	1	2	3	4	5
15	Our company is well known by customers for radical service innovations.	1	2	3	4	5
16	Our company seeks to add new services to its existing ones.	1	2	3	4	5
17	Our company seeks to improve or revise existing services.	1	2	3	4	5
18	Our company seeks to change its services in order to reduce costs.	1	2	3	4	5
19	Our company seeks to reposition existing services.	1	2	3	4	5
20	In our company, the introduction of new services has increased over the last year.	1	2	3	4	5

Section F: Organisational performance: Please indicate the degree of **objectives achievement** with the following statements on a five-point Likert scale (Please circle your chosen answer).

No.	**Statement**	**Not at all**	**Limited Extent**	**Not sure**	**Certain extent**	**Large extent**
1	Our company achieved revenues above our stated objective in the last year.	1	2	3	4	5
2	Our company achieved sales above our stated objective in the last year.	1	2	3	4	5
3	Our company achieved return on investments above our stated objective in the last year.	1	2	3	4	5
4	Our company achieved return on assets above our stated objective in the last year.	1	2	3	4	5
5	Our company achieved profit margin above our stated objective in the last year.	1	2	3	4	5
6	Our company achieved a high degree of customer satisfaction in the last year.	1	2	3	4	5

7	Our company kept a large number of existing customers in the last year.	1	2	3	4	5
8	Our company attracted a significant number of new customers in the last year.	1	2	3	4	5
9	Our company secured a large portion of our desired market share in the last year.	1	2	3	4	5
10	Our company reduced the number of customer complaints significantly in the last year.	1	2	3	4	5
11	In our company, the speediness of our services processes improved in the last year.	1	2	3	4	5
12	In our company, the quality of our services processes improved in the last year.	1	2	3	4	5
13	In our company, the cost of our services processes declined in the last year.	1	2	3	4	5
14	In our company, the flexibility of services processes improved in the last year.	1	2	3	4	5
15	In our company, the efficiency of our services processes improved in the last year.	1	2	3	4	5
16	Our company significantly enhanced its operating and marketing strategy skills compared with last year.	1	2	3	4	5
17	Our company significantly enhanced its operating and marketing implementation skills compared with last year.	1	2	3	4	5
18	Our company significantly enhanced its development research skills compared with last year.	1	2	3	4	5
19	Our company significantly enhanced its services development skills compared with last year.	1	2	3	4	5
20	Our company significantly enhanced its employees’ development skills compared with last year.	1	2	3	4	5

APPENDIX 1
PART B

ARABIC QUESTIONNAIRE

العلاقة بين تنفيذ إدارة المعرفة والابتكار والأداء التنظيمي: دراسة تطبيقية في قطاع الإتصالات المتنقلة العراقية

عزيزي المجيب،

أنا طالب دكتوراه من جامعة أوتارا (UUM) الماليزية، تحت أشراف الأستاذ المشارك شاهيزان حسن. أضع بين يديك الإستبانة التي أعدت لإكمال مسح أكاديمي لإستكشاف العلاقة بين تنفيذ إدارة المعرفة والإبتكار والأداء التنظيمي: دراسة تطبيقية في قطاع الاتصالات المتنقلة العراقية. تتكون الإستبانة من ستة أقسام، القسم (أ) معلومات شخصية، القسم (ب) عوامل النجاح الحرجة لإدارة المعرفة، القسم (جـ) إستراتيجيات إدارة المعرفة، القسم (د) عمليات إدارة المعرفة، القسم (هـ) الإبتكار، القسم (و) الأداء التنظيمي. تجدر الإشارة إلى انه من المؤمل أن يكون لنتائج هذه الدراسة مساهمة فاعلة في توفير معلومات مهمة حول تطوير قطاع الاتصالات المتنقلة العراقية ضمن محتوى دراستي . لذا آمل مخلصاً أن تمنحني القليل من وقتك بما لا يتجاوز ثلاثين دقيقة للإجابة على هذا الاستبيان. إجاباتك هي قيمة جدا للوصول إلى نتائج دقيقة لهذه الدراسة. رجاءاً كن مطمئناً بإن كل إجاباتك ستبقى سرية تماماً مع بقاء هويتك مجهولة، كما إن البيانات ستستخدم لأغراض البحث العلمي فقط. أتطلع لإكمال استفتائي بصورة مثالية من قبلكم، وسأزوركم مرة ثانية لإسترجاع الإستبانة.

شكرا لكم على الدعم والمساعدة

تفضلوا بقبول فائق الاحترام ،

الباحث

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القسم أ : معلومات شخصية

التفاصيل	يرجى وضع علامة (✓) في المكان المناسب	
الجنس	❑ ذكر	❑ أنثى
العمر	25-18 ❑ 35-26 ❑ 54-36 ❑ 55-46 ❑ أعلى من 56❑	
مكان العمل	أسيا سيل ❑ كورك - ساناتيل ❑ زين العراق ❑ أمنية ❑ اتصالنا ❑	
مستوى التعليم	إعدادية ❑ دبلوم ❑ بكالوريوس ❑ ماجستير ❑ دكتوراه ❑	
الخبرة	أقل من 1 ❑ 1-3 ❑ 4-6 ❑ أعلى من 6	
المركز الوظيفي	مدير الحسابات ❑ مدير التدقيق ❑ مدير أنظمة المعلومات ❑ مدير المبيعات ❑ مدير الإدارة ❑ مدير الصيانة ❑ مدير التخطيط ❑ مدير خدمات الزبائن ❑ مدير الموارد البشرية ❑ مدير التسويق ❑ مدير الجودة ❑	

القسم باء : عوامل النجاح الحرجة لإدارة المعرفة : يرجى الإشارة إلى **درجة أتفاقك** مع العبارات أدناه وفقاً لمقياس ليكرت الخماسي (يرجى وضع دائرة حول الإجابة التي تختارها)

ت	التفاصيل	لا أتفق تماماً	لا أتفق	محايد	أتفق	اتفق تماماً
1	شركتنا تسعى إلى ملء فجوات المعرفة عن طريق تعيين الموظفين الكفوئيين.	1	2	3	4	5
2	شركتنا تسعى إلى تعيين الموظفين الذين لديهم توجهات إيجابية نحو المعرفة.	1	2	3	4	5
3	شركتنا تسعى إلى توفير برامج التنمية المهنية للموظفين.	1	2	3	4	5
4	شركتنا تسعى إلى الإحتفاظ بالموظفين الأكفاء.	1	2	3	4	5
5	شركتنا تسعى إلى تقديم فرص التقدم الوظيفي للعاملين.	1	2	3	4	5
6	تكنولوجيا المعلومات المتوفرة في شركتنا تساعد على إمتلاك المعلومات التي نحتاج أليها.	1	2	3	4	5
7	تكنولوجيا المعلومات المتوفرة في شركتنا هي خاضعة للتحديث دوماً.	1	2	3	4	5
8	تكنولوجيا المعلومات المتوفرة في شركتنا تساهم في عملية دعم وصناعة القرار.	1	2	3	4	5
9	تكنولوجيا المعلومات المتوفرة في شركتنا تسهل من عملية تقاسم المعرفة على جميع المستويات التنظيمية.	1	2	3	4	5
10	تكنولوجيا المعلومات المتوفرة حالياً في شركتنا قادرة على دعم التنمية المستقبلية.	1	2	3	4	5
11	في شركتنا هنالك رؤية واضحة ومحددة لإدارة المعرفة.	1	2	3	4	5
12	في شركتنا الأهداف الرئيسة تركز على تنفيذ إدارة المعرفة.	1	2	3	4	5
13	في شركتنا الإدارة العليا مؤمنة بإن عملية تنفيذ إدارة المعرفة مهمة لإضافة قيمة للشركة.	1	2	3	4	5
14	في شركتنا الإدارة العليا ملتزمة بتنفيذ إدارة المعرفة.	1	2	3	4	5
15	في شركتنا هنالك من يتفانى في قيادة ودعم أنشطة المعرفة.	1	2	3	4	5
16	شركتنا تسعى إلى تقديم العديد من برامج التدريب الرسمي.	1	2	3	4	5
17	شركتنا تسعى إلى توفير الفرص غير الرسمية لتطوير الموظفين إضافة إلى برامج التدريب الرسمية.	1	2	3	4	5
18	شركتنا تشجع الموظفين على الاستفادة من حضور الحلقات الدراسية والندوات وغيرها.	1	2	3	4	5
19	شركتنا تقدم العديد من برامج التعلم التنظيمي للموظفين.	1	2	3	4	5
20	شركتنا تقدم برامج التدريب المهني والتطوير الذاتي.	1	2	3	4	5
21	شركتنا تسعى إلى توضيح أهمية إدارة المعرفة إلى جميع العاملين فيها.	1	2	3	4	5
22	شركتنا تضع خطط إستراتيجية لإكتساب المعرفة.	1	2	3	4	5
23	شركتنا لديها أهداف خاصة ترتبط بتنفيذ إدارة المعرفة.	1	2	3	4	5
24	رسالة شركتنا تعكس أهمية تنفيذ إدارة المعرفة.	1	2	3	4	5
25	رسالة وأهداف شركتنا هي واضحة لجميع المستويات التنظيمية.	1	2	3	4	5

5	4	3	2	1	يتمكن الموظفين في شركتنا من أداء مهامهم من غير أشراف مباشر.	26
5	4	3	2	1	لدى موظفي شركتنا التشجيع الكافي لإتخاذ القرارات الخاصة بهم.	27
5	4	3	2	1	ليس من الضروري أن يستشير الموظفين في شركتنا الآخرين أثناء أداء أعمالهم.	28
5	4	3	2	1	موظفوا شركتنا لا يستشيرون رؤسائهم المباشرين قبل إتخاذ أي إجراء إداري.	29
5	4	3	2	1	يتمكن الموظفين في شركتنا من إتخاذ القرارات دون إذن.	30
5	4	3	2	1	يتم نشر قصص النجاح في العمل على نطاق واسع في شركتنا.	31
5	4	3	2	1	المعرفة لا تهدد أي مناصب وظيفية في جميع المستويات التنظيمية.	32
5	4	3	2	1	شركتنا تمنح الجوائز والشهادات التقديرية للذين يشاركون الآخرين بمعرفتهم.	33
5	4	3	2	1	شركتنا تسعى إلى زيادة ثقافة الانفتاح والثقة المتبادلة.	34
5	4	3	2	1	شركتنا تشجع الموظفين للمشاركة في عملية صناعة القرار.	35

القسم ج : استراتيجيات إدارة المعرفة : يرجى الإشارة إلى **درجة أتفاقك** مع العبارات أدناه وفقاً لمقياس ليكرت الخماسي (يرجى وضع دائرة حول الإجابة التي تختارها)

اتفق تماماً	أتفق	محايد	لا أتفق	لا أتفق تماماً	التفاصيل	ت
5	4	3	2	1	شركتنا تسعى إلى تدوين وتوثيق الأفكار المكتسبة أثناء العمل.	1
5	4	3	2	1	شركتنا تسعى إلى إمتلاك تجارب العمل الخاصة بالموظفين.	2
5	4	3	2	1	شركتنا تسعى إلى تدوين البيانات و الأحداث الهامة من أجل إستخدامها في المستقبل.	3
5	4	3	2	1	شركتنا تسعى إلى تشكيل فريق مختص من الموظفين يقوم بأرشفة التقارير والمعلومات المفيدة.	4
5	4	3	2	1	شركتنا تسعى إلى إنشاء قاعدة بيانات من أجل حفظ المعرفة المتعلقة بعملنا.	5
5	4	3	2	1	شركتنا تعد عملية مراجعة آراء العملاء من قبل الموظفين كجزء من ممارسات التعلم التنظيمي.	6
5	4	3	2	1	شركتنا تعقد أجتماعات غير رسمية لإستعراض سير العمل وخلق أفكار جديدة.	7
5	4	3	2	1	يتبادل موظفوا شركتنا تجاربهم وما تعلموه مع بعضهم البعض بعد عودتهم من رحلات العمل الرسمية.	8
5	4	3	2	1	شركتنا تسعى إلى تشكيل مجموعات صغيرة أو مجتمعات من الموظفين لمناقشة المعارف والأفكار حول موضوع معين.	9
5	4	3	2	1	شركتنا تسعى إلى إتاحة "دليل الأفراد" لمساعدة الموظفين الذين يبحثون عن زملائهم من ذوي خبرة معينة.	10

القسم دال : عمليات إدارة المعرفة : يرجى الإشارة إلى **درجة أتفاقك** مع العبارات أدناه وفقاً لمقياس ليكرت الخماسي (يرجى وضع دائرة حول الإجابة التي تختارها)

ت	التفاصيل	لا أتفق تماماً	لا أتفق	محايد	أتفق	اتفق تماماً
1	شركتنا تسعى لإستخدام المهارات التي تمكنها من إكتساب المعرفة الخارجية وجعلها متكاملة مع العمليات الإدارية في جميع المستويات التنظيمية.	1	2	3	4	5
2	شركتنا تسعى لإستخدام منهج منتظم لتوليد المعرفة الجديدة في جميع المستويات التنظيمية.	1	2	3	4	5
3	شركتنا تسعى إلى إستخدام وحدات عمل متعددة التخصصات مع خبرات داخلية لتوليد المعرفة الجديدة في جميع المستويات التنظيمية.	1	2	3	4	5
4	شركتنا تسعى إلى إستخدام وحدات عمل متعددة التخصصات مع خبرات خارجية لتوليد المعرفة الجديدة في جميع المستويات التنظيمية.	1	2	3	4	5
5	شركتنا تسعى لإستخدام أساليب المحاكاة (السيناريوهات) لتوليد المعرفة الجديدة في جميع المستويات التنظيمية.	1	2	3	4	5
6	شركتنا لديها إجراءات محددة لإستعراض المعرفة على أساس منتظم وهنالك موظفين مختصين بحفظ المعرفة وتحديثها.	1	2	3	4	5
7	شركتنا ليها أنظمة خاصة بتصفية المعرفة، عبر إدراج وإدماج مختلف مصادر المعرفة وأنواعها.	1	2	3	4	5
8	شركتنا تعطي ملاحظاتها للموظفين فيما يخص أفكارهم وما يحملونه من معرفة.	1	2	3	4	5
9	شركتنا لديها إجراءات لتطبيق المعارف المستخلصة من الخبرات لمواجهة التحديات والمشاكل.	1	2	3	4	5
10	شركتنا لديها إجراءات لجعل المعرفة متاحة لأولئك الذين في حاجة أليها.	1	2	3	4	5
11	شركتنا تستخدم قواعد البيانات، و المستودعات، وتطبيقات تكنولوجيا المعلومات لخزن المعرفة لضمان سهولة الوصول أليها من قبل الموظفين.	1	2	3	4	5
12	شركتنا تستخدم أساليب مختلفة لتخزين المعرفة المكتسبة من الموظفين الحاليين والموظفين المغادرين.	1	2	3	4	5
13	شركتنا لديها العديد من المنشورات لإظهار المعرفة المكتسبة.	1	2	3	4	5
14	شركتنا لديها إجراءات محددة لحماية براءات الاختراع وحقوق الطبع والنشر المتعلقة بالمعرفة الجديدة.	1	2	3	4	5
15	في شركتنا يمكن للجميع وضع أي فكوة في قاعدة بيانات مركزية بسيطة.	1	2	3	4	5
16	شركتنا تهتم كثيراً بالحوارات التنظيمية المتعلقة بمراجعة الدروس السابقة للإستفادة منها مستقبلاً.	1	2	3	4	5
17	شركتنا تهتم بتحليل حالات الفشل السابقة من أجل تحقيق النجاحات التنظيمية مستقبلاً.	1	2	3	4	5
18	شركتنا لديها آليات محددة لمشاركة الدروس المستفادة من الأنشطة التنظيمية بين مختلف الأقسام.	1	2	3	4	5
19	الإدارة العليا في شركتنا تؤكد مراراً على أهمية مشاركة المعرفة بين مختلف الأقسام.	1	2	3	4	5
20	شركتنا لا تمتلك أنشطة لتبادل الخبرات والدروس بين مختلف الأقسام.	1	2	3	4	5
21	شركتنا تستخدم مصادر المعرفة في محاولة لحل المشاكل ومواجهة التحديات.	1	2	3	4	5
22	شركتنا تستخدم المعرفة المتراكمة في حل المشاكل الجديدة.	1	2	3	4	5
23	شركتنا تطبق مبدأ المعرفة المكتسبة من الأخطاء.	1	2	3	4	5
24	شركتنا تستخدم مبدأ تقاسم المعرفة لتعزيز الكفاءة.	1	2	3	4	5
25	شركتنا قادة على تطبيق إدارة المعرفة لمواجهة الظروف التنافسية.	1	2	3	4	5

القسم هاء : الابتكار : يرجى الإشارة إلى **درجة أتفاقك** مع العبارات أدناه وفقاً لمقياس ليكرت الخماسي (يرجى وضع دائرة حول الإجابة التي تختارها).

ت	التفاصيل	لا أتفق تماماً	لا أتفق	محايد	أتفق	اتفق تماماً
1	شركتنا قادرة على تقديم أفكار متكررة للخدمات الجديدة.	1	2	3	4	5
2	شركتنا تمتلك احتمال كبير لنجاح الخدمات الجديدة التي يجري اختبارها	1	2	3	4	5
3	شركتنا تنفق فترات أقصر في البحث والتطوير عن الخدمات الجديدة.	1	2	3	4	5
4	شركتنا لديها تحسنا جوهرياً في مجال تكنولوجيا المعلومات.	1	2	3	4	5
5	شركتنا كثيراً ما تجدد معداتها.	1	2	3	4	5
6	شركتنا تتبنى أنظمة المكافآت المبتكرة.	1	2	3	4	5
7	شركتنا تتبنى تصاميم العمل المبتكرة.	1	2	3	4	5
8	شركتنا تعتمد على إدارة مبتكرة لتطوير خدمة جديدة.	1	2	3	4	5
9	شركتنا تتبنى إعادة الهيكلة التنظيمية لزيادة كفاءة الأنظمة التشغيلية.	1	2	3	4	5
10	شركتنا تتبنى أنظمة إعادة هندسة العمليات.	1	2	3	4	5
11	شركتنا تسعى إلى تقديم خدمات تختلف جوهرياً عن منافسيها.	1	2	3	4	5
12	شركتنا تسعى إلى تقديم خدمات تعتمد على الإبتكار الجذري بصورة تفوق منافسيها.	1	2	3	4	5
13	في شركتنا، النسبة المئوية للخدمات التي تعتمد على الإبتكار الجذري للسنوات الثلاث الأخيرة هي أعلى جداً من المنافسين.	1	2	3	4	5
14	في شركتنا، النسبة المئوية للمبيعات الكلية من الخدمات التي تعتمد على الإبتكار الجذري قد أرتفعتفي السنة الأخيرة.	1	2	3	4	5
15	شركتنا تشتهر بين زبائنها بأنها تقدم خدمات تعتمد على الإبتكار الجذري.	1	2	3	4	5
16	شركتنا في أغلب الأحيان تسعى إلى إضافة خدمات جديدة إلى مجموعتها الحالية.	1	2	3	4	5
17	شركتنا في أغلب الأحيان تسعى إلى تحسين ومراجعة خدماتها.	1	2	3	4	5
18	شركتنا في أغلب الأحيان تسعى إلى تغيير خدماتها من أجل خفض التكاليف.	1	2	3	4	5
19	شركتنا في أغلب الأحيان تسعى إلى إعادة ترتيب مواقع الخدمات الموجودة.	1	2	3	4	5
20	في شركتنا زادت عملية إدخال خدمات جديدة خلال السنة الماضية.	1	2	3	4	5

القسم واو : الأداء التنظيمي : يرجى الإشارة إلى **مستوى تحقق الأهداف** مع العبارات أدناه وفقاً لمقياس ليكرت الخماسي (يرجى وضع دائرة حول الإجابة التي تختارها)

ت	التفاصيل	لا على الاطلاق	بقدر محدود	لست متأكداً	إلى حد معين	إلى حد كبير
1	شركتنا حققت إيرادات أعلى من الهدف المحدد في السنة الأخيرة.	1	2	3	4	5
2	شركتنا حققت مبيعات أعلى من الهدف المحدد في السنة الأخيرة.	1	2	3	4	5
3	شركتنا حققت عائد على الإستثمار أعلى من الهدف المحدد في السنة الأخيرة.	1	2	3	4	5
4	شركتنا حققت عائد على الموجودات أعلى من الهدف المحدد في السنة الأخيرة.	1	2	3	4	5
5	شركتنا حققت هامش ربح أعلى من الهدف المحدد في السنة الأخيرة.	1	2	3	4	5
6	شركتنا حققت درجة عالية من رضا الزبائن في السنة الأخيرة.	1	2	3	4	5

7	شركتنا احتفظت بعدد كبير من الزبائن القدماء في السنة الأخيرة.	1	2	3	4	5
8	شركتنا جذبت عدد كبير من الزبائن الجدد في السنة الأخيرة.	1	2	3	4	5
9	شركتنا ضمنت حصة سوقية كبيرة في السنة الأخيرة.	1	2	3	4	5
10	شركتنا خفضت عدد كبير من شكاوى الزبائن في السنة الأخيرة.	1	2	3	4	5
11	في شركتنا سرعة عمليات خدماتنا قد تحسنت في السنة الأخيرة.	1	2	3	4	5
12	في شركتنا جودة عمليات خدماتنا قد تحسنت في السنة الأخيرة.	1	2	3	4	5
13	في شركتنا تكاليف عمليات خدماتنا قد تحسنت في السنة الأخيرة.	1	2	3	4	5
14	في شركتنا مرونة عمليات خدماتنا قد تحسنت في السنة الأخيرة.	1	2	3	4	5
15	في شركتنا فاعلية عمليات خدماتنا قد تحسنت في السنة الأخيرة.	1	2	3	4	5
16	شركتنا عززت مهارات إستراتيجياتها التشغيلية والتسويقية بشكل ملحوظ مقارنة مع السنة الماضية.	1	2	3	4	5
17	شركتنا عززت مهاراتها التشغيلية والتسويقية بشكل ملحوظ مقارنة مع السنة الماضية.	1	2	3	4	5
18	شركتنا عززت مهارات بحوثها التطويرية بشكل ملحوظ مقارنة مع السنة الماضية.	1	2	3	4	5
19	شركتنا عززت مهارات تطوير خدماتها بشكل ملحوظ مقارنة مع السنة الماضية.	1	2	3	4	5
20	شركتنا عززت مهارات تطوير موظفيها بشكل ملحوظ مقارنة مع السنة الماضية.	1	2	3	4	5

APPENDIX 2
PART A

Coding Sheet of Items and Data

Construct	Dimension	Item	Item Code	Values	Measure
Respondents' Demographic Factors	-----------------	Response non-bias	-	1-2	Scale
		Gender	-	1-2	Scale
		Workplace	-	1-6	Scale
		Age	-	1-5	Scale
		Education	-	1-5	Scale
		Experience	-	1-4	Scale
		Position	-	1-11	Scale
Critical Success Factors of Knowledge Management (CSFs of KM)	Human Resource Management (HR)	Our company seeks to recruit of employees for fill knowledge gaps.	HR1	1-5	Scale
		Our company seeks to hire employees who have a positive orientation toward knowledge.	HR2	1-5	Scale
		Our company seeks to provide professional development activities for employees.	HR3	1-5	Scale
		Our company seeks to retain perfect employees to work.	HR4	1-5	Scale
		Our company seeks to provide job advancement opportunities to employees.	HR5	1-5	Scale
	Information Technology (IT)	In our company, information technology helps to capture information we need.	IT1	1-5	Scale
		In our company, information is keeping up-to-date.	IT2	1-5	Scale
		In our company, information technology supports the decision making process.	IT3	1-5	Scale
		In our company, technology facilitates sharing of knowledge at all organisational levels.	IT4	1-5	Scale
		In our company, a current information system is able to support future development.	IT5	1-5	Scale
	Leadership (LE)	In our company, there is a stated and clear vision for managing knowledge.	LE1	1-5	Scale
		In our company, the main objectives focus on implementation of knowledge management.	LE2	1-5	Scale
		In our company, top management recognizes that knowledge management implementation can add value.	LE3	1-5	Scale
		In our company, top management is committed to knowledge management implementation.	LE4	1-5	Scale
		In our company, dedicated personnel lead and support knowledge management activities.	LE5	1-5	Scale
	Organisational Learning (OL)	Our company attempts to carry out various formal training programs.	OL1	1-5	Scale
		Our company seeks to provide opportunities for informal individual development in addition to formal training.	OL2	1-5	Scale
		Our company encourages employees to take advantage from attending seminars, symposia, and so on.	OL3	1-5	Scale
		Our company provides multiple learning programs for employees.	OL4	1-5	Scale
		Our company provides job training and self-development programs.	OL5	1-5	Scale
	Organisational Strategy (OS)	Our company explains the importance of knowledge management to all employees.	OS1	1-5	Scale
		Our company formulates strategic plans to acquire knowledge.	OS2	1-5	Scale
		Our company has specific objectives for knowledge management implementation.	OS3	1-5	Scale
		Our company's mission statement reflects the importance of knowledge management implementation.	OS4	1-5	Scale
		Our company's mission and objective are explained well at all organisational levels.	OS5	1-5	Scale
	Organisational Structure (OT)	Our company employees can perform their tasks without a supervisor.	OT1	1-5	Scale
		Our company employees are encouraged to make their own decisions.	OT2	1-5	Scale
		Our company employees do not have to refer to someone else.	OT3	1-5	Scale
		Our company employees do not have to ask their supervisor before taking performance action.	OT4	1-5	Scale
		Our company employees can make decisions without permission.	OT5	1-5	Scale
	Organisational Culture (OC)	In our company, communications of success stories are widely applied at all organisational levels.	OC1	1-5	Scale
		In our company, knowledge does not threaten positions in any organisational levels.	OC2	1-5	Scale
		Our company develops rewards and recognition for knowledge sharing.	OC3	1-5	Scale

		Our company seeks to create a culture of openness and mutual trust.	OC4	1-5	Scale
		Our company encourages employee empowerment and participation in decision making.	OC5	1-5	Scale
Knowledge Management Strategies (KMSs)	Codification Strategy (CS)	Our company seeks to write down ideas and to document those gained during work.	CS1	1-5	Scale
		Our company seeks to capture the experiences that employees narrated.	CS2	1-5	Scale
		Our company seeks to record important data, drawings, and happenings for future use.	CS3	1-5	Scale
		Our company seeks to dedicate a team of employees to archive drawings, reports, and such useful information.	CS4	1-5	Scale
		Our company seeks to create a database such as an online repository for keeping project related knowledge.	CS5	1-5	Scale
	Personalisation Strategy (PS)	Our company considers reviewing customer opinion in team/group meetings as a learning practice.	PS1	1-5	Scale
		Our company holds informal meetings to review work progress and create new ideas.	PS2	1-5	Scale
		Our company employees can share their learning and experiences with each other after returning from official trips.	PS3	1-5	Scale
		Our company attempts to form small groups or communities of employees to discuss knowledge and ideas around a particular theme.	PS4	1-5	Scale
		Our company seeks to make available a “people directory” to help employees in their search for colleagues with certain expertise.	PS5	1-5	Scale
Knowledge Management Processes (KMPs)	Knowledge Creation (KC)	Our company seeks to use skills to acquire external knowledge to be integrated into management processes at all organisational levels.	KC1	1-5	Scale
		Our company seeks to use systematic approaches to new knowledge or experiences from business units to generate knowledge at all organisational levels.	KC2	1-5	Scale
		Our company seeks to use interdisciplinary business units with internal experts to generate knowledge at all organisational levels.	KC3	1-5	Scale
		Our company seeks to use interdisciplinary business units with external experts to generate knowledge at all organisational levels.	KC4	1-5	Scale
		Our company seeks to use simulation methods (scenarios) to generate new knowledge at all organisational levels.	KC5	1-5	Scale
	Knowledge Organisation (KO)	Our company has a procedure to review knowledge on a regular basis. Employees are specially tasked to keep knowledge up-to-date.	KO1	1-5	Scale
		Our company has a filtering system, cross listing and integrating various sources and types of knowledge.	KO2	1-5	Scale
		Our company gives feedback to employees on their ideas and knowledge.	KO3	1-5	Scale
		Our company has procedures to apply knowledge learned from experiences and matches sources of knowledge to problems and challenges.	KO4	1-5	Scale
		Our company has procedures to make knowledge available to those who need it.	KO5	1-5	Scale
	Knowledge Storage (KS)	Our company utilizes databases, repositories, and information technology applications of knowledge stored to give all employees easy access.	KS1	1-5	Scale
		Our company utilizes different methods to store knowledge captured from both current and departing employees.	KS2	1-5	Scale
		Our company has several publications to show captured knowledge.	KS3	1-5	Scale
		Our company has procedures of patents and copyrights to new knowledge.	KS4	1-5	Scale
		In our company everyone can put any idea into a simple central database.	KS5	1-5	Scale
	Knowledge Sharing (KH)	Our company has a good deal of organisational conversation to keep alive the lessons learned from history.	KH1	1-5	Scale
		Our company always analysis unsuccessful organisational endeavors and communicate the lessons learned widely.	KH2	1-5	Scale
		Our company has a specific mechanism for sharing lessons learned in organisational activities between business units.	KH3	1-5	Scale
		In our company, top management frequently emphasizes the importance of knowledge sharing between business units.	KH4	1-5	Scale
		Our company put little effort in sharing experiences and lessons between business units.	RECO KH5	1-5	Scale
	Knowledge Utilisation (KU)	Our company matches sources of knowledge in an attempt to solve problems and face challenges.	KU1	1-5	Scale
		Our company uses accumulated knowledge in an attempt to solve new problems.	KU2	1-5	Scale
		Our company applies the principle of knowledge gained from mistakes.	KU3	1-5	Scale
		Our company uses shared knowledge to enhance efficiency.	KU4	1-5	Scale
		Our company is able to apply knowledge management to shifting competitive conditions.	KU5	1-5	Scale

Innovation	Technological Innovation (TI)	Our company is able to introduce frequent new services ideas.	TI1	1-5	Scale
		Our company has a high probability of success for new services being tested.	TI2	1-5	Scale
		Our company spends shorter periods in research and development of new services.	TI3	1-5	Scale
		Our company has made essential improvements in information technology.	TI4	1-5	Scale
		Our company frequently upgrades its equipment.	TI5	1-5	Scale
	Administrative Innovation (AI)	Our company depends on an innovative rewards system.	AI1	1-5	Scale
		Our company depends on innovative work designs.	AI2	1-5	Scale
		Our company depends on innovative administration to develop new services.	AI3	1-5	Scale
		Our company adopts organisational reconstruction to pursue operational efficiency.	AI4	1-5	Scale
		Our company adopts reengineering of its business process.	AI5	1-5	Scale
	Radical Innovation (RI)	Our company seeks to introduce new services that differ substantially from its competitors.	RI1	1-5	Scale
		Our company seeks to introduce radical service innovations into the market more frequently than competitors.	RI2	1-5	Scale
		In our company, the percentage of radical service innovations in the service range in the last year is significantly higher than the competition.	RI3	1-5	Scale
		In our company, the percentage of total sales from radical service innovations rose in the last year.	RI4	1-5	Scale
		Our company is well known by customers for radical service innovations.	RI5	1-5	Scale
	Incremental Innovation (NI)	Our company seeks to add new services to its existing ones.	NI1	1-5	Scale
		Our company seeks to improve or revise existing services.	NI2	1-5	Scale
		Our company seeks to change its services in order to reduce costs.	NI3	1-5	Scale
		Our company seeks to reposition existing services.	NI4	1-5	Scale
		In our company, the introduction of new services has increased over the last year.	NI5	1-5	Scale
Organisational Performance (OP)	Financial Perspective (FP)	Our company achieved revenues above our stated objective in the last year.	FP1	1-5	Scale
		Our company achieved sales above our stated objective in the last year.	FP2	1-5	Scale
		Our company achieved return on investments above our stated objective in the last year.	FP3	1-5	Scale
		Our company achieved return on assets above our stated objective in the last year.	FP4	1-5	Scale
		Our company achieved profit margin above our stated objective in the last year.	FP5	1-5	Scale
	Customer Perspective (CP)	Our company achieved a high degree of customer satisfaction in the last year.	CP1	1-5	Scale
		Our company kept a large number of existing customers in the last year.	CP2	1-5	Scale
		Our company attracted a significant number of new customers in the last year.	CP3	1-5	Scale
		Our company secured a large portion of our desired market share in the last year.	CP4	1-5	Scale
		Our company reduced the number of customer complaints significantly in the last year.	CP5	1-5	Scale
	Internal Process Perspective (IP)	In our company, the speediness of our services processes improved in the last year.	IP1	1-5	Scale
		In our company, the quality of our services processes improved in the last year.	IP2	1-5	Scale
		In our company, the cost of our services processes declined in the last year.	IP3	1-5	Scale
		In our company, the flexibility of services processes improved in the last year.	IP4	1-5	Scale
		In our company, the efficiency of our services processes improved in the last year.	IP5	1-5	Scale
	Learning and Growth Perspective (GP)	Our company significantly enhanced its operating and marketing strategy skills compared with last year.	GP1	1-5	Scale
		Our company significantly enhanced its operating and marketing implementation skills compared with last year.	GP2	1-5	Scale
		Our company significantly enhanced its development research skills compared with last year.	GP3	1-5	Scale
		Our company significantly enhanced its services development skills compared with last year.	GP4	1-5	Scale
		Our company significantly enhanced its employees' development skills compared with last year.	GP5	1-5	Scale

APPENDIX 2
PART B

Missing Data

Item	N	Missing	Minimum	Maximum
ID	230	0	1	233
Response non-bias	230	0	1	2
Gender	230	0	1	2
Workplace	230	0	1	6
Age	230	0	1	5
Education	230	0	1	5
Experience	230	0	1	4
Position	230	0	1	11
HR1	230	0	1	5
HR2	230	0	1	5
HR3	230	0	1	5
HR	230	0	1	5
HR5	230	0	1	5
IT1	230	0	1	5
IT2	230	0	1	5
IT3	230	0	1	5
IT4	230	0	1	5
IT5	230	0	1	5
LE1	230	0	1	5
LE2	230	0	1	5
LE3	230	0	1	5
LE4	230	0	1	5
LE5	230	0	1	5
OL1	230	0	1	5
OL2	230	0	1	5
OL3	230	0	1	5
OL4	230	0	1	5
OL5	230	0	1	5
OS1	230	0	1	5
OS2	230	0	1	5
OS3	230	0	1	5
OS4	230	0	1	5
OS5	230	0	1	5
OT1	230	0	1	5
OT2	230	0	1	5
OT3	230	0	1	5
OT4	230	0	1	5
OT5	230	0	1	5
OC1	230	0	1	5
OC2	230	0	1	5
OC3	230	0	1	5
OC4	230	0	1	5
OC5	230	0	1	5
CS1	230	0	1	5
CS2	230	0	1	5
CS3	230	0	1	5
CS4	230	0	1	5
CS5	230	0	1	5
PS1	230	0	1	5
PS2	230	0	1	5
PS3	230	0	1	5
PS4	230	0	1	5
PS5	230	0	1	5
KC1	230	0	1	5
KC2	230	0	1	5
KC3	230	0	1	5
KC4	230	0	1	5
KC5	230	0	1	5
KO1	230	0	1	5
KO2	230	0	1	5
KO3	230	0	1	5
KO4	230	0	1	5
KO5	230	0	1	5
KS1	230	0	1	5
KS2	230	0	1	5
KS3	230	0	1	5

KS4	230	0	1	5
KS5	230	0	1	5
KH1	230	0	1	5
KH2	230	0	1	5
KH3	230	0	1	5
KH4	230	0	1	5
RECOKH5	230	0	1	5
KU1	230	0	1	5
KU2	230	0	1	5
KU3	230	0	1	5
KU4	230	0	1	5
KU5	230	0	1	5
TI1	230	0	1	5
TI2	230	0	1	5
TI3	230	0	1	5
TI4	230	0	1	5
TI5	230	0	1	5
AI1	230	0	1	5
AI2	230	0	1	5
AI3	230	0	1	5
AI4	230	0	1	5
AI5	230	0	1	5
RI1	230	0	1	5
RI2	230	0	1	5
RI3	230	0	1	5
RI4	230	0	1	5
RI5	230	0	1	5
NI1	230	0	1	5
NI2	230	0	1	5
NI3	230	0	1	5
NI4	230	0	1	5
NI5	230	0	1	5
FP1	230	0	1	5
FP2	230	0	1	5
FP3	230	0	1	5
FP4	230	0	1	5
FP5	230	0	1	5
CP1	230	0	1	5
CP2	230	0	1	5
CP3	230	0	1	5
CP4	230	0	1	5
CP5	230	0	1	5
IP1	230	0	1	5
IP2	230	0	1	5
IP3	230	0	1	5
IP4	230	0	1	5
IP5	230	0	1	5
GP1	230	0	1	5
GP2	230	0	1	5
GP3	230	0	1	5
GP4	230	0	1	5
GP5	230	0	1	5

APPENDIX 2
PART C

Independent Samples T-Test

T-Test

Group Statistics

	ResponseBias	N	Mean	Std. Deviation	Std. Error Mean
Gender	Early Response	171	1.18	.386	.030
	Late Response	59	1.17	.378	.049
Age	Early Response	171	3.11	1.180	.090
	Late Response	59	3.32	1.357	.177
Workplace	Early Response	171	2.62	1.507	.115
	Late Response	59	2.51	1.478	.192
Education	Early Response	171	3.20	.794	.061
	Late Response	59	3.17	.723	.094
Experience	Early Response	171	2.73	1.100	.084
	Late Response	59	2.97	1.098	.143
Position	Early Response	171	7.05	3.234	.247
	Late Response	59	7.59	3.212	.418

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means	
		F	Sig.	t	df
Gender	Equal variances assumed	.168	.682	.203	228
	Equal variances not assumed			.205	102.701
Age	Equal variances assumed	3.134	.078	-1.138-	228
	Equal variances not assumed			-1.063-	90.120
Workplace	Equal variances assumed	.053	.818	.492	228
	Equal variances not assumed			.497	102.578
Education	Equal variances assumed	.369	.544	.250	228
	Equal variances not assumed			.262	109.880
Experience	Equal variances assumed	1.051	.306	-1.416-	228
	Equal variances not assumed			-1.418-	100.972
Position	Equal variances assumed	.697	.405	-1.121-	228
	Equal variances not assumed			-1.125-	101.437

Independent Samples Test

		t-test for Equality of Means		
		Sig. (2-tailed)	Mean Difference	Std. Error Difference
Gender	Equal variances assumed	.839	.012	.058
	Equal variances not assumed	.838	.012	.057
Workplace	Equal variances assumed	.623	.111	.226
	Equal variances not assumed	.621	.111	.224
Age	Equal variances assumed	.256	-.211-	.185
	Equal variances not assumed	.291	-.211-	.198
Education	Equal variances assumed	.803	.029	.117
	Equal variances not assumed	.794	.029	.112
Experience	Equal variances assumed	.158	-.235-	.166
	Equal variances not assumed	.159	-.235-	.166
Position	Equal variances assumed	.263	-.546-	.487
	Equal variances not assumed	.263	-.546-	.486

Independent Samples Test

		t-test for Equality of Means	
		95% Confidence Interval of the Difference	
		Lower	Upper
Gender	Equal variances assumed	-.103-	.126
	Equal variances not assumed	-.102-	.126
Age	Equal variances assumed	-.576-	.154
	Equal variances not assumed	-.605-	.183
Workplace	Equal variances assumed	-.335-	.558
	Equal variances not assumed	-.334-	.556
Education	Equal variances assumed	-.202-	.260
	Equal variances not assumed	-.193-	.251
Experience	Equal variances assumed	-.562-	.092
	Equal variances not assumed	-.564-	.094
Position	Equal variances assumed	-1.507-	.414
	Equal variances not assumed	-1.510-	.417

APPENDIX 2
PART D

Table of Chi-square (χ^2) Statistics

Table III continued

Q / υ	0.250	0.100	0.050	0.025	0.010	0.005	0.001
1	1.32330	2.70554	3.84146	5.02389	6.63490	7.87944	10.828
2	2.77259	4.60517	5.99147	7.37776	9.21034	10.5966	13.816
3	4.10835	6.25139	7.81473	9.34840	11.3449	12.8381	16.266
4	5.38527	7.77944	9.48773	11.1433	13.2767	14.8602	18.467
5	6.62568	9.23635	11.0705	12.8325	15.0863	16.7496	20.515
6	7.84080	10.6446	12.5916	14.4494	16.8119	18.5476	22.458
7	9.03715	12.0170	14.0671	16.0128	18.4753	20.2777	24.322
8	10.2188	13.3616	15.5073	17.5346	20.0902	21.9550	26.125
9	11.3887	14.6837	16.9190	19.0228	21.6660	23.5893	27.877
10	12.5489	15.9871	18.3070	20.4831	23.2093	25.1882	29.588
11	13.7007	17.2750	19.6751	21.9200	24.7250	26.7569	31.264
12	14.8454	18.5494	21.0261	23.3367	26.2170	28.2995	32.909
13	15.9839	19.8119	22.3621	24.7356	27.6883	29.8194	34.528
14	17.1170	21.0642	23.6848	26.1190	29.1413	31.3193	36.123
15	18.2451	22.3072	24.9958	27.4884	30.5779	32.8013	37.697
16	19.3688	23.5418	26.2962	28.8454	31.9999	34.2672	39.252
17	20.4887	24.7690	27.5871	30.1910	33.4087	35.7185	40.790
18	21.6049	25.9894	28.8693	31.5264	34.8053	37.1564	42.312
19	22.71578	27.2036	30.1435	32.8523	36.1908	38.5822	43.820
20	23.8277	28.4120	31.4104	34.1696	37.5662	39.9968	45.315
21	24.9348	29.6151	32.6705	35.4789	38.9321	41.4010	46.797
22	26.0393	30.8133	33.9244	36.7807	40.2894	42.7956	48.268
23	27.1413	32.0069	35.1725	38.0757	41.6384	44.1813	49.728
24	28.2412	33.1963	36.4151	39.3641	42.9798	45.5585	51.179
25	29.3389	34.3816	37.6525	40.6465	44.3141	46.9278	52.620
26	30.4345	35.5631	38.8852	41.9232	45.6417	48.2899	54.052
27	31.5284	36.7412	40.1133	43.1944	46.9630	49.6449	55.476
28	32.6205	37.9159	41.3372	44.4607	48.2782	50.9933	56.892
29	33.7109	39.0875	42.5569	45.7222	49.5879	52.3356	58.302
30	34.7998	40.2560	43.7729	46.9792	50.8922	53.6720	59.703
40	45.6160	51.8050	55.7585	59.3417	63.6907	66.7659	73.402
50	56.3336	63.1671	67.5048	71.4202	76.1539	79.4900	86.661
60	66.9814	74.3970	79.0819	83.2976	88.3794	91.9517	99.607
70	77.5766	85.5271	90.5312	95.0231	100.425	104.215	112.317
80	88.1303	96.5782	101.879	106.629	112.329	116.321	124.839
90	98.6499	107.565	113.145	118.136	124.116	128.299	137.208
100	109.141	118.498	124.342	129.561	135.807	140.169	149.449
z_Q	+0.6745	+1.2816	+1.6449	+1.9600	+2.3263	+2.5758	+3.0902

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APPENDIX 2
PART E

Descriptive Statistics of Respondents' Demographic Factors

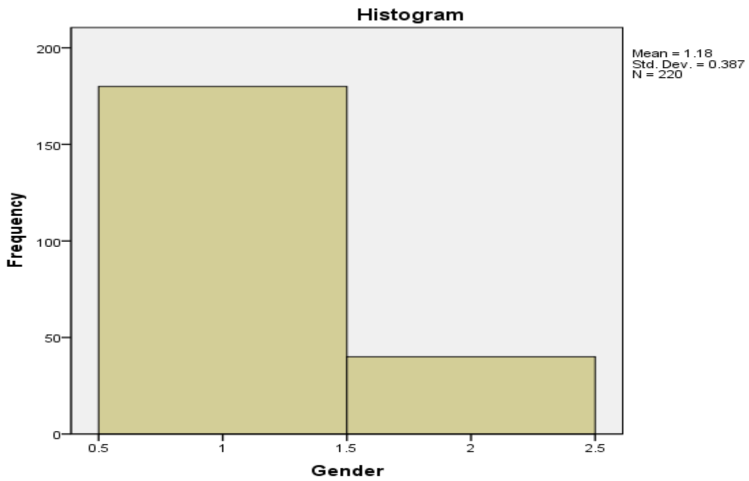
Statistics

Gender

N	Valid	220
	Missing	0

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	180	81.8	81.8	81.8
	Female	40	18.2	18.2	100.0
	Total	220	100.0	100.0	



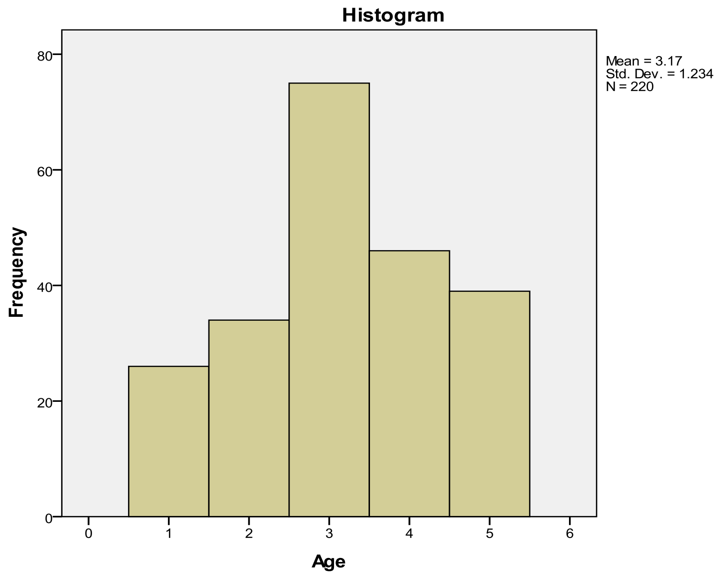
Statistics

Age

N	Valid	220
	Missing	0

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Between 18 and 25 years	26	11.8	11.8	11.8
	Between 26 and 35 years	34	15.5	15.5	27.3
	Between 36 and 45 years	75	34.1	34.1	61.4
	Between 46 and 55 years	46	20.9	20.9	82.3
	Over 56 years	39	17.7	17.7	100.0
	Total	220	100.0	100.0	

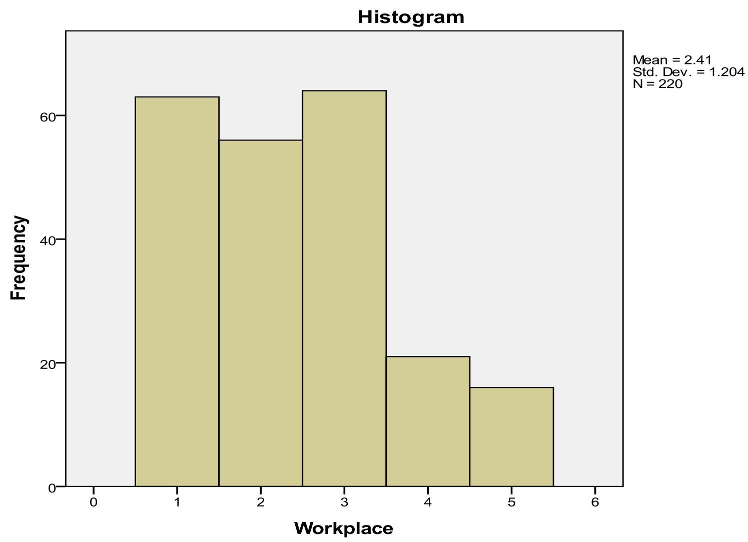


Statistics

		Workplace
N	Valid	220
	Missing	0

Workplace

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Asia-Cell	63	28.6	28.6	28.6
	Korek & Sanatel	56	25.5	25.5	54.1
	Zain Iraq	64	29.1	29.1	83.2
	Omnnea	21	9.5	9.5	92.7
	Itisaluna	16	7.3	7.3	100.0
	Total	220	100.0	100.0	

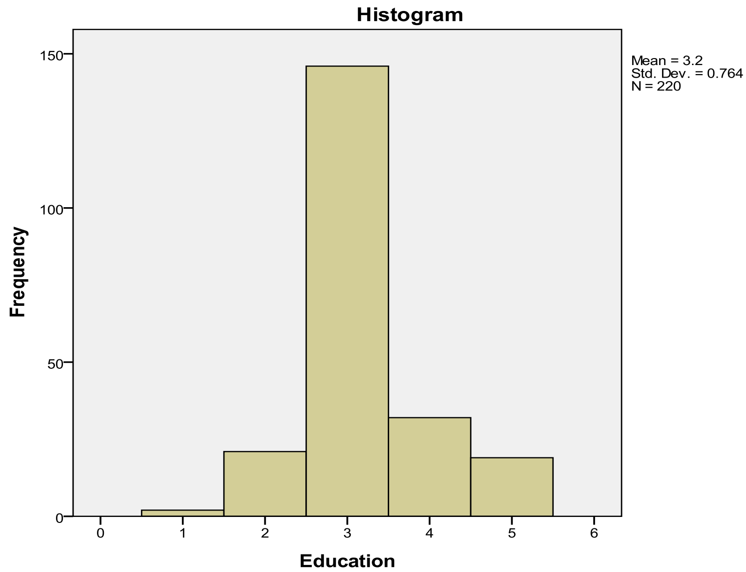


Education

N	Valid	220
	Missing	0

Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High School	2	.9	.9	.9
	Diploma	21	9.5	9.5	10.5
	Bachelor's degree	146	66.4	66.4	76.8
	Master's degree	32	14.5	14.5	91.4
	PhD	19	8.6	8.6	100.0
	Total	220	100.0	100.0	



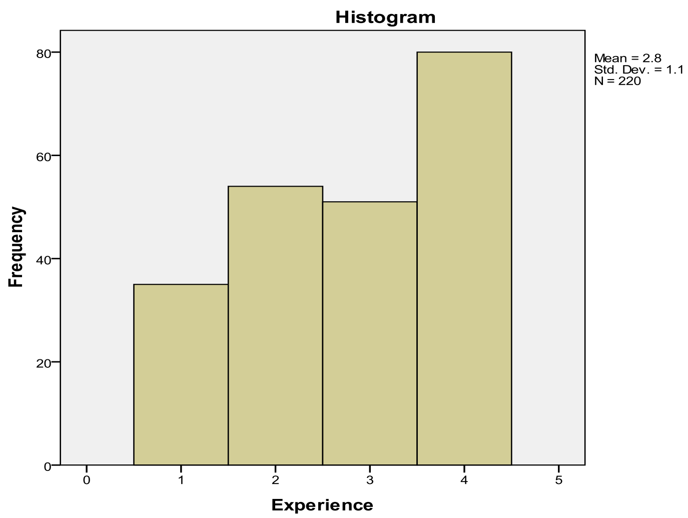
Statistics

Experience

N	Valid	220
	Missing	0

Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 1 year	35	15.9	15.9	15.9
	Between 1 and 3 years	54	24.5	24.5	40.5
	Between 4 and 6 years	51	23.2	23.2	63.6
	Over 6 years	80	36.4	36.4	100.0
	Total	220	100.0	100.0	



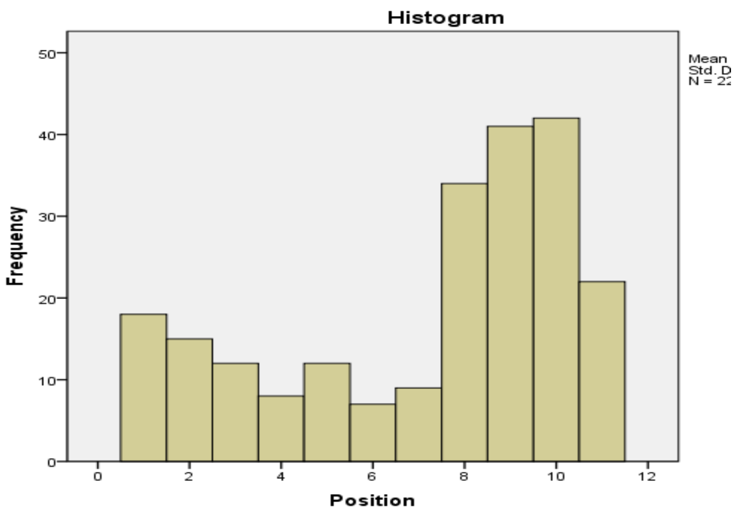
Statistics

Position

N	Valid	220
	Missing	0

Position

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Accounting Manager	18	8.2	8.2	8.2
	Auditing Manager	15	6.8	6.8	15.0
	Information Systems Manager	12	5.5	5.5	20.5
	Sale Manager	8	3.6	3.6	24.1
	Administration Manager	12	5.5	5.5	209.5
	Quality Manager	7	3.2	3.2	32.7
	Planning Manager	9	4.1	4.1	36.8
	Customer Service Manager	34	15.5	15.5	52.3
	Human Resources Manager	41	18.6	18.6	70.9
	Marketing Manager	42	19.1	19.1	90.0
	Maintains Manager	22	10.0	10.0	100.0
	Total	220	100.0	100.0	



APPENDIX 2
PART F

Descriptive Statistics of the Variables

Descriptives (CSFs of KM)

			Statistic	Std. Error
CSFsofKM	Mean		2.6494	.03850
	95% Confidence Interval for Mean	Lower Bound	2.5735	
		Upper Bound	2.7252	
	5% Trimmed Mean		2.6380	
	Median		2.5714	
	Variance		.326	
	Std. Deviation		.57099	
	Minimum		1.37	
	Maximum		4.14	
	Range		2.77	
	Interquartile Range		.80	
	Skewness		.276	.164
	Kurtosis		-.245-	.327

Descriptives (KMSs)

			Statistic	Std. Error
KMSs	Mean		2.9127	.05357
	95% Confidence Interval for Mean	Lower Bound	2.8071	
		Upper Bound	3.0183	
	5% Trimmed Mean		2.9182	
	Median		2.9500	
	Variance		.631	
	Std. Deviation		.79457	
	Minimum		1.10	
	Maximum		4.60	
	Range		3.50	
	Interquartile Range		1.10	
	Skewness		-.065-	.164
	Kurtosis		-.416-	.327

Descriptives (KMPs)

			Statistic	Std. Error
KMPs	Mean		2.8013	.04206
	95% Confidence Interval for Mean	Lower Bound	2.7184	
		Upper Bound	2.8842	
	5% Trimmed Mean		2.7947	
	Median		2.8400	
	Variance		.389	
	Std. Deviation		.62391	
	Minimum		1.32	
	Maximum		4.48	
	Range		3.16	
	Interquartile Range		.92	
	Skewness		.121	.164
	Kurtosis		-.385-	.327

Descriptives (Innovation)

			Statistic	Std. Error
Innovation	Mean		2.6155	.04830
	95% Confidence Interval for Mean	Lower Bound	2.5203	
		Upper Bound	2.7106	
	5% Trimmed Mean		2.6053	
	Median		2.6000	
	Variance		.513	
	Std. Deviation		.71635	
	Minimum		1.10	
	Maximum		4.35	
	Range		3.25	
	Interquartile Range		1.04	
	Skewness		.163	.164
	Kurtosis		-.566-	.327

Descriptives (OP)

			Statistic	Std. Error
OP	Mean		2.7889	.04399
	95% Confidence Interval for Mean	Lower Bound	2.7022	
		Upper Bound	2.8756	
	5% Trimmed Mean		2.7758	
	Median		2.7500	
	Variance		.426	
	Std. Deviation		.65250	
	Minimum		1.50	
	Maximum		4.60	
	Range		3.10	
	Interquartile Range		.95	
	Skewness		.252	.164
	Kurtosis		-.436-	.327

APPENDIX 3
PART A

Assessment of Normality Using AMOS

Assessment of normality of the CSFs of KM

Variable	min	max	skew	c.r.	kurtosis	c.r.
OC5	1.000	5.000	.225	1.363	-.893	-2.704
OC4	1.000	5.000	.246	1.489	-.833	-2.523
OC3	1.000	5.000	.445	2.693	-.560	-1.696
OC2	1.000	5.000	.162	.984	-.844	-2.556
OC1	1.000	5.000	.498	3.016	-.452	-1.367
HR5	1.000	5.000	.596	3.610	-.682	-2.066
HR4	1.000	5.000	.325	1.966	-1.102	-3.337
HR3	1.000	5.000	.667	4.037	-.474	-1.435
HR2	1.000	5.000	.667	4.038	-.418	-1.266
HR1	1.000	5.000	.572	3.464	-.601	-1.820
OT5	1.000	5.000	-.003	-.019	-1.088	-3.295
OT4	1.000	5.000	.015	.088	-1.093	-3.309
OT3	1.000	5.000	.193	1.170	-.828	-2.506
OT2	1.000	5.000	.130	.786	-.911	-2.758
OT1	1.000	5.000	.028	.171	-.987	-2.988
OS5	1.000	5.000	.465	2.814	-.852	-2.580
OS4	1.000	5.000	.559	3.382	-.314	-.952
OS3	1.000	5.000	.536	3.245	-.638	-1.930
OS2	1.000	5.000	.533	3.228	-.666	-2.015
OS1	1.000	5.000	.382	2.316	-.785	-2.376
OL5	1.000	5.000	-.272	-1.646	-1.041	-3.153
OL4	1.000	5.000	.010	.061	-.974	-2.949
OL3	1.000	5.000	.336	2.037	-.837	-2.534
OL2	1.000	5.000	.305	1.845	-.748	-2.264
OL1	1.000	5.000	.091	.552	-.951	-2.878
LE5	1.000	5.000	.407	2.464	-.851	-2.576
LE4	1.000	5.000	.280	1.698	-.911	-2.759
LE3	1.000	5.000	.463	2.801	-.643	-1.948
LE2	1.000	5.000	.585	3.541	-.680	-2.059
LE1	1.000	5.000	.684	4.140	-.578	-1.751
IT5	1.000	5.000	.174	1.055	-.983	-2.976
IT4	1.000	5.000	.337	2.042	-.872	-2.641
IT3	1.000	5.000	.163	.986	-1.027	-3.111
IT2	1.000	5.000	.284	1.719	-.826	-2.500
IT1	1.000	5.000	.027	.166	-.917	-2.776
Multivariate					78.689	11.467

Assessment of normality of KMSs

Variable	min	max	skew	c.r.	kurtosis	c.r.
PS5	1.000	5.000	-.008	-.051	-1.050	-3.178
PS4	1.000	5.000	-.195	-1.179	-.846	-2.563
PS3	1.000	5.000	-.065	-.395	-.892	-2.700
PS2	1.000	5.000	.007	.044	-.941	-2.850
PS1	1.000	5.000	-.079	-.481	-.932	-2.823
CS5	1.000	5.000	.205	1.240	-.836	-2.532
CS4	1.000	5.000	.079	.477	-.928	-2.808
CS3	1.000	5.000	.053	.322	-.786	-2.380
CS2	1.000	5.000	.052	.318	-.940	-2.847
CS1	1.000	5.000	.168	1.015	-.860	-2.604
Multivariate					20.355	9.744

Assessment of normality of KMPs

Variable	min	max	skew	c.r.	kurtosis	c.r.
KU5	1.000	5.000	.221	1.338	-1.063	-3.219
KU4	1.000	5.000	.148	.897	-1.114	-3.373
KU3	1.000	5.000	.101	.611	-.995	-3.013
KU2	1.000	5.000	.108	.652	-.889	-2.692
KU1	1.000	5.000	-.277	-1.675	-1.158	-3.507
RECOKH5	1.000	5.000	.300	1.819	-.979	-2.965
KH4	1.000	5.000	.128	.774	-.322	-.974
KH3	1.000	5.000	.121	.735	-.417	-1.262
KH2	1.000	5.000	.077	.464	-.432	-1.309
KH1	1.000	5.000	.214	1.298	-.147	-.445
KS5	1.000	5.000	.284	1.717	-1.180	-3.573
KS4	1.000	5.000	.189	1.143	-.902	-2.731
KS3	1.000	5.000	.328	1.984	-.977	-2.958
KS2	1.000	5.000	.197	1.192	-1.124	-3.404
KS1	1.000	5.000	.366	2.219	-.734	-2.223
KO5	1.000	5.000	.608	3.680	-.687	-2.081
KO4	1.000	5.000	.392	2.376	-1.009	-3.056
KO3	1.000	5.000	.442	2.677	-.881	-2.668
KO2	1.000	5.000	.393	2.379	-.979	-2.963
KO1	1.000	5.000	.216	1.309	-.930	-2.817
KC5	1.000	5.000	-.327	-1.977	-.997	-3.019
KC4	1.000	5.000	.014	.083	-1.162	-3.517
KC3	1.000	5.000	-.271	-1.643	-.958	-2.902
KC2	1.000	5.000	.019	.116	-.863	-2.612
KC1	1.000	5.000	-.153	-.925	-1.029	-3.116
Multivariate					83.698	16.894

Assessment of normality of Innovation

Variable	min	max	skew	c.r.	kurtosis	c.r.
NI5	1.000	5.000	.148	.899	-.897	-2.715
NI4	1.000	5.000	.119	.718	-.669	-2.025
NI3	1.000	5.000	-.461	-2.794	-.771	-2.333
NI2	1.000	5.000	.143	.866	-.934	-2.829
NI1	1.000	5.000	.026	.155	-.696	-2.107
RI5	1.000	5.000	.267	1.615	-.710	-2.149
RI4	1.000	5.000	.100	.607	-1.106	-3.350
RI3	1.000	5.000	.044	.266	-.861	-2.607
RI2	1.000	5.000	.411	2.490	-.680	-2.060
RI1	1.000	5.000	.152	.919	-.491	-1.485
AI5	1.000	5.000	.314	1.901	-.944	-2.859
AI4	1.000	5.000	.316	1.914	-.859	-2.602
AI3	1.000	5.000	.164	.994	-1.035	-3.135
AI2	1.000	5.000	.528	3.198	-.430	-1.301
AI1	1.000	5.000	.246	1.492	-.652	-1.975
TI5	1.000	5.000	.240	1.456	-.948	-2.870
TI4	1.000	5.000	.007	.045	-.763	-2.311
TI3	1.000	5.000	.104	.628	-.909	-2.751
TI2	1.000	5.000	.153	.925	-.952	-2.884
TI1	1.000	5.000	.162	.984	-.931	-2.818
Multivariate					54.652	13.663

Assessment of normality of OP

Variable	min	max	skew	c.r.	kurtosis	c.r.
GP5	1.000	5.000	.089	.539	-1.142	-3.457
GP4	1.000	5.000	.130	.790	-1.112	-3.368
GP3	1.000	5.000	.323	1.956	-.967	-2.928
GP2	1.000	5.000	.264	1.600	-1.034	-3.131
GP1	1.000	5.000	.148	.897	-1.054	-3.190
IP5	1.000	5.000	.250	1.512	-1.008	-3.052
IP4	1.000	5.000	.154	.933	-.972	-2.944
IP3	1.000	5.000	.091	.550	-.853	-2.581
IP2	1.000	5.000	.226	1.368	-.934	-2.827
IP1	1.000	5.000	.361	2.183	-.733	-2.220
CP5	1.000	5.000	.418	2.532	-.835	-2.527
CP4	1.000	5.000	.247	1.496	-.900	-2.723
CP3	1.000	5.000	.541	3.276	-.260	-.787
CP2	1.000	5.000	.286	1.730	-.974	-2.950
CP1	1.000	5.000	.146	.887	-1.003	-3.037
FP5	1.000	5.000	.445	2.694	-.570	-1.725
FP4	1.000	5.000	.516	3.126	-.617	-1.869
FP3	1.000	5.000	.341	2.066	-.835	-2.530
FP2	1.000	5.000	.383	2.318	-.936	-2.833
FP1	1.000	5.000	.362	2.190	-.848	-2.567
Multivariate					76.847	19.212

APPENDIX 3
PART B

Assessment of Normality Using Kolmogorov-Smirnov Test

CSFs of KM

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
CSFsofKM	220	100.0%	0	.0%	220	100.0%

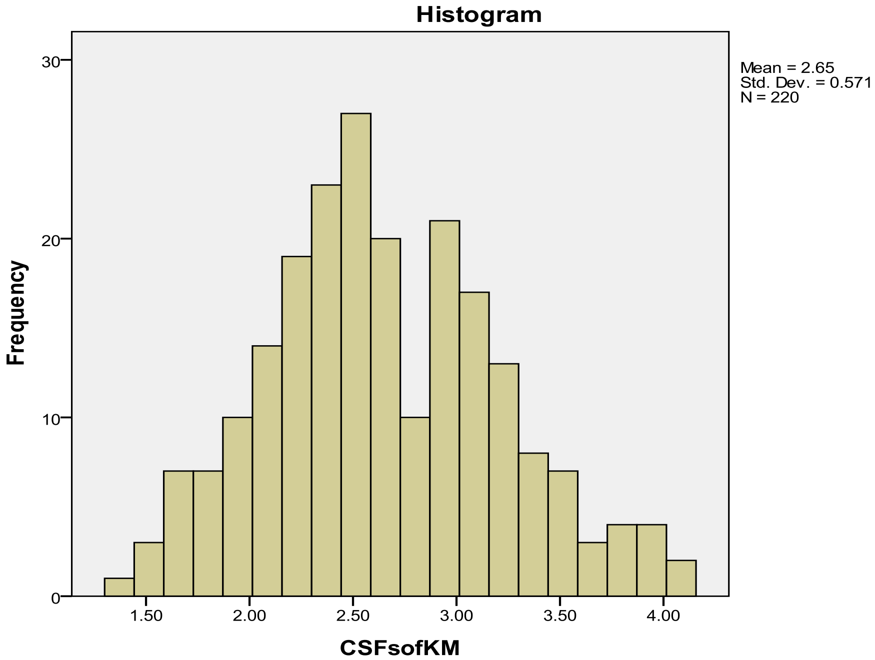
Extreme Values

			Case Number	Value
CSFsofKM	Highest	1	56	4.14
		2	45	4.06
		3	102	4.00
		4	69	3.97
		5	98	3.97
	Lowest	1	49	1.37
		2	94	1.46
		3	77	1.51
		4	160	1.54
		5	209	1.60

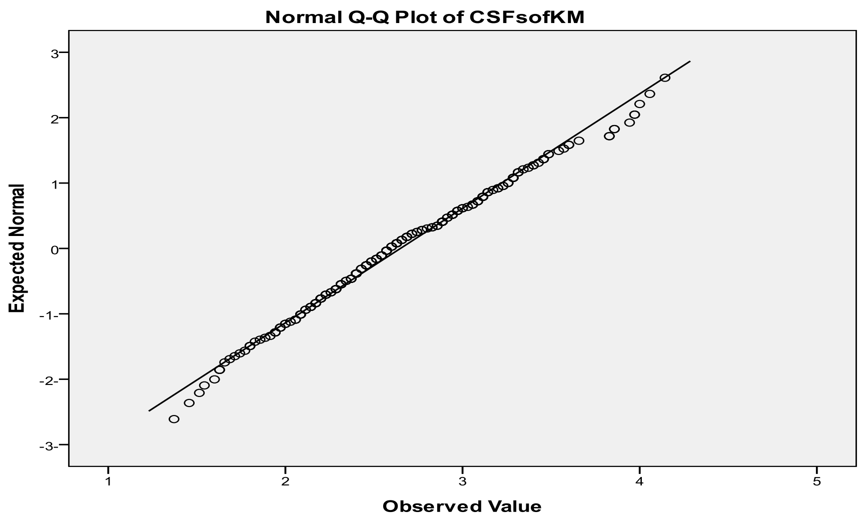
Tests of Normality

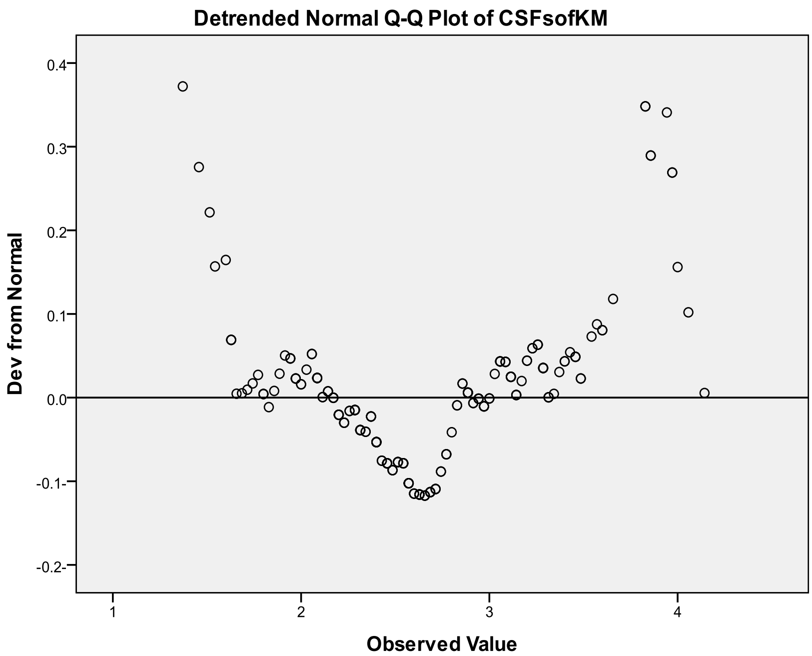
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
CSFsofKM	.060	220	.059	.989	220	.099

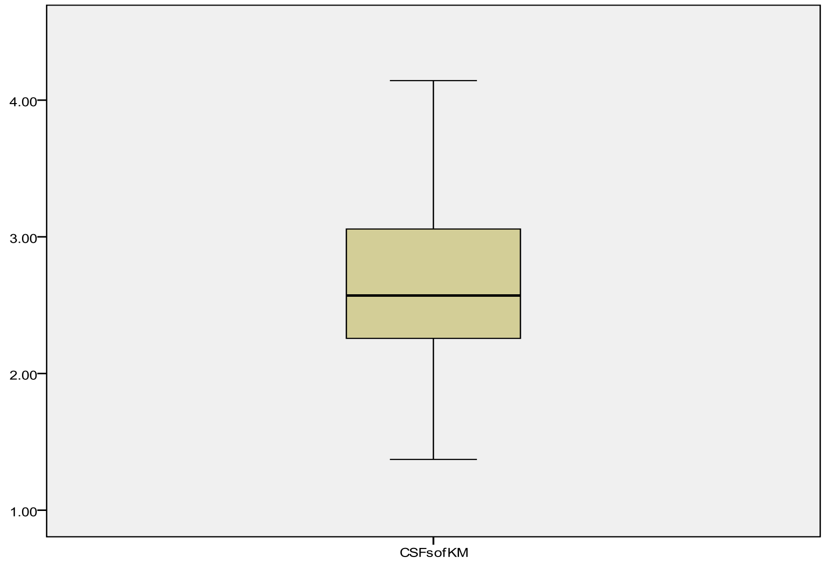
a. Lilliefors Significance Correction




```
CSFsofKM Stem-and-Leaf Plot

 Frequency    Stem &  Leaf

     1.00        1 .  3
     3.00        1 .  455
     9.00        1 .  666666777
    13.00        1 .  8888889999999
    20.00        2 .  00000000000111111111
    26.00        2 .  22222222222222233333333333
    39.00        2 .  444444444444444444444455555555555555555
    25.00        2 .  6666666666666666677777777
    24.00        2 .  888888888888899999999999
    20.00        3 .  00000000001111111111
    17.00        3 .  22222222222233333
    10.00        3 .  4444444455
     3.00        3 .  666
     7.00        3 .  8888999
     3.00        4 .  001

 Stem width:      1.00
 Each leaf:       1 case(s)
```


Normal Q-Q Plot of CSFsofKM
Expected Normal
Observed Value
3
2
1
0
-1
-2
-3
1
2
3
4
5


Detrended Normal Q-Q Plot of CSFsofKM
Dev from Normal
Observed Value
0.4
0.3
0.2
0.1
0.0
-0.1
-0.2
1
2
3
4



KMs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
KMSs	220	100.0%	0	.0%	220	100.0%

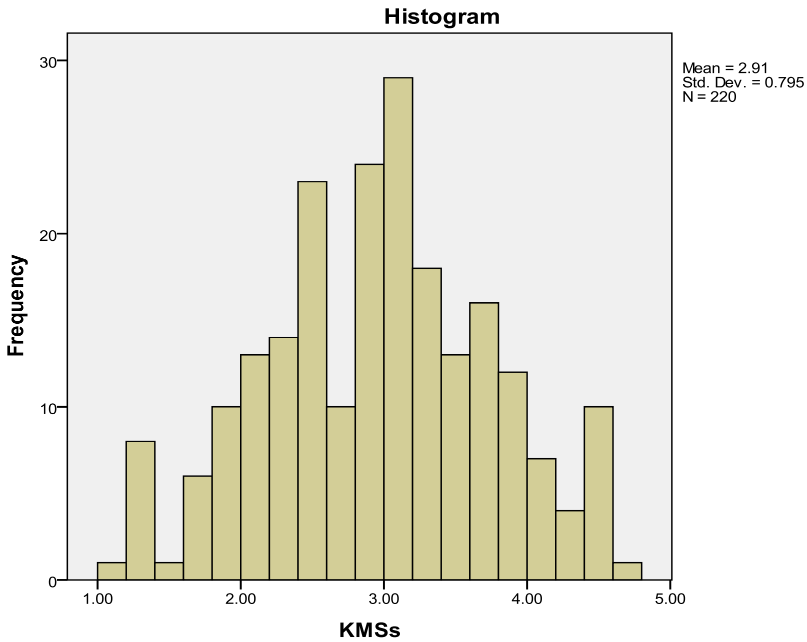
			Case Number	Value
KMSs	Highest	1	126	4.60
		2	27	4.50
		3	88	4.50
		4	119	4.50
		5	140	4.50
	Lowest	1	136	1.10
		2	198	1.20
		3	191	1.20
		4	183	1.20
		5	182	1.20[a]

a. Only a partial list of cases with the value 1.20 are shown in the table of lower extremes.

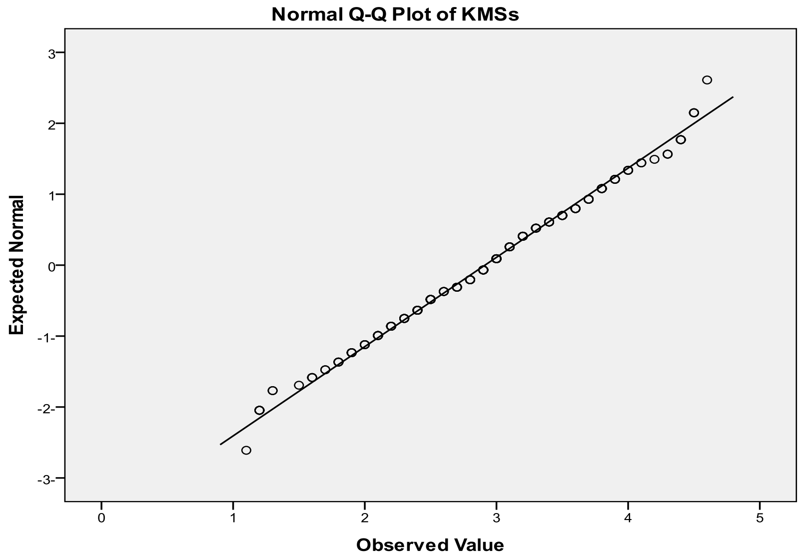
Tests of Normality

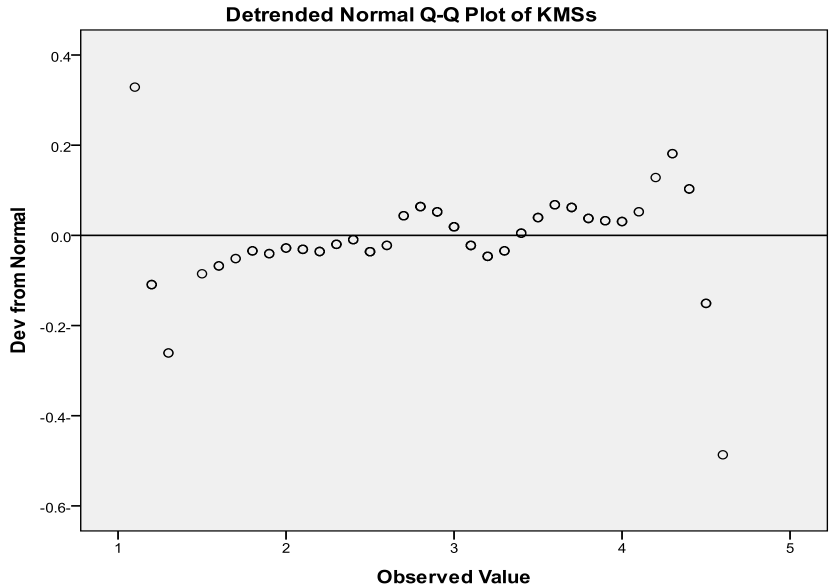
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
KMSs	.053	220	.200*	.988	220	.056

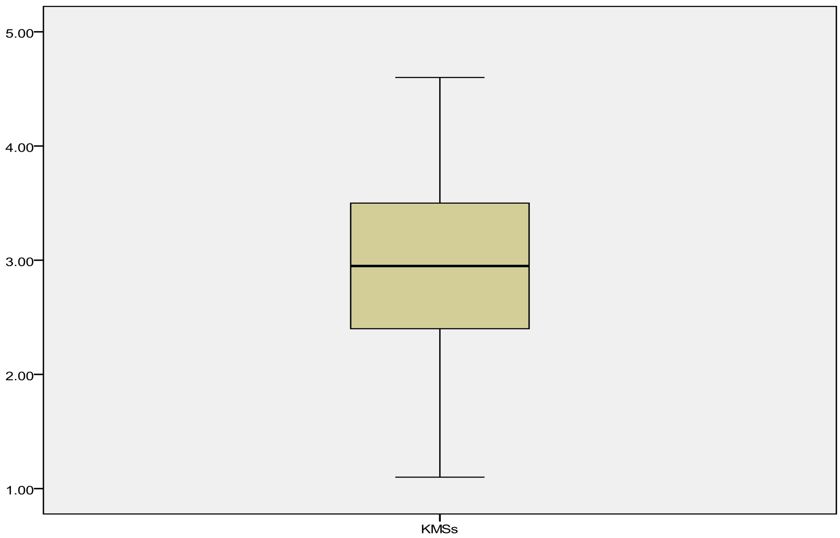
a. Lilliefors Significance Correction
*. This is a lower bound of the true significance.




```
KMSs Stem-and-Leaf Plot

 Frequency    Stem &  Leaf

     1.00        1 .  1
     8.00        1 .  22222233
     1.00        1 .  5
     6.00        1 .  666677
    10.00        1 .  8888899999
    13.00        2 .  0000011111111
    14.00        2 .  22222223333333
    23.00        2 .  44444444455555555555555
    10.00        2 .  6666777777
    24.00        2 .  888888888888899999999999
    29.00        3 .  00000000000000001111111111111
    18.00        3 .  222222222222333333
    13.00        3 .  4444444555555
    16.00        3 .  6666666777777777
    12.00        3 .  888888899999
     7.00        4 .  0000011
     4.00        4 .  2333
    10.00        4 .  4444445555
     1.00        4 .  6

 Stem width:      1.00
 Each leaf:       1 case(s)
```


Normal Q-Q Plot of KMSs
Expected Normal
Observed Value
3
2
1
0
-1
-2
-3
0
1
2
3
4
5


Detrended Normal Q-Q Plot of KMSs
Dev from Normal
Observed Value
0.4
0.2
0.0
-0.2
-0.4
-0.6
1
2
3
4
5


5.00
4.00
3.00
2.00
1.00
KMSs

KMPs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
KMPs	220	100.0%	0	.0%	220	100.0%

Extreme Values

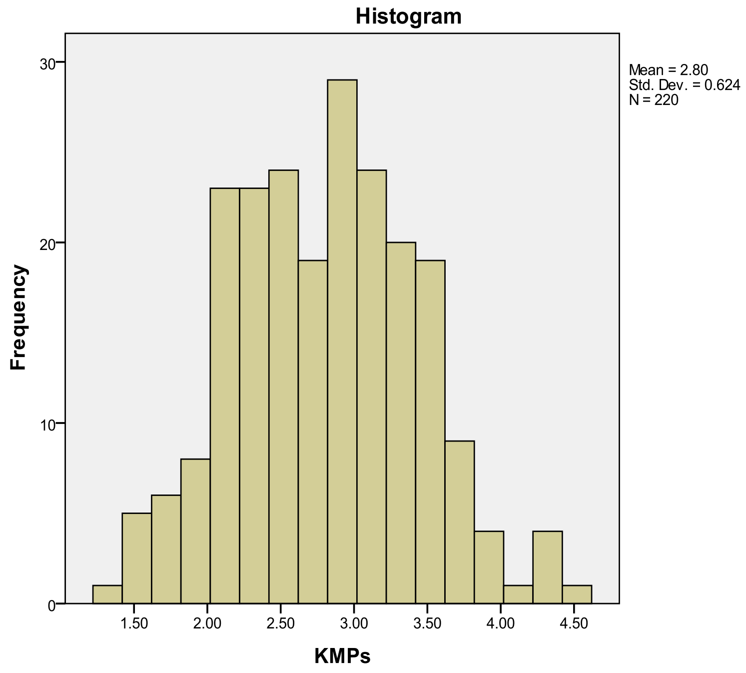
			Case Number	Value
KMPs	Highest	1	89	4.48
		2	27	4.32
		3	220	4.28
		4	32	4.24
		5	174	4.24
	Lowest	1	157	1.32
		2	128	1.48
		3	163	1.52
		4	3	1.52
		5	182	1.56

Tests of Normality

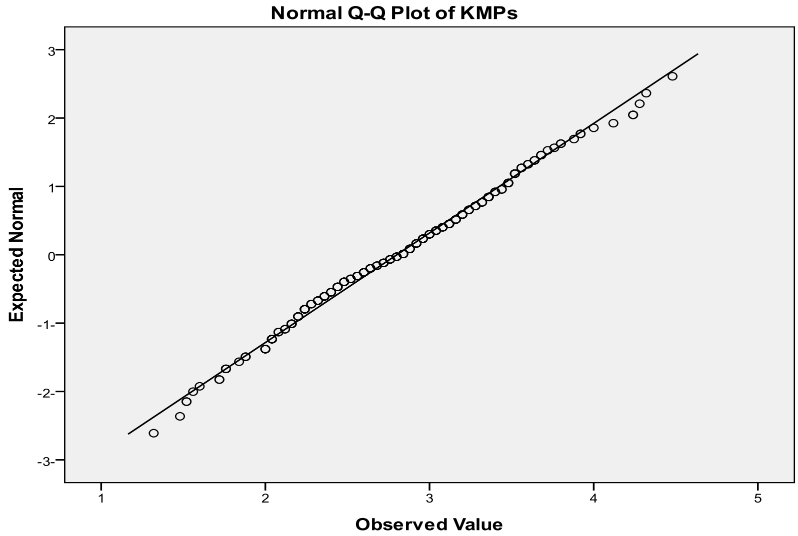
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
KMPs	.055	220	.200*	.992	220	.308

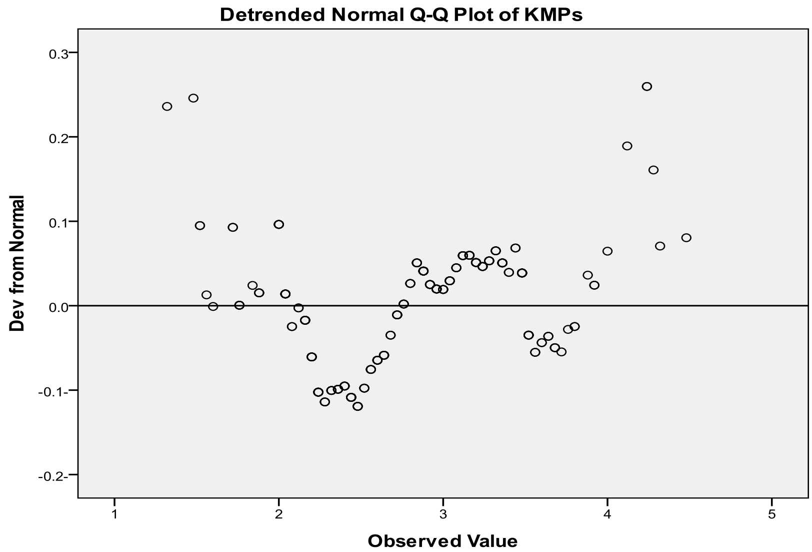
a. Lilliefors Significance Correction

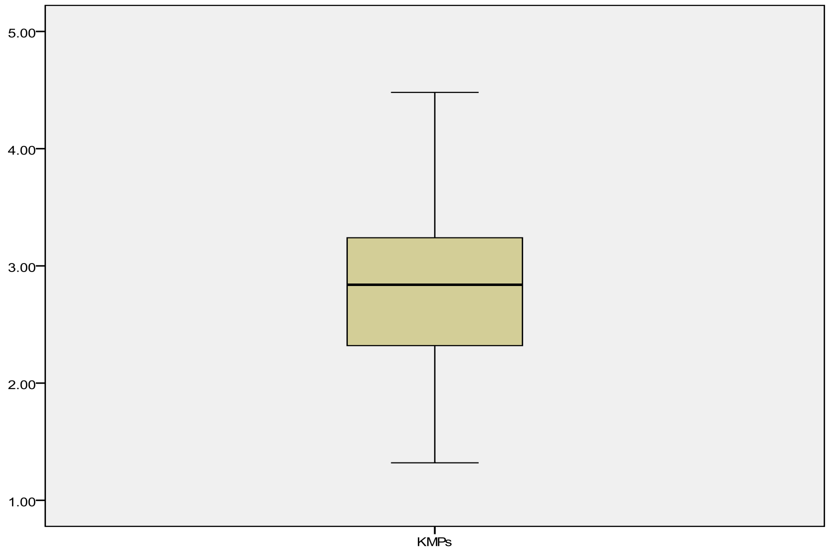
*. This is a lower bound of the true significance.



```
KMPs Stem-and-Leaf Plot

 Frequency    Stem &  Leaf

     1.00        1 .  3
     4.00        1 .  4555
     7.00        1 .  6777777
     4.00        1 .  8888
    21.00        2 .  000000000000011111111
    25.00        2 .  2222222222222222333333333
    23.00        2 .  44444444444444445555555
    21.00        2 .  666666666666777777777
    28.00        2 .  8888888888888888999999999999
    22.00        3 .  0000000000001111111111
    24.00        3 .  222222222222222333333333
    19.00        3 .  4444444444445555555
     9.00        3 .  666666677
     5.00        3 .  88899
     2.00        4 .  01
     4.00        4 .  2223
     1.00        4 .  4

 Stem width:      1.00
 Each leaf:       1 case(s)
```







Innovation

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Innovation	220	100.0%	0	.0%	220	100.0%

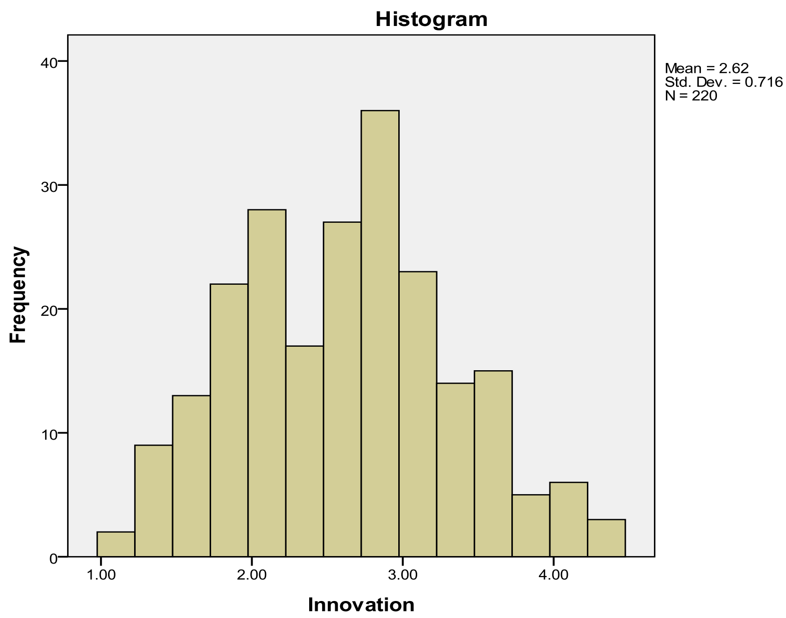
Extreme Values

			Case Number	Value
Innovation	Highest	1	155	4.35
		2	51	4.25
		3	113	4.25
		4	45	4.20
		5	32	4.10
	Lowest	1	209	1.10
		2	183	1.15
		3	167	1.25
		4	212	1.30
		5	53	1.30

Tests of Normality

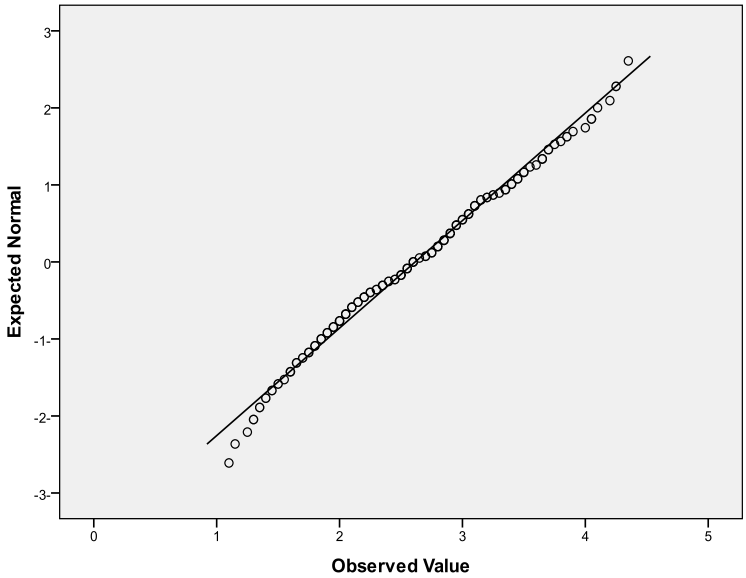
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Innovation	.055	220	.098	.988	220	.055

a. Lilliefors Significance Correction

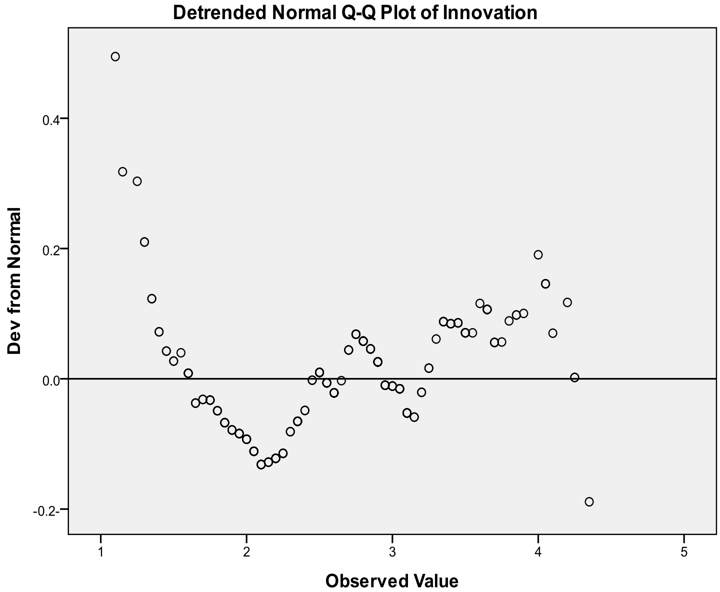


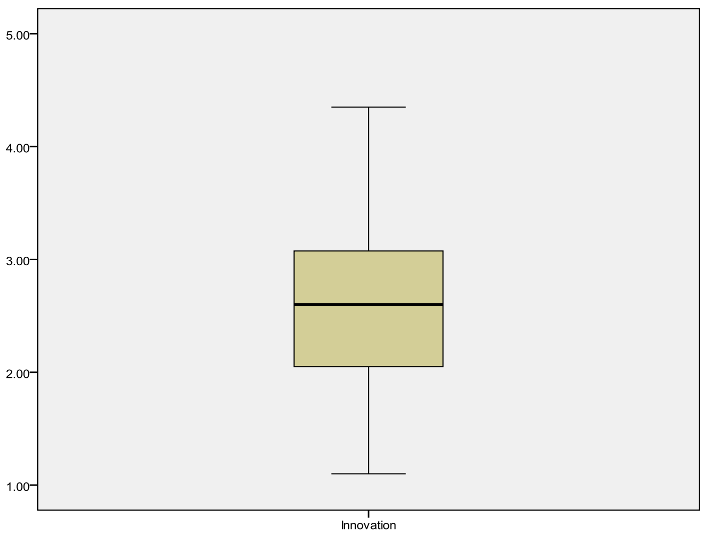

```
Innovation Stem-and-Leaf Plot

 Frequency    Stem &  Leaf

     2.00        1 .  11
     5.00        1 .  23333
     7.00        1 .  4444555
    14.00        1 .  66666666777777
    18.00        1 .  888888888999999999
    22.00        2 .  0000000000001111111111
    19.00        2 .  2222222222333333333
    19.00        2 .  4444555555555555555
    17.00        2 .  66666666677777777
    31.00        2 .  8888888888888899999999999999999
    21.00        3 .  000000000001111111111
     9.00        3 .  222233333
    13.00        3 .  4444444555555
    10.00        3 .  6666667777
     4.00        3 .  8889
     5.00        4 .  00001
     4.00        4 .  2223

 Stem width:       1.00
 Each leaf:        1 case(s)
```

Normal Q-Q Plot of Innovation



Detrended Normal Q-Q Plot of Innovation





Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
OP	220	100.0%	0	.0%	220	100.0%

Extreme Values

			Case Number	Value
OP	Highest	1	91	4.60
		2	50	4.35
		3	70	4.30
		4	32	4.25
		5	66	4.20[a]
	Lowest	1	209	1.50
		2	67	1.55
		3	18	1.55
		4	15	1.55
		5	2	1.55

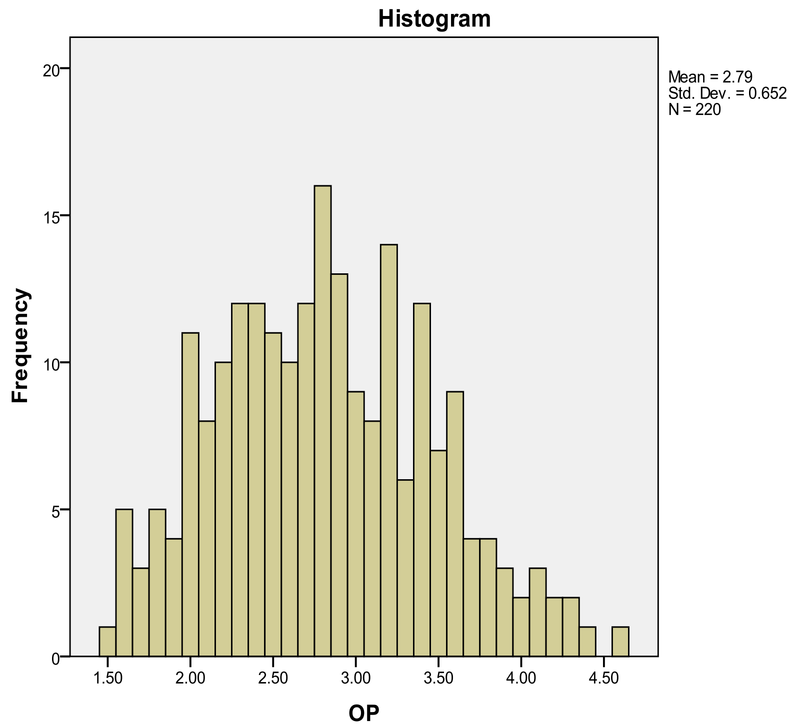
a. Only a partial list of cases with the value 4.20 are shown in the table of upper extremes.

Tests of Normality

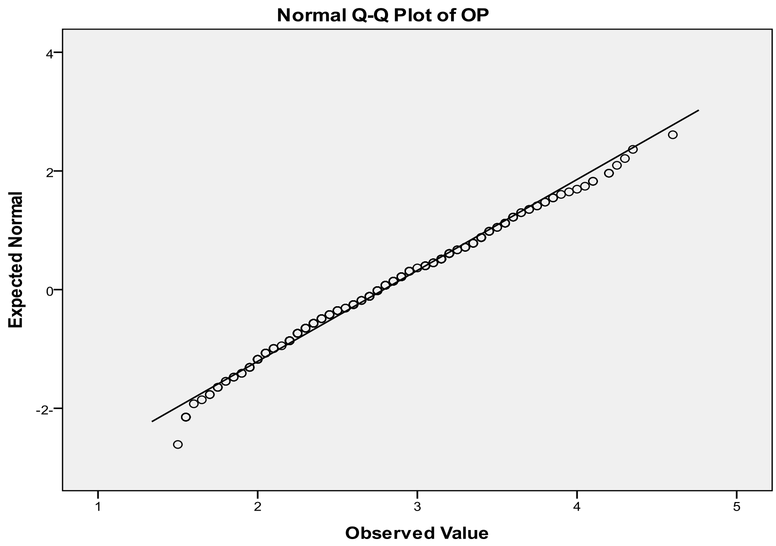
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
OP	.049	220	.200[*]	.988	220	.059

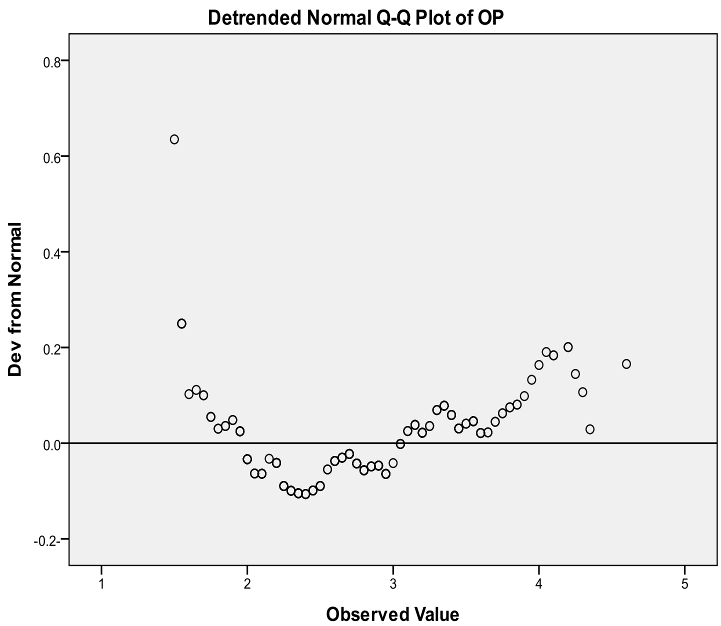
a. Lilliefors Significance Correction

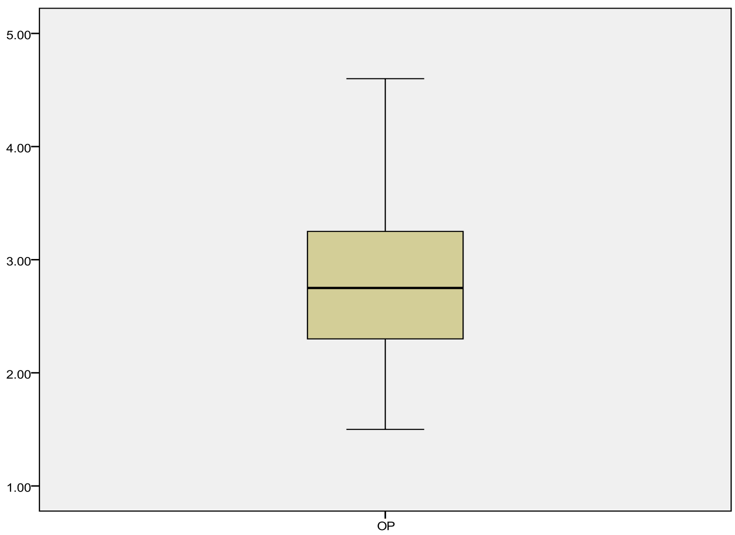
*. This is a lower bound of the true significance.



```
OP Stem-and-Leaf Plot

 Frequency    Stem &  Leaf

     5.00        1 .  55555
     7.00        1 .  6677777
    11.00        1 .  88889999999
    15.00        2 .  000000000011111
    28.00        2 .  2222222222222222333333333333
    18.00        2 .  444444444445555555
    29.00        2 .  66666666666667777777777777777
    28.00        2 .  8888888888888999999999999999
    16.00        3 .  0000001111111111
    18.00        3 .  222222222333333333
    19.00        3 .  4444444444445555555
    10.00        3 .  6666667777
     6.00        3 .  888899
     4.00        4 .  0011
     5.00        4 .  22233
      .00        4 .
     1.00        4 .  6

 Stem width:      1.00
 Each leaf:       1 case(s)
```




Detrended Normal Q-Q Plot of OP
Dev from Normal
0.8
0.6
0.4
0.2
0.0
-0.2
1
2
3
4
5
Observed Value


5.00
4.00
3.00
2.00
1.00
OP

APPENDIX 3
PART C

Multicollinearity Test

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	61.604	4	15.401	65.210	.000[a]
	Residual	50.778	215	.236		
	Total	112.382	219			

a. Predictors: (Constant), CSFs of KM, KMSs, KMPs, Innovation
b. Dependent Variable: OP

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.284-	.183		-1.551-	.122
	CSFsofKM	.351	.069	.283	5.090	.000
	KMSs	.133	.050	.147	2.651	.009
	KMPs	.276	.060	.255	4.577	.000
	Innovation	.293	.066	.265	4.433	.000

a. Dependent Variable: OP

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	CSFs of KM	.680	1.471
	KMSs	.680	1.471
	KMPs	.675	1.481
	Innovation	.590	1.694

a. Dependent Variable: OP

APPENDIX 4
PART A

Exploratory Factor Analysis

1. Exploratory Factor Analysis of the CSFs of KM

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.837
Bartlett's Test of Sphericity	Approx. Chi-Square	3723.819
	df	595
	Sig.	.000

Communalities

	Initial	Extraction
HR1	1.000	.559
HR2	1.000	.605
HR3	1.000	.665
HR4	1.000	.521
HR5	1.000	.518
IT1	1.000	.664
IT2	1.000	.633
IT3	1.000	.609
IT4	1.000	.614
IT5	1.000	.697
LE1	1.000	.645
LE2	1.000	.609
LE3	1.000	.678
LE4	1.000	.522
LE5	1.000	.567
OL1	1.000	.688
OL2	1.000	.582
OL3	1.000	.602
OL4	1.000	.737
OL5	1.000	.566
OS1	1.000	.678
OS2	1.000	.662
OS3	1.000	.588
OS4	1.000	.588
OS5	1.000	.642
OT1	1.000	.549
OT2	1.000	.556
OT3	1.000	.565
OT4	1.000	.726
OT5	1.000	.586
OC1	1.000	.603
OC2	1.000	.758
OC3	1.000	.744
OC4	1.000	.760
OC5	1.000	.647

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.559	24.455	24.455	8.559	24.455	24.455	3.592	10.263	10.263
2	3.621	10.344	34.800	3.621	10.344	34.800	3.426	9.790	20.053
3	2.538	7.251	42.050	2.538	7.251	42.050	3.148	8.994	29.047
4	2.006	5.730	47.781	2.006	5.730	47.781	3.010	8.601	37.648
5	1.923	5.494	53.275	1.923	5.494	53.275	2.994	8.553	46.201
6	1.715	4.901	58.175	1.715	4.901	58.175	2.972	8.492	54.693
7	1.573	4.493	62.669	1.573	4.493	62.669	2.792	7.976	62.669
8	.989	2.827	65.495						
9	.878	2.510	68.005						
10	.818	2.338	70.343						
11	.782	2.235	72.578						
12	.697	1.993	74.571						
13	.657	1.877	76.448						
14	.629	1.798	78.246						
15	.590	1.685	79.931						
16	.573	1.637	81.568						
17	.569	1.626	83.195						
18	.528	1.508	84.703						
19	.496	1.418	86.121						
20	.463	1.322	87.443						
21	.440	1.258	88.701						
22	.432	1.235	89.936						
23	.401	1.145	91.081						
24	.366	1.045	92.127						
25	.339	.968	93.094						
26	.327	.934	94.028						
27	.313	.895	94.923						
28	.300	.858	95.781						
29	.282	.805	96.586						

30	.233	.665	97.252							
31	.226	.646	97.898							
32	.211	.602	98.500							
33	.189	.539	99.039							
34	.183	.523	99.562							
35	.153	.438	100.000							

Extraction Method: Principal Component Analysis.

Rotated Component Matrix[a]

	Component						
	1	2	3	4	5	6	7
HR1	.046	.034	-.010-	.734	.081	.056	.081
HR2	.017	.053	.006	.769	-.002-	.016	.103
HR3	.127	.172	-.040-	.781	.029	.082	.016
HR4	.128	-.089-	.039	.694	-.012-	-.096-	-.062-
HR5	.168	.208	.184	.601	.068	.139	.164
IT1	.120	.740	.173	-.085-	.196	.163	.013
IT2	.117	.736	.019	.113	.246	.055	.044
IT3	.214	.686	.072	.034	.112	.046	.268
IT4	.111	.687	.184	.204	.019	.119	.202
IT5	.141	.806	.007	.100	.015	.027	.130
LE1	.116	.180	.104	.197	.167	.706	.153
LE2	.097	.119	.052	.139	.116	.740	.051
LE3	.052	.082	.194	-.059-	-.004-	.790	.056
LE4	.006	-.051-	.243	-.050-	.039	.676	.019
LE5	-.037-	.071	.196	-.003-	.158	.704	.014
OL1	-.018-	.168	.135	.016	.791	.107	.058
OL2	.176	.197	.304	.145	.612	.137	.069
OL3	.285	.232	.003	-.112-	.593	.173	.270
OL4	.132	.046	.086	.064	.827	.077	.131
OL5	.124	.047	.244	.050	.678	.078	.143
OS1	-.019-	-.047-	.775	-.006-	.183	.187	.080
OS2	.009	.031	.763	-.001-	.139	.207	.128
OS3	.047	.238	.631	.329	.034	.089	.119
OS4	.009	.058	.716	-.054-	.188	.153	.101
OS5	.003	.196	.740	.018	.081	.190	-.112-
OT1	.034	.256	-.106-	.057	.270	.075	.624
OT2	.219	.317	.135	.154	.199	.086	.564
OT3	.042	-.024-	.106	.094	.077	.007	.732
OT4	.119	.086	.057	-.008-	.047	.052	.834
OT5	.294	.234	.148	.085	.096	.118	.627
OC1	.669	.049	.007	.264	.206	.087	.180
OC2	.841	.010	.074	.115	.102	.065	.131
OC3	.801	.283	.007	.048	.117	.063	.056
OC4	.839	.209	-.040-	.048	-.002-	.036	.086
OC5	.772	.138	-.005-	.093	.116	-.021-	.098

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

2. Exploratory Factor Analysis of KMSs

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.873
Bartlett's Test of Sphericity	Approx. Chi-Square	930.455
	df	45
	Sig.	.000

Communalities

	Initial	Extraction
CS1	1.000	.633
CS2	1.000	.567
CS3	1.000	.646
CS4	1.000	.504
CS5	1.000	.644
PS1	1.000	.626
PS2	1.000	.709
PS3	1.000	.656
PS4	1.000	.550
PS5	1.000	.686

Extraction Method: Principal Component Analysis.

Rotated Component Matrix[a]

	Component	
	1	2
CS1	.230	.762
CS2	.164	.735
CS3	.159	.788
CS4	.332	.615
CS5	.075	.799
PS1	.790	.051
PS2	.750	.304
PS3	.804	.096
PS4	.708	.222
PS5	.770	.305

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.607	46.069	46.069	4.607	46.069	46.069	3.164	31.636	31.636
2	1.615	16.148	62.217	1.615	16.148	62.217	3.058	30.581	62.217
3	.719	7.192	69.409						
4	.565	5.653	75.062						
5	.552	5.521	80.583						
6	.486	4.864	85.447						
7	.466	4.656	90.104						
8	.399	3.986	94.090						
9	.305	3.047	97.136						
10	.286	2.864	100.000						

Extraction Method: Principal Component Analysis.

3. Exploratory Factor Analysis of KMPs

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.842
Bartlett's Test of Sphericity	Approx. Chi-Square	2493.203
	df	300
	Sig.	.000

Communalities

	Initial	Extraction
KC1	1.000	.642
KC2	1.000	.582
KC3	1.000	.599
KC4	1.000	.604
KC5	1.000	.619
KO1	1.000	.694
KO2	1.000	.587
KO3	1.000	.657
KO4	1.000	.603
KO5	1.000	.550
KS1	1.000	.575
KS2	1.000	.665
KS3	1.000	.540
KS4	1.000	.534
KS5	1.000	.544
KH1	1.000	.624
KH2	1.000	.652
KH3	1.000	.656
KH4	1.000	.682
RECOKH5	1.000	.564
KU1	1.000	.646
KU2	1.000	.692
KU3	1.000	.763
KU4	1.000	.701
KU5	1.000	.568

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.701	26.803	26.803	6.701	26.803	26.803	3.585	14.340	14.340
2	2.860	11.441	38.244	2.860	11.441	38.244	3.317	13.268	27.608
3	2.280	9.122	47.366	2.280	9.122	47.366	2.968	11.871	39.479
4	2.180	8.718	56.084	2.180	8.718	56.084	2.921	11.682	51.161
5	1.522	6.087	62.171	1.522	6.087	62.171	2.752	11.009	62.171
6	.967	3.869	66.039						
7	.828	3.312	69.352						
8	.739	2.956	72.308						
9	.675	2.698	75.006						
10	.603	2.410	77.416						
11	.569	2.276	79.692						
12	.543	2.171	81.863						
13	.498	1.993	83.856						
14	.492	1.969	85.824						
15	.467	1.868	87.692						
16	.426	1.705	89.398						
17	.409	1.638	91.035						
18	.364	1.457	92.492						
19	.347	1.387	93.879						
20	.310	1.242	95.121						
21	.289	1.158	96.278						
22	.280	1.121	97.399						
23	.234	.936	98.335						
24	.219	.876	99.210						
25	.197	.790	100.000						

Extraction Method: Principal Component Analysis.

Rotated Component Matrix[a]

	Component				
	1	2	3	4	5
KC1	.165	.050	.098	.775	.041
KC2	.168	.059	-.116-	.719	.142
KC3	.109	.243	-.013-	.727	.006
KC4	.341	.177	.128	.642	.068
KC5	-.069-	-.087-	.071	.774	.055
KO1	.027	.005	.825	-.109-	-.022-
KO2	.249	.326	.620	.128	.133
KO3	.038	.067	.792	.116	.102
KO4	.036	.148	.751	.080	.090
KO5	-.025-	.031	.740	-.024-	-.034-
KS1	.019	.126	-.041-	.081	.742
KS2	.301	.134	.080	.100	.735
KS3	.192	.049	.015	-.033-	.707
KS4	.164	.059	.089	.089	.698
KS5	.322	.216	.126	.094	.597
KH1	.000	.777	-.016-	.129	.062
KH2	.206	.765	.138	.037	.063
KH3	.097	.791	.110	.026	.089
KH4	.169	.788	.085	-.042-	.151
RECOKH5	.029	.683	.143	.221	.166
KU1	.732	.031	.072	.224	.230
KU2	.807	.067	.027	.053	.183
KU3	.841	.151	-.025-	.053	.172
KU4	.809	.067	.031	.134	.151
KU5	.636	.240	.143	.198	.215

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.

4. Exploratory Factor Analysis of Innovation

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.870
Bartlett's Test of Sphericity	Approx. Chi-Square	2042.073
	df	190
	Sig.	.000

Communalities

	Initial	Extraction
TI1	1.000	.541
TI2	1.000	.701
TI3	1.000	.602
TI4	1.000	.599
TI5	1.000	.624
AI1	1.000	.662
AI2	1.000	.569
AI3	1.000	.628
AI4	1.000	.585
AI5	1.000	.723
RI1	1.000	.584
RI2	1.000	.648
RI3	1.000	.631
RI4	1.000	.630
RI5	1.000	.516
NI1	1.000	.631
NI2	1.000	.692
NI3	1.000	.541
NI4	1.000	.714
NI5	1.000	.673

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.449	32.245	32.245	6.449	32.245	32.245	3.255	16.273	16.273
2	2.865	14.327	46.572	2.865	14.327	46.572	3.185	15.924	32.198
3	1.775	8.876	55.448	1.775	8.876	55.448	3.064	15.318	47.516
4	1.402	7.008	62.456	1.402	7.008	62.456	2.988	14.940	62.456
5	.987	4.936	67.392						
6	.752	3.759	71.151						
7	.708	3.538	74.689						
8	.609	3.047	77.736						
9	.546	2.731	80.468						
10	.516	2.581	83.048						
11	.493	2.464	85.512						
12	.437	2.183	87.695						
13	.379	1.896	89.591						
14	.360	1.800	91.391						
15	.346	1.732	93.123						
16	.327	1.637	94.760						
17	.294	1.471	96.231						
18	.270	1.348	97.579						
19	.254	1.269	98.848						
20	.230	1.152	100.000						

Extraction Method: Principal Component Analysis.

Rotated Component Matrix[a]

	Component			
	1	2	3	4
TI1	.658	.220	.047	.239
TI2	.785	.248	-.006-	.150
TI3	.742	.197	.095	.060
TI4	.754	.068	.123	.099
TI5	.755	.146	.082	.160
AI1	-.100-	.187	.782	-.075-
AI2	.077	.086	.742	-.073-
AI3	.097	.253	.740	.076
AI4	.291	.202	.663	.144
AI5	.068	.076	.843	.034
RI1	.011	.015	.021	.764
RI2	.294	.252	.077	.702
RI3	.109	.130	.003	.776
RI4	.193	.254	-.025-	.726
RI5	.138	.049	-.003-	.703
NI1	.145	.751	.214	.029
NI2	.286	.762	.095	.146
NI3	.048	.678	.245	.138
NI4	.252	.772	.168	.160
NI5	.279	.714	.144	.253

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.

5. Exploratory Factor Analysis of OP

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.883
Bartlett's Test of Sphericity	Approx. Chi-Square	2344.877
	df	190
	Sig.	.000

Communalities

	Initial	Extraction
FP1	1.000	.684
FP2	1.000	.710
FP3	1.000	.510
FP4	1.000	.738
FP5	1.000	.561
CP1	1.000	.598
CP2	1.000	.799
CP3	1.000	.718
CP4	1.000	.527
CP5	1.000	.671
IP1	1.000	.663
IP2	1.000	.651
IP3	1.000	.601
IP4	1.000	.690
IP5	1.000	.784
GP1	1.000	.607
GP2	1.000	.690
GP3	1.000	.555
GP4	1.000	.594
GP5	1.000	.610

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.192	35.958	35.958	7.192	35.958	35.958	3.521	17.606	17.606
2	2.605	13.027	48.985	2.605	13.027	48.985	3.323	16.617	34.223
3	1.752	8.759	57.744	1.752	8.759	57.744	3.113	15.566	49.789
4	1.412	7.060	64.804	1.412	7.060	64.804	3.003	15.014	64.804
5	.948	4.738	69.542						
6	.711	3.554	73.096						
7	.645	3.224	76.320						
8	.592	2.960	79.279						
9	.552	2.762	82.041						
10	.497	2.486	84.527						
11	.474	2.369	86.897						
12	.449	2.246	89.142						
13	.384	1.919	91.062						
14	.354	1.768	92.829						
15	.307	1.537	94.366						
16	.288	1.441	95.807						
17	.267	1.336	97.143						
18	.205	1.027	98.170						
19	.196	.979	99.149						
20	.170	.851	100.000						

Extraction Method: Principal Component Analysis.

Rotated Component Matrix[a]

	Component			
	1	2	3	4
FP1	.161	.097	.122	.800
FP2	.072	.278	.149	.740
FP3	-.042-	.266	.047	.673
FP4	.099	.308	.192	.755
FP5	.097	.002	-.118-	.722
CP1	.036	.731	.175	.114
CP2	.134	.771	.198	.325
CP3	.134	.828	.034	.115
CP4	-.011-	.685	.161	.152
CP5	.050	.787	.265	.069
IP1	.219	.206	.724	.047
IP2	.278	.161	.697	.081
IP3	.064	.115	.763	.157
IP4	.120	.216	.780	.036
IP5	.244	.184	.752	.102
GP1	.721	.186	.106	.224
GP2	.773	.156	.204	.147
GP3	.670	.208	.156	.154
GP4	.735	.134	.167	.115
GP5	.707	.158	.102	.251

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

APPENDIX 4
PART B

Reliability

Scale: HR

Case Processing Summary

		N	%
Cases	Valid	220	100.0
	Excluded[a]	0	.0
	Total	220	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.794	5

Scale: IT

Case Processing Summary

		N	%
Cases	Valid	220	100.0
	Excluded[a]	0	.0
	Total	220	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.845	5

Scale: LE

Case Processing Summary

		N	%
Cases	Valid	220	100.0
	Excluded[a]	0	.0
	Total	220	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.815	5

Scale: OL

Case Processing Summary

		N	%
Cases	Valid	220	100.0
	Excluded[a]	0	.0
	Total	220	100.0

Case Processing Summary

		N	%
Cases	Valid	220	100.0
	Excluded[a]	0	.0
	Total	220	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.828	5

Scale: OS

Case Processing Summary

		N	%
Cases	Valid	220	100.0
	Excluded[a]	0	.0
	Total	220	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.797	5

Scale: OT

Case Processing Summary

		N	%
Cases	Valid	220	100.0
	Excluded[a]	0	.0
	Total	220	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.796	5

Scale: OC

Case Processing Summary

		N	%
Cases	Valid	220	100.0
	Excluded[a]	0	.0
	Total	220	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.880	5

Scale: CS

Case Processing Summary

		N	%
Cases	Valid	220	100.0
	Excluded[a]	0	.0
	Total	220	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.826	5

Scale: PS

Case Processing Summary

		N	%
Cases	Valid	220	100.0
	Excluded[a]	0	.0
	Total	220	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.855	5

Scale: KC

Case Processing Summary

		N	%
Cases	Valid	220	100.0
	Excluded[a]	0	.0
	Total	220	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.811	5

Scale: KO

Case Processing Summary

		N	%
Cases	Valid	220	100.0
	Excluded[a]	0	.0
	Total	220	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.820	5

Scale: KS

Case Processing Summary

		N	%
Cases	Valid	220	100.0
	Excluded[a]	0	.0
	Total	220	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.815	5

Scale: KH

Case Processing Summary

		N	%
Cases	Valid	220	100.0
	Excluded[a]	0	.0
	Total	220	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.847	5

Scale: KU

Case Processing Summary

		N	%
Cases	Valid	220	100.0
	Excluded[a]	0	.0
	Total	220	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.875	5

Scale: TI

Case Processing Summary

		N	%
Cases	Valid	220	100.0
	Excluded[a]	0	.0
	Total	220	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.839	5

Scale: AI

Case Processing Summary

		N	%
Cases	Valid	220	100.0
	Excluded[a]	0	.0
	Total	220	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.837	5

Scale: RI

Case Processing Summary

		N	%
Cases	Valid	220	100.0
	Excluded[a]	0	.0
	Total	220	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.822	5

Scale: NI

Case Processing Summary

		N	%
Cases	Valid	220	100.0
	Excluded[a]	0	.0
	Total	220	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.856	5

Scale: FP

Case Processing Summary

		N	%
Cases	Valid	220	100.0
	Excluded[a]	0	.0
	Total	220	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.832	5

Scale: CP

Case Processing Summary

		N	%
Cases	Valid	220	100.0
	Excluded[a]	0	.0
	Total	220	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.861	5

Scale: IP

Case Processing Summary

		N	%
Cases	Valid	220	100.0
	Excluded[a]	0	.0
	Total	220	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.865	5

Scale: GP

Case Processing Summary

		N	%
Cases	Valid	220	100.0
	Excluded[a]	0	.0
	Total	220	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.849	5

APPENDIX 4
PART C

Correlations

Correlations

		CSFsofKM	KMSs	KMPs	Innovation	OP
CSFsofKM	Pearson Correlation	1	.362**	.393**	.578**	.492**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	220	220	220	220	220
KMSs	Pearson Correlation	.362**	1	.448**	.508**	.468**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	220	220	220	220	220
KMPs	Pearson Correlation	.393**	.448**	1	.540**	.405**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	220	220	220	220	220
Innovation	Pearson Correlation	.578**	.508**	.540**	1	.633**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	220	220	220	220	220
OP	Pearson Correlation	.492**	.468**	.405**	.633**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	220	220	220	220	220

**. Correlation is significant at the 0.01 level (2-tailed).

APPENDIX 5
PART A

Confirmatory Factor Analysis of Evaluating a Measurement Instrument

Standardised Regression Weights of the CSFs of KM

			Estimate
HR1	<---	HR	.683
HR2	<---	HR	.682
HR3	<---	HR	.776
HR4	<---	HR	.531
HR5	<---	HR	.644
IT1	<---	IT	.715
IT2	<---	IT	.717
IT3	<---	IT	.741
IT4	<---	IT	.696
IT5	<---	IT	.747
LE1	<---	LE	.743
LE2	<---	LE	.696
LE3	<---	LE	.741
LE4	<---	LE	.592
LE5	<---	LE	.648
OL1	<---	OL	.715
OL2	<---	OL	.687
OL3	<---	OL	.668
OL4	<---	OL	.780
OL5	<---	OL	.672
OS1	<---	OS	.785
OS2	<---	OS	.779
OS3	<---	OS	.591
OS4	<---	OS	.684
OS5	<---	OS	.681
OT1	<---	OT	.605
OT2	<---	OT	.708
OT3	<---	OT	.553
OT4	<---	OT	.709
OT5	<---	OT	.733
OC1	<---	OC	.686
OC2	<---	OC	.789
OC3	<---	OC	.828
OC4	<---	OC	.835
OC5	<---	OC	.739

Standardised Regression Weights of KMSs

			Estimate
CS1	<---	CS	.758
CS2	<---	CS	.660
CS3	<---	CS	.738
CS4	<---	CS	.637
CS5	<---	CS	.704
PS1	<---	PS	.657
PS2	<---	PS	.832
PS3	<---	PS	.704
PS4	<---	PS	.653
PS5	<---	PS	.812

Standardised Regression Weights of KMPs

			Estimate
KC1	<---	KC	.749
KC2	<---	KC	.642
KC3	<---	KC	.693
KC4	<---	KC	.707
KC5	<---	KC	.604
KO1	<---	KO	.695
KO2	<---	KO	.645
KO3	<---	KO	.777
KO4	<---	KO	.752
KO5	<---	KO	.587
KS1	<---	KS	.570
KS2	<---	KS	.824
KS3	<---	KS	.587
KS4	<---	KS	.580
KS5	<---	KS	.735
KH1	<---	KH	.661
KH2	<---	KH	.754
KH3	<---	KH	.755
KH4	<---	KH	.796
RECOKH5	<---	KH	.665
KU1	<---	KU	.756
KU2	<---	KU	.789
KU3	<---	KU	.847
KU4	<---	KU	.786
KU5	<---	KU	.661

Standardised Regression Weights of Innovation

			Estimate
TI1	<---	TI	.701
TI2	<---	TI	.820
TI3	<---	TI	.673
TI4	<---	TI	.693
TI5	<---	TI	.691
AI1	<---	AI	.711
AI2	<---	AI	.652
AI3	<---	AI	.729
AI4	<---	AI	.684
AI5	<---	AI	.791
RI1	<---	RI	.617
RI2	<---	RI	.766
RI3	<---	RI	.714
RI4	<---	RI	.748
RI5	<---	RI	.606
NI1	<---	IN	.691
NI2	<---	IN	.794
NI3	<---	IN	.616
NI4	<---	IN	.809
NI5	<---	IN	.782

Standardised Regression Weights of OP

			Estimate
FP1	<---	FP	.764
FP2	<---	FP	.785
FP3	<---	FP	.612
FP4	<---	FP	.892
FP5	<---	FP	.580
CP1	<---	CP	.654
CP2	<---	CP	.902
CP3	<---	CP	.738
CP4	<---	CP	.662
CP5	<---	CP	.740
IP1	<---	IP	.730
IP2	<---	IP	.787
IP3	<---	IP	.533
IP4	<---	IP	.755
IP5	<---	IP	.916
GP1	<---	GP	.705
GP2	<---	GP	.807
GP3	<---	GP	.685
GP4	<---	GP	.688
GP5	<---	GP	.758

APPENDIX 5
PART B

Confirmatory Factor Analysis of the CSFs of KM

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
HR1	<---	HR	1.000				
HR2	<---	HR	.956	.123	7.747	***	par_22
HR3	<---	HR	1.215	.166	7.299	***	par_23
IT2	<---	IT	1.000				
IT5	<---	IT	1.011	.160	6.330	***	par_24
LE1	<---	LE	1.000				
LE2	<---	LE	.870	.106	8.222	***	par_25
LE5	<---	LE	.689	.097	7.098	***	par_26
OL3	<---	OL	1.000				
OL4	<---	OL	.671	.108	6.235	***	par_27
OS1	<---	OS	1.000				
OS2	<---	OS	1.015	.099	10.220	***	par_28
OS4	<---	OS	.764	.085	9.017	***	par_29
OT2	<---	OT	1.000				
OT5	<---	OT	.845	.114	7.409	***	par_30
OC2	<---	OC	1.000				
OC5	<---	OC	1.032	.150	6.865	***	par_31

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
HR1	<---	HR	.652
HR2	<---	HR	.668
HR3	<---	HR	.809
IT2	<---	IT	.709
IT5	<---	IT	.729
LE1	<---	LE	.794
LE2	<---	LE	.694
LE5	<---	LE	.580
OL3	<---	OL	.918
OL4	<---	OL	.612
OS1	<---	OS	.815
OS2	<---	OS	.788
OS4	<---	OS	.660
OT2	<---	OT	.776
OT5	<---	OT	.647
OC2	<---	OC	.814
OC5	<---	OC	.808

Variances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
HR	.646	.141	4.598	***	par_32
OC	.829	.158	5.261	***	par_33
IT	.711	.155	4.585	***	par_34
LE	1.027	.177	5.800	***	par_35
OL	1.121	.198	5.664	***	par_36
OS	.873	.136	6.413	***	par_37
OT	.853	.158	5.401	***	par_38
e1	.872	.112	7.770	***	par_39
e2	.732	.097	7.510	***	par_40
e3	.504	.116	4.345	***	par_41
e4	.701	.122	5.766	***	par_42
e5	.640	.120	5.319	***	par_43
e6	.604	.117	5.152	***	par_44
e7	.834	.112	7.458	***	par_45
e8	.963	.109	8.818	***	par_46
e9	.534	.124	4.295	***	par_47
e10	.843	.106	7.957	***	par_48
e11	.440	.080	5.536	***	par_49
e12	.549	.087	6.289	***	par_50
e13	.659	.077	8.555	***	par_51
e14	.565	.111	5.071	***	par_52
e15	.847	.107	7.932	***	par_53
e16	.422	.117	3.590	***	par_54
e17	.469	.126	3.729	***	par_55

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
OC5	.653
OC2	.663
OT5	.419
OT2	.602
OS4	.436
OS2	.621
OS1	.665
OL4	.374
OL3	.844
LE5	.336
LE2	.482
LE1	.630
IT5	.531
IT2	.503
HR3	.654
HR2	.446
HR1	.426

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	55	110.984	98	.175	1.132
Saturated model	153	.000	0		
Independence model	17	1221.133	136	.000	8.979

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.059	.946	.916	.606
Saturated model	.000	1.000		
Independence model	.333	.498	.435	.442

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.909	.874	.988	.983	.988
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.721	.655	.712
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	12.984	.000	43.088
Saturated model	.000	.000	.000
Independence model	1085.133	977.103	1200.604

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.507	.059	.000	.197
Saturated model	.000	.000	.000	.000
Independence model	5.576	4.955	4.462	5.482

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.025	.000	.045	.985
Independence model	.191	.181	.201	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	220.984	230.834	407.633	462.633
Saturated model	306.000	333.403	825.225	978.225
Independence model	1255.133	1258.178	1312.825	1329.825

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	1.009	.950	1.147	1.054
Saturated model	1.397	1.397	1.397	1.522
Independence model	5.731	5.238	6.258	5.745

APPEN DIX 5
PART C

Confirmatory Factor Analysis of KMSs

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
CS1	<---	CS	1.000				
CS2	<---	CS	.801	.104	7.670	***	par_2
CS3	<---	CS	.923	.102	9.016	***	par_3
PS1	<---	PS	1.000				
PS2	<---	PS	1.376	.143	9.638	***	par_4
PS4	<---	PS	1.014	.126	8.045	***	par_5
PS5	<---	PS	1.334	.143	9.358	***	par_6

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
CS1	<---	CS	.773
CS2	<---	CS	.605
CS3	<---	CS	.742
PS1	<---	PS	.642
PS2	<---	PS	.858
PS4	<---	PS	.637
PS5	<---	PS	.793

Variances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
CS	.776	.133	5.834	***	par_7
PS	.561	.113	4.972	***	par_8
e1	.523	.085	6.130	***	par_9
e2	.864	.098	8.784	***	par_10
e3	.538	.079	6.846	***	par_11
e4	.798	.087	9.220	***	par_12
e5	.382	.069	5.509	***	par_13
e6	.847	.092	9.223	***	par_14
e7	.588	.080	7.326	***	par_15

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
PS5	.629
PS4	.405
PS2	.736
PS1	.413
CS3	.551
CS2	.366
CS1	.597

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	15	14.916	13	.313	1.147
Saturated model	28	.000	0		
Independence model	7	556.166	21	.000	26.484

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.046	.982	.960	.456
Saturated model	.000	1.000		
Independence model	.519	.475	.300	.356

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.973	.957	.996	.994	.996
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.619	.602	.617
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	1.916	.000	15.734
Saturated model	.000	.000	.000
Independence model	535.166	461.988	615.762

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.068	.009	.000	.072
Saturated model	.000	.000	.000	.000
Independence model	2.540	2.444	2.110	2.812

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.026	.000	.074	.743
Independence model	.341	.317	.366	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	44.916	46.053	95.820	110.820
Saturated model	56.000	58.123	151.022	179.022
Independence model	570.166	570.697	593.921	600.921

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.205	.196	.268	.210
Saturated model	.256	.256	.256	.265
Independence model	2.603	2.269	2.972	2.606

APPENDIX 5
PART D

Confirmatory Factor Analysis of KMPs

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
KC2	<---	KC	1.000				
KC3	<---	KC	1.001	.283	3.537	***	par_11
KO3	<---	KO	1.000				
KO4	<---	KO	1.133	.154	7.360	***	par_12
KO5	<---	KO	.705	.105	6.726	***	par_13
KS2	<---	KS	1.000				
KS4	<---	KS	.565	.079	7.192	***	par_14
KS5	<---	KS	.955	.101	9.495	***	par_15
KH1	<---	KH	1.000				
KH2	<---	KH	1.346	.144	9.370	***	par_16
KH3	<---	KH	1.187	.138	8.625	***	par_17
KH4	<---	KH	1.324	.148	8.935	***	par_18
KU1	<---	KU	1.000				
KU3	<---	KU	.993	.088	11.221	***	par_19
KU4	<---	KU	.988	.089	11.063	***	par_20

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
KC2	<---	KC	.687
KC3	<---	KC	.671
KO3	<---	KO	.757
KO4	<---	KO	.834
KO5	<---	KO	.521
KS2	<---	KS	.825
KS4	<---	KS	.525
KS5	<---	KS	.765
KH1	<---	KH	.645
KH2	<---	KH	.796
KH3	<---	KH	.727
KH4	<---	KH	.802
KU1	<---	KU	.769
KU3	<---	KU	.820
KU4	<---	KU	.795

Variances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
KC	.714	.231	3.085	.002	par_21
KS	1.157	.183	6.336	***	par_22
KO	.906	.175	5.173	***	par_23
KU	1.082	.173	6.234	***	par_24
KH	.443	.090	4.926	***	par_25
e1	.798	.210	3.795	***	par_26
e2	.875	.214	4.094	***	par_27
e3	.676	.127	5.316	***	par_28
e4	.511	.148	3.455	***	par_29
e5	1.209	.129	9.400	***	par_30
e6	.542	.111	4.878	***	par_31
e7	.970	.102	9.516	***	par_32
e8	.749	.115	6.502	***	par_33
e9	.623	.069	8.985	***	par_34
e10	.464	.067	6.893	***	par_35
e11	.556	.068	8.178	***	par_36
e12	.431	.063	6.801	***	par_37
e13	.746	.099	7.554	***	par_38
e14	.519	.081	6.419	***	par_39
e15	.615	.086	7.116	***	par_40

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
KU4	.632
KU3	.672
KU1	.592
KH4	.643
KH3	.529
KH2	.634
KH1	.416
KS5	.585
KS4	.276
KS2	.681
KO5	.271
KO4	.695
KO3	.573
KC3	.450
KC2	.472

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	40	88.084	80	.251	1.101
Saturated model	120	.000	0		
Independence model	15	1178.828	105	.000	11.227

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.067	.949	.923	.632
Saturated model	.000	1.000		
Independence model	.393	.482	.408	.421

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.925	.902	.993	.990	.992
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.762	.705	.756
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	8.084	.000	35.128
Saturated model	.000	.000	.000
Independence model	1073.828	967.096	1187.987

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.402	.037	.000	.160
Saturated model	.000	.000	.000	.000
Independence model	5.383	4.903	4.416	5.425

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.021	.000	.045	.983
Independence model	.216	.205	.227	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	168.084	174.390	303.829	343.829
Saturated model	240.000	258.916	647.235	767.235
Independence model	1208.828	1211.192	1259.732	1274.732

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.768	.731	.891	.796
Saturated model	1.096	1.096	1.096	1.182
Independence model	5.520	5.032	6.041	5.531

APPENDIX 5
PART E

Confirmatory Factor Analysis of Innovation

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
TI1	<---	TI	1.000				
TI2	<---	TI	.988	.130	7.616	***	par_1
AI1	<---	AI	1.000				
AI3	<---	AI	1.069	.126	8.479	***	par_2
AI5	<---	AI	1.081	.124	8.702	***	par_3
RI2	<---	RI	1.000				
RI4	<---	RI	1.080	.142	7.607	***	par_4
NI2	<---	NI	1.000				
NI5	<---	NI	1.024	.129	7.954	***	par_5

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
TI1	<---	TI	.775
TI2	<---	TI	.783
AI1	<---	AI	.746
AI3	<---	AI	.740
AI5	<---	AI	.732
RI2	<---	RI	.736
RI4	<---	RI	.719
NI2	<---	NI	.744
NI5	<---	NI	.773

Variances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
TI	.868	.161	5.381	***	par_12
AI	.742	.134	5.521	***	par_13
RI	.689	.133	5.175	***	par_14
NI	.806	.152	5.314	***	par_15
e1	.578	.114	5.064	***	par_16
e2	.535	.110	4.856	***	par_17
e3	.591	.091	6.522	***	par_18
e4	.703	.106	6.597	***	par_19
e5	.750	.109	6.903	***	par_20
e6	.583	.096	6.089	***	par_21
e7	.750	.116	6.487	***	par_22
e8	.652	.107	6.109	***	par_23
e9	.571	.106	5.392	***	par_24

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
NI5	.597
NI2	.553
RI4	.517
RI2	.542
AI5	.536
AI3	.547
AI1	.557
TI2	.613

	Estimate
TI1	.600

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	24	22.075	21	.395	1.051
Saturated model	45	.000	0		
Independence model	9	611.397	36	.000	16.983

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.056	.979	.955	.457
Saturated model	.000	1.000		
Independence model	.420	.541	.426	.433

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.964	.938	.998	.997	.998
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.583	.562	.582
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	1.075	.000	16.582
Saturated model	.000	.000	.000
Independence model	575.397	498.934	659.288

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.101	.005	.000	.076
Saturated model	.000	.000	.000	.000
Independence model	2.792	2.627	2.278	3.010

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.015	.000	.060	.875
Independence model	.270	.252	.289	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	70.075	72.372	151.523	175.523
Saturated model	90.000	94.306	242.713	287.713
Independence model	629.397	630.258	659.939	668.939

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.320	.315	.391	.330
Saturated model	.411	.411	.411	.431
Independence model	2.874	2.525	3.257	2.878

APPENDIX 5
PART F

Confirmatory Factor Analysis of OP

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
FP1	<---	FP	1.000				
FP3	<---	FP	.907	.207	4.379	***	par_1
CP3	<---	CP	1.000				
CP4	<---	CP	1.124	.222	5.055	***	par_2
IP2	<---	IP	1.000				
IP4	<---	IP	.912	.081	11.270	***	par_3
IP5	<---	IP	1.225	.090	13.564	***	par_4
GP1	<---	GP	1.000				
GP2	<---	GP	1.076	.107	10.104	***	par_5
GP3	<---	GP	.929	.102	9.110	***	par_6
GP4	<---	GP	.943	.102	9.231	***	par_7

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
FP1	<---	FP	.666
FP3	<---	FP	.622
CP3	<---	CP	.658
CP4	<---	CP	.699
IP2	<---	IP	.773
IP4	<---	IP	.722
IP5	<---	IP	.959
GP1	<---	GP	.732
GP2	<---	GP	.765
GP3	<---	GP	.692
GP4	<---	GP	.694

Variances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
FP	.666	.189	3.530	***	par_14
CP	.521	.136	3.842	***	par_15
IP	.865	.134	6.480	***	par_16
GP	.862	.148	5.805	***	par_17
e1	.833	.166	5.004	***	par_18
e2	.866	.146	5.933	***	par_19
e3	.684	.117	5.849	***	par_20
e4	.689	.139	4.952	***	par_21
e5	.581	.070	8.305	***	par_22
e6	.659	.071	9.263	***	par_23
e7	.921	.100	9.249	***	par_24
e8	.748	.093	8.066	***	par_25
e9	.710	.094	7.551	***	par_26
e10	.808	.095	8.538	***	par_27
e11	.824	.096	8.547	***	par_28

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
GP4	.482
GP3	.479
GP2	.585
GP1	.535
IP5	.919
IP4	.522
IP2	.598
CP4	.489
CP3	.432
FP3	.387
FP1	.444

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	28	41.403	38	.324	1.090
Saturated model	66	.000	0		
Independence model	11	889.197	55	.000	16.167

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.050	.968	.944	.557
Saturated model	.000	1.000		
Independence model	.478	.448	.338	.374

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.953	.933	.996	.994	.996
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.691	.659	.688
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	3.403	.000	23.236
Saturated model	.000	.000	.000
Independence model	834.197	741.302	934.514

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.189	.016	.000	.106
Saturated model	.000	.000	.000	.000
Independence model	4.060	3.809	3.385	4.267

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.020	.000	.053	.928
Independence model	.263	.248	.279	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	97.403	100.650	192.425	220.425
Saturated model	132.000	139.652	355.979	421.979
Independence model	911.197	912.472	948.527	959.527

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.445	.429	.535	.460
Saturated model	.603	.603	.603	.638
Independence model	4.161	3.737	4.619	4.167

APPENDIX 5
PART G

Confirmatory Factor Analysis of Exogenous Model

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
HR	<---	CSFs of KM	1.000				
IT	<---	CSFs of KM	2.540	1.058	2.400	.016	par_4
LE	<---	CSFs of KM	2.643	1.101	2.401	.016	par_5
OL	<---	CSFs of KM	2.860	1.182	2.419	.016	par_6
OS	<---	CSFs of KM	1.243	.607	2.046	.041	par_7
OT	<---	CSFs of KM	3.482	1.393	2.499	.012	par_8
OC	<---	CSFs of KM	2.151	.907	2.372	.018	par_9
KU	<---	KMPs	1.626	.412	3.947	***	par_10
KH	<---	KMPs	.842	.271	3.104	.002	par_11
KS	<---	KMPs	1.776	.451	3.940	***	par_12
KO	<---	KMPs	.917	.315	2.912	.004	par_13
PS	<---	KMSs	1.338	.251	5.334	***	par_28
CS	<---	KMSs	1.000				
KC	<---	KMPs	1.000				
HR1	<---	HR	1.000				
HR2	<---	HR	.979	.391	2.504	.012	par_14
IT2	<---	IT	1.000				
IT5	<---	IT	.933	.146	6.383	***	par_15
LE1	<---	LE	1.000				
LE2	<---	LE	.797	.136	5.853	***	par_16
OL3	<---	OL	1.000				
OL4	<---	OL	.779	.115	6.755	***	par_17
OS1	<---	OS	1.000				
OS2	<---	OS	1.272	.296	4.303	***	par_18
OT2	<---	OT	1.000				
OT5	<---	OT	.864	.112	7.709	***	par_19
OC2	<---	OC	1.000				
OC5	<---	OC	1.029	.147	7.025	***	par_20
CS1	<---	CS	1.000				
CS2	<---	CS	.916	.144	6.343	***	par_21
PS2	<---	PS	1.000				
PS5	<---	PS	.929	.099	9.352	***	par_22
KC2	<---	KC	1.000				
KC3	<---	KC	1.026	.250	4.112	***	par_23
KO3	<---	KO	1.000				
KO4	<---	KO	.909	.217	4.199	***	par_24
KS2	<---	KS	1.000				
KS4	<---	KS	.741	.126	5.893	***	par_25
KH3	<---	KH	1.000				
KH4	<---	KH	1.164	.235	4.945	***	par_26
KU3	<---	KU	1.000				
KU4	<---	KU	1.031	.129	7.991	***	par_27

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
HR	<---	CSFs of KM	.287
IT	<---	CSFs of KM	.688
LE	<---	CSFs of KM	.591
OL	<---	CSFs of KM	.692
OS	<---	CSFs of KM	.352
OT	<---	CSFs of KM	.906
OC	<---	CSFs of KM	.561
KU	<---	KMPs	.695
KH	<---	KMPs	.463
KS	<---	KMPs	.807
KO	<---	KMPs	.377
PS	<---	KMSs	.847
CS	<---	KMSs	.814
KC	<---	KMPs	.523
HR1	<---	HR	.673
HR2	<---	HR	.706
IT2	<---	IT	.738
IT5	<---	IT	.700
LE1	<---	LE	.833
LE2	<---	LE	.668
OL3	<---	OL	.852
OL4	<---	OL	.659
OS1	<---	OS	.733
OS2	<---	OS	.888
OT2	<---	OT	.767
OT5	<---	OT	.654
OC2	<---	OC	.815
OC5	<---	OC	.807
CS1	<---	CS	.718
CS2	<---	CS	.643
PS2	<---	PS	.876
PS5	<---	PS	.777
KC2	<---	KC	.679
KC3	<---	KC	.679
KO3	<---	KO	.844
KO4	<---	KO	.745
KS2	<---	KS	.737
KS4	<---	KS	.614
KH3	<---	KH	.730
KH4	<---	KH	.840
KU3	<---	KU	.811
KU4	<---	KU	.814

Variances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
KMPs	.190	.085	2.230	.026	par_29
CSFs of KM	.057	.045	1.265	.206	par_30
KMSs	.444	.121	3.672	***	par_31
e29	.631	.272	2.316	.021	par_32
e30	.405	.113	3.594	***	par_33
e31	.737	.189	3.903	***	par_34
e32	.503	.135	3.729	***	par_35
e33	.618	.163	3.791	***	par_36
e34	.149	.098	1.531	.126	par_37
e35	.570	.118	4.821	***	par_38
e37	.314	.147	2.137	.033	par_39
e36	.227	.108	2.096	.036	par_40

	Estimate	S.E.	C.R.	P	Label
e38	.506	.162	3.131	.002	par_41
e39	.965	.270	3.581	***	par_42
e40	.322	.149	2.159	.031	par_43
e41	.494	.122	4.039	***	par_44
e42	.539	.129	4.166	***	par_45
e1	.750	.227	3.299	***	par_46
e2	.657	.118	5.560	***	par_47
e3	.642	.125	5.147	***	par_48
e4	.696	.116	6.015	***	par_49
e5	.436	.116	3.753	***	par_50
e6	.892	.140	6.357	***	par_51
e7	.430	.117	3.674	***	par_52
e8	.762	.105	7.282	***	par_53
e9	.608	.168	3.621	***	par_54
e10	.571	.161	3.555	***	par_55
e11	.584	.106	5.484	***	par_56
e12	.833	.105	7.974	***	par_57
e13	.419	.115	3.654	***	par_58
e14	.471	.123	3.844	***	par_59
e15	.628	.113	5.585	***	par_60
e16	.799	.111	7.226	***	par_61
e17	.501	.091	5.485	***	par_62
e18	.629	.104	6.031	***	par_63
e19	.816	.181	4.516	***	par_64
e20	.857	.190	4.509	***	par_65
e21	.810	.116	6.967	***	par_66
e22	.744	.225	3.304	***	par_67
e23	.777	.160	4.847	***	par_68
e24	.834	.111	7.480	***	par_69
e25	.552	.131	4.197	***	par_70
e26	.763	.227	3.369	***	par_71
e27	.543	.126	4.302	***	par_72
e28	.562	.133	4.213	***	par_73

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
KC	.273
PS	.717
CS	.662
KO	.142
KS	.651
KH	.215
KU	.483
OC	.315
OT	.821
OS	.124
OL	.479
LE	.349
IT	.474
HR	.082
KU4	.663
KU3	.658
KH4	.705
KH3	.533
KS4	.377
KS2	.543
KO4	.556

	Estimate
KO3	.712
KC3	.461
KC2	.461
PS5	.603
PS2	.767
CS2	.413
CS1	.516
OC5	.652
OC2	.665
OT5	.428
OT2	.588
OS2	.788
OS1	.537
OL4	.434
OL3	.726
LE2	.446
LE1	.694
IT5	.491
IT2	.545
HR2	.498
HR1	.453

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	73	338.952	333	.399	1.018
Saturated model	406	.000	0		
Independence model	28	2032.433	378	.000	5.377

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.079	.905	.884	.742
Saturated model	.000	1.000		
Independence model	.280	.482	.443	.449

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.833	.811	.996	.996	.996
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.881	.734	.878
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	5.952	.000	53.430
Saturated model	.000	.000	.000
Independence model	1654.433	1516.878	1799.455

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	1.548	.027	.000	.244
Saturated model	.000	.000	.000	.000
Independence model	9.281	7.554	6.926	8.217

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.009	.000	.027	1.000
Independence model	.141	.135	.147	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	484.952	507.236	732.687	805.687
Saturated model	812.000	935.937	2189.813	2595.813
Independence model	2088.433	2096.981	2183.455	2211.455

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	2.214	2.187	2.431	2.316
Saturated model	3.708	3.708	3.708	4.274
Independence model	9.536	8.908	10.198	9.575

APPENDIX 5
PART H

Confirmatory Factor Analysis of Endogenous Model

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
TI	<---	Innovation	1.000				
AI	<---	Innovation	.424	.119	3.553	***	par_6
RI	<---	Innovation	1.064	.164	6.493	***	par_7
NI	<---	Innovation	1.056	.173	6.096	***	par_8
FP	<---	OP	1.000				
GP	<---	OP	1.954	.415	4.713	***	par_17
CP	<---	OP	1.025	.264	3.886	***	par_18
IP	<---	OP	1.430	.322	4.433	***	par_19
TI1	<---	TI	1.000				
TI2	<---	TI	1.027	.124	8.308	***	par_1
AI1	<---	AI	1.000				
AI3	<---	AI	1.105	.130	8.476	***	par_2
AI5	<---	AI	1.097	.125	8.805	***	par_3
RI2	<---	RI	1.000				
RI4	<---	RI	.933	.124	7.494	***	par_4
NI2	<---	NI	1.000				
NI5	<---	NI	1.067	.127	8.403	***	par_5
FP1	<---	FP	1.000				
FP3	<---	FP	.921	.213	4.316	***	par_10
CP3	<---	CP	1.000				
CP4	<---	CP	.962	.193	4.994	***	par_11
IP2	<---	IP	1.000				
IP4	<---	IP	.910	.081	11.275	***	par_12
IP5	<---	IP	1.220	.090	13.489	***	par_13
GP1	<---	GP	1.000				
GP2	<---	GP	1.105	.106	10.429	***	par_14
GP3	<---	GP	.932	.101	9.255	***	par_15
GP4	<---	GP	.943	.101	9.330	***	par_16

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
TI	<---	Innovation	.739
AI	<---	Innovation	.338
RI	<---	Innovation	.805
NI	<---	Innovation	.810
FP	<---	OP	.544
GP	<---	OP	.934
CP	<---	OP	.578
IP	<---	OP	.675
TI1	<---	TI	.760
TI2	<---	TI	.798
AI1	<---	AI	.734
AI3	<---	AI	.752
AI5	<---	AI	.731
RI2	<---	RI	.792
RI4	<---	RI	.668

			Estimate
NI2	<---	NI	.729
NI5	<---	NI	.789
FP1	<---	FP	.661
FP3	<---	FP	.627
CP3	<---	CP	.711
CP4	<---	CP	.647
IP2	<---	IP	.775
IP4	<---	IP	.722
IP5	<---	IP	.957
GP1	<---	GP	.726
GP2	<---	GP	.778
GP3	<---	GP	.689
GP4	<---	GP	.688

Variances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
Innovation	.456	.115	3.957	***	par_20
OP	.194	.078	2.492	.013	par_21
e21	.379	.093	4.083	***	par_22
e22	.636	.123	5.173	***	par_23
e23	.281	.098	2.870	.004	par_24
e24	.266	.082	3.241	.001	par_25
e25	.461	.149	3.105	.002	par_26
e26	.405	.119	3.410	***	par_27
e27	.474	.082	5.807	***	par_28
e28	.108	.068	1.591	.112	par_29
e1	.610	.103	5.905	***	par_30
e2	.501	.102	4.916	***	par_31
e3	.616	.090	6.867	***	par_32
e4	.674	.108	6.251	***	par_33
e5	.753	.110	6.868	***	par_34
e6	.474	.101	4.696	***	par_35
e7	.859	.114	7.566	***	par_36
e8	.684	.101	6.793	***	par_37
e9	.535	.101	5.294	***	par_38
e10	.844	.167	5.052	***	par_39
e11	.857	.149	5.764	***	par_40
e12	.596	.128	4.655	***	par_41
e13	.784	.130	6.032	***	par_42
e14	.577	.070	8.200	***	par_43
e15	.659	.071	9.271	***	par_44
e16	.599	.129	4.633	***	par_45
e17	.762	.090	8.437	***	par_46
e18	.674	.088	7.653	***	par_47
e19	.816	.093	8.810	***	par_48
e20	.837	.095	8.808	***	par_49

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
GP	.872
IP	.455
CP	.334
FP	.296
NI	.657
RI	.648
AI	.114
TI	.546
GP4	.474
GP3	.474
GP2	.605
GP1	.526
IP5	.916
IP4	.522
IP2	.601
CP4	.418
CP3	.505
FP3	.393
FP1	.437
NI5	.622
NI2	.531
RI4	.447
RI2	.627
AI5	.534
AI3	.565
AI1	.538
TI2	.637
TI1	.578

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	49	170.774	161	.284	1.061
Saturated model	210	.000	0		
Independence model	20	1700.961	190	.000	8.952

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.073	.931	.909	.713
Saturated model	.000	1.000		
Independence model	.408	.383	.318	.346

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.900	.882	.994	.992	.994
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.847	.762	.842
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	9.774	.000	45.279
Saturated model	.000	.000	.000
Independence model	1510.961	1382.795	1646.549

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.780	.045	.000	.207
Saturated model	.000	.000	.000	.000
Independence model	7.767	6.899	6.314	7.518

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.017	.000	.036	1.000
Independence model	.191	.182	.199	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	268.774	279.168	435.062	484.062
Saturated model	420.000	464.545	1132.662	1342.662
Independence model	1740.961	1745.204	1808.834	1828.834

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	1.227	1.183	1.389	1.275
Saturated model	1.918	1.918	1.918	2.121
Independence model	7.950	7.364	8.569	7.969

APPENDIX 5
PART I

Confirmatory Factor Analysis of Final Structural Model

Maximum Likelihood Estimate

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Innovation	<---	KMSs	1.158	.459	2.525	.012	par_34
Innovation	<---	KMPs	.315	.154	2.049	.041	par_35
Innovation	<---	CSFs of KM	1.169	.212	5.504	***	par_36
OP	<---	Innovation	.624	.146	4.276	***	par_30
OP	<---	KMPs	.088	.105	.840	.401	par_31
OP	<---	KMSs	.332	.163	2.031	.042	par_32
OP	<---	CSFs of KM	1.448	.618	2.343	.019	par_33
LE	<---	CSFs of KM	2.699	1.023	2.638	.008	par_19
PS	<---	KMSs	1.183	.180	6.571	***	par_20
CS	<---	KMSs	1.000				
KC	<---	KMPs	1.000				
TI	<---	Innovation	1.000				
NI	<---	Innovation	1.053	.170	6.197	***	par_24
RI	<---	Innovation	1.053	.160	6.586	***	par_25
AI	<---	Innovation	.284	.133	2.129	.033	par_26
KH	<---	KMPs	.826	.259	3.191	.001	par_27
KS	<---	KMPs	1.779	.434	4.101	***	par_28
KO	<---	KMPs	.957	.309	3.095	.002	par_29
OC	<---	CSFs of KM	2.035	.790	2.577	.010	par_37
OT	<---	CSFs of KM	3.033	1.122	2.703	.007	par_38
OS	<---	CSFs of KM	1.179	.537	2.197	.028	par_39
OL	<---	CSFs of KM	2.482	.951	2.609	.009	par_40
IT	<---	CSFs of KM	2.413	.923	2.615	.009	par_41
KU	<---	KMPs	1.535	.380	4.036	***	par_42
HR	<---	CSFs of KM	1.000				
GP	<---	OP	1.000				
FP	<---	OP	.524	.104	5.054	***	par_48
CP	<---	OP	.469	.094	4.977	***	par_49
IP	<---	OP	.771	.103	7.474	***	par_50
HR1	<---	HR	1.000				
HR2	<---	HR	1.018	.366	2.778	.005	par_1
IT2	<---	IT	1.000				
IT5	<---	IT	.876	.137	6.374	***	par_2
LE1	<---	LE	1.000				
LE2	<---	LE	.729	.121	6.040	***	par_3
OL3	<---	OL	1.000				
OL4	<---	OL	.838	.124	6.741	***	par_4
OS1	<---	OS	1.000				
OS2	<---	OS	1.312	.293	4.481	***	par_5
OT2	<---	OT	1.000				
OT5	<---	OT	.891	.116	7.665	***	par_6
OC2	<---	OC	1.000				
OC5	<---	OC	1.017	.141	7.220	***	par_7
PS2	<---	PS	1.000				
PS5	<---	PS	.972	.099	9.781	***	par_8
CS1	<---	CS	1.000				
CS2	<---	CS	1.053	.151	6.962	***	par_9

			Estimate	S.E.	C.R.	P	Label
KC2	<---	KC	1.000				
KC3	<---	KC	1.003	.238	4.216	***	par_10
KO3	<---	KO	1.000				
KO4	<---	KO	.940	.204	4.613	***	par_11
KS2	<---	KS	1.000				
KS4	<---	KS	.736	.120	6.147	***	par_12
KH3	<---	KH	1.000				
KH4	<---	KH	1.152	.231	4.994	***	par_13
KU3	<---	KU	1.000				
KU4	<---	KU	1.054	.133	7.929	***	par_14
TI1	<---	TI	1.000				
TI2	<---	TI	1.011	.120	8.398	***	par_15
AI1	<---	AI	1.000				
AI5	<---	AI	1.610	.615	2.618	.009	par_16
RI2	<---	RI	1.000				
RI4	<---	RI	.894	.123	7.261	***	par_17
NI2	<---	NI	1.000				
NI5	<---	NI	1.052	.124	8.476	***	par_18
FP1	<---	FP	1.000				
FP3	<---	FP	.961	.204	4.720	***	par_43
CP3	<---	CP	1.000				
CP4	<---	CP	.896	.201	4.470	***	par_44
IP2	<---	IP	1.000				
IP4	<---	IP	.745	.108	6.870	***	par_45
GP1	<---	GP	1.000				
GP2	<---	GP	1.100	.103	10.710	***	par_46
GP4	<---	GP	.891	.097	9.217	***	par_47

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Innovation	<---	KMSs	.371
Innovation	<---	KMPs	.264
Innovation	<---	CSFs of KM	.522
OP	<---	Innovation	.681
OP	<---	KMPs	.123
OP	<---	KMSs	.221
OP	<---	CSFs of KM	.329
LE	<---	CSFs of KM	.624
PS	<---	KMSs	.780
CS	<---	KMSs	.889
KC	<---	KMPs	.523
TI	<---	Innovation	.743
NI	<---	Innovation	.814
RI	<---	Innovation	.790
AI	<---	Innovation	.273
KH	<---	KMPs	.457
KS	<---	KMPs	.815
KO	<---	KMPs	.405
OC	<---	CSFs of KM	.570
OT	<---	CSFs of KM	.867
OS	<---	CSFs of KM	.366
OL	<---	CSFs of KM	.674
IT	<---	CSFs of KM	.685
KU	<---	KMPs	.671
HR	<---	CSFs of KM	.316
GP	<---	OP	.928
FP	<---	OP	.578

			Estimate
CP	<---	OP	.507
IP	<---	OP	.653
HR1	<---	HR	.660
HR2	<---	HR	.720
IT2	<---	IT	.762
IT5	<---	IT	.678
LE1	<---	LE	.871
LE2	<---	LE	.639
OL3	<---	OL	.822
OL4	<---	OL	.684
OS1	<---	OS	.722
OS2	<---	OS	.902
OT2	<---	OT	.755
OT5	<---	OT	.664
OC2	<---	OC	.820
OC5	<---	OC	.802
CS1	<---	CS	.670
CS2	<---	CS	.689
PS2	<---	PS	.856
PS5	<---	PS	.794
KC2	<---	KC	.687
KC3	<---	KC	.671
KO3	<---	KO	.830
KO4	<---	KO	.758
KS2	<---	KS	.739
KS4	<---	KS	.612
KH3	<---	KH	.734
KH4	<---	KH	.836
KU3	<---	KU	.802
KU4	<---	KU	.823
TI1	<---	TI	.766
TI2	<---	TI	.792
AI1	<---	AI	.616
AI5	<---	AI	.900
RI2	<---	RI	.809
RI4	<---	RI	.654
NI2	<---	NI	.734
NI5	<---	NI	.783
FP1	<---	FP	.647
FP3	<---	FP	.641
CP3	<---	CP	.736
CP4	<---	CP	.624
IP2	<---	IP	.859
IP4	<---	IP	.655
GP1	<---	GP	.742
GP2	<---	GP	.793
GP4	<---	GP	.665

Variances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
CSFs of KM	.432	.111	3.881	***	par_51
KMSs	.460	.116	3.983	***	par_52
KMPs	.195	.084	2.305	.021	par_53
R01	.524	.106	4.970	***	par_54
R02	.876	.151	5.816	***	par_55
e46	.595	.235	2.527	.012	par_56
e47	.435	.121	3.588	***	par_57

	Estimate	S.E.	C.R.	P	Label
e48	.757	.196	3.869	***	par_58
e49	.490	.125	3.931	***	par_59
e50	.592	.151	3.911	***	par_60
e51	.201	.095	2.120	.034	par_61
e52	.568	.117	4.862	***	par_62
e54	.415	.110	3.759	***	par_63
e53	.123	.077	1.590	.112	par_64
e55	.518	.163	3.187	.001	par_65
e56	.910	.238	3.830	***	par_66
e57	.312	.143	2.186	.029	par_67
e58	.503	.124	4.066	***	par_68
e59	.561	.126	4.460	***	par_69
e60	.380	.093	4.062	***	par_70
e61	.468	.189	2.478	.013	par_71
e62	.313	.106	2.957	.003	par_72
e63	.265	.082	3.217	.001	par_73
e64	.418	.130	3.211	.001	par_74
e65	.486	.145	3.355	***	par_75
e66	.612	.146	4.183	***	par_76
e67	.123	.064	1.919	.055	par_77
e1	.857	.247	3.464	***	par_78
e2	.903	.172	5.257	***	par_79
e3	.592	.129	4.601	***	par_80
e4	.737	.113	6.516	***	par_81
e5	.455	.072	6.336	***	par_82
e6	.953	.133	7.194	***	par_83
e7	.431	.124	3.469	***	par_84
e8	.718	.107	6.696	***	par_85
e9	.630	.158	3.988	***	par_86
e10	.455	.072	6.336	***	par_87
e11	.609	.107	5.719	***	par_88
e12	.814	.105	7.734	***	par_89
e13	.409	.112	3.639	***	par_90
e14	.482	.118	4.079	***	par_91
e15	.715	.101	7.092	***	par_92
e16	.715	.107	6.685	***	par_93
e17	.385	.096	3.988	***	par_94
e18	.585	.101	5.785	***	par_95
e19	.799	.179	4.457	***	par_96
e20	.874	.183	4.769	***	par_97
e21	.567	.158	3.580	***	par_98
e22	.712	.211	3.375	***	par_99
e23	.771	.154	4.992	***	par_100
e24	.837	.109	7.709	***	par_101
e25	.545	.131	4.156	***	par_102
e26	.587	.136	4.325	***	par_103
e27	.566	.126	4.496	***	par_104
e28	.538	.136	3.948	***	par_105
e29	.597	.103	5.807	***	par_106
e30	.515	.100	5.139	***	par_107
e31	.828	.205	4.048	***	par_108
e32	.444	.128	3.470	***	par_109
e33	.439	.106	4.141	***	par_110
e34	.889	.115	7.720	***	par_111
e35	.673	.100	6.715	***	par_112
e36	.547	.100	5.483	***	par_113
e37	.871	.152	5.727	***	par_114

	Estimate	S.E.	C.R.	P	Label
e38	.833	.142	5.865	***	par_115
e39	.552	.148	3.717	***	par_116
e40	.823	.136	6.030	***	par_117
e41	.502	.092	5.449	***	par_118
e42	.787	.105	7.460	***	par_119
e43	.723	.088	8.188	***	par_120
e44	.635	.087	7.313	***	par_121
e45	.886	.099	8.990	***	par_122

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
Innovation	.721
OP	.844
GP	.861
IP	.426
CP	.257
FP	.334
NI	.663
RI	.624
AI	.075
TI	.552
KU	.450
KH	.209
KS	.664
KO	.164
KC	.273
CS	.790
PS	.608
OC	.325
OT	.751
OS	.134
OL	.454
LE	.389
IT	.469
HR	.100
GP4	.443
GP2	.628
GP1	.551
IP4	.429
IP2	.738
CP4	.390
CP3	.542
FP3	.411
FP1	.419
NI5	.613
NI2	.538
RI4	.428
RI2	.655
AI5	.810
AI1	.379
TI2	.627
TI1	.587
KU4	.678
KU3	.643
KH4	.698
KH3	.538
KS4	.375

	Estimate
KS2	.546
KO4	.575
KO3	.688
KC3	.451
KC2	.471
PS5	.631
PS2	.733
CS2	.475
CS1	.449
OC5	.643
OC2	.673
OT5	.441
OT2	.571
OS2	.813
OS1	.521
OL4	.467
OL3	.675
LE2	.408
LE1	.759
IT5	.460
IT2	.581
HR2	.518
HR1	.435

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	122	926.711	913	.369	1.015
Saturated model	1035	.000	0		
Independence model	45	3807.795	990	.000	3.846

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.008	.903	.890	.797
Saturated model	.000	1.000		
Independence model	1.209	.027	.017	.026

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.757	.736	.995	.995	.995
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.922	.698	.918
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	13.711	.000	89.318
Saturated model	.000	.000	.000
Independence model	2817.795	2632.118	3010.936

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	4.232	.063	.000	.408
Saturated model	.000	.000	.000	.000
Independence model	17.387	12.867	12.019	13.749

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.008	.000	.021	1.000
Independence model	.114	.110	.118	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	1170.711	1235.590	1584.734	1706.734
Saturated model	2070.000	2620.405	5582.405	6617.405
Independence model	3897.795	3921.726	4050.508	4095.508

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	5.346	5.283	5.691	5.642
Saturated model	9.452	9.452	9.452	11.965
Independence model	17.798	16.950	18.680	17.907