Mediating effects in Reverse Knowledge Transfer Processes: The Case of Knowledge-Intensive Services in the U.K.

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Zhaleh Najafi Tavani

Manchester Business School

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ABSTRACT

The University of Manchester
Zhaleh Najafi Tavani
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Recent contributions highlight the importance of international knowledge transfer as a fundamental source of competitive advantage of MNCs. Due to the traditional assumption that parent firms are the prime source of knowledge, majority of studies have focused on knowledge transfer from headquarters to subsidiaries. However, the role of subsidiaries within MNCs has changed dramatically; many subsidiaries have gained a creative role by generating new resources depending on the comparative advantage of the location in which they operate, and through the process of reverse knowledge transfer, they subsequently contribute to the competence upgrading of the MNC. In reviewing the extant literature on MNC knowledge transfer and in particular reverse knowledge transfer, this research unleashes several gaps, notably in the understanding of factor affecting subsidiary knowledge development and reverse knowledge transfer within the service sector.

Borrowing concepts from the knowledge-based and network views, a series of hypotheses were tested using the result of a web-based survey of the subsidiaries that were located in the UK, had a non-UK parent firm, and were active in the KIBS sector. Responses from 187 general managers, managing directors, or chief executives of subsidiaries confirm that those subsidiaries that develop and maintain business relationships with their internal (sister subsidiaries and headquarters) and external actors (customers, universities, suppliers, competitors) and have high level of autonomy are more capable of developing knowledge.

With regards to determinants of reverse knowledge transfer, while subsidiary characteristics (knowledge development and willingness) and relationship characteristics (socialization mechanisms) are emerged as the main facilitators of reverse knowledge transfer, knowledge characteristics (tacitness and complexity) appeared as the main hindrances of this phenomenon. Moreover, the results indicate that, (a) socialisation mechanisms augment the extent of shared values and subsidiary-parent firm embeddedness and (b) willingness mediates the impacts of shared values and subsidiary-parent firm embeddedness on reverse knowledge transfer.

The key contributions of this research are two-fold: firstly, it examines the process of reverse knowledge transfer and knowledge development exclusively within the KIBS sector. Secondly, it investigates the joint impacts of relationship characteristics, knowledge characteristics, and subsidiary (sender) characteristics on reverse knowledge transfer.

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To my husband

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Part I

INTRODUCTION AND LITERATURE REVIEW

CHAPTER 1

INTRODUCTION

1.1. Introduction

This chapter is organised as follow: it begins by reviewing the existing literature and explaining the current limitations. Research questions and aims are illustrated next. Then, the research contributions are demonstrated. Research methodology and the outline of the thesis are presented in turn in the last two sections.

1.2. Research Problems

Over the last two decades, there has been a major transformation in the source of firms' competitive advantages. Previously, capital was assumed to be the main source of firms' competitiveness. However, recent studies show that the most successful firms are the ones with superior capability in knowledge management (Nonaka and Takeuchi, 1995, Verbeke, 2010). Inter-organisational knowledge transfer is recognised as one of the most challenging and vital aspects of international knowledge management (Bresman et al., 2010, Schleimer and Riege, 2009). It is argued that compared to other types of knowledge transfer (i.e. knowledge transfer between two companies in the same country), cross-border knowledge transfer is more difficult, due to differences in language and culture (Bresman et al., 2010). Moreover, knowledge transfer is a complex task since knowledge resides in *particular ways of thinking and acting* and it is not generated and possessed only by individuals (McDermott, 1999, Kostova, 1999).

Consequently, many researchers have attempted to understand cross-border knowledge transfer from different perspectives (Bresman et al., 1999, Teece, 1977, Szulanski, 1996). One line of research has focused on the characteristics of the receiver (i.e. Zhao and Anand, 2009, Chen, 2004, Zahra and George, 2002, Minbaeva et al., 2003). In this regard, the importance of absorptive capacity in

knowledge transfer has been consistently highlighted by previous studies (Zhao and Anand, 2009, Lane et al., 2001). Another line of research investigates the association between knowledge transfer and the characteristics of the sender-receiver relationship (i.e. Bresman et al., 2010, Dhanaraj et al., 2004). Bresman et al. (2010), for example, illustrate that communication significantly impacts on knowledge transfer. Szulanski (1996), on the other hand, demonstrates that "arduous relationships" negatively influence international knowledge transfer. In addition to characteristics of the receiver and relationship, the extant literature also highlights the importance of the sender characteristics in the success of knowledge transfer (Szulanski, 1996). In this regard, some scholars underline the importance of motivation of the sender to share its knowledge (i.e. Simonin, 1999b) and others focus on the knowledge stock (i.e. Gupta and Govindarajan, 2000, Minbaeva, 2007) or innovativeness of the sender (i.e. Håkanson and Nobel, 2001). Finally, one of the main focuses of the contemporary research has been on the relationship between knowledge characteristics and cross-border knowledge transfer (i.e. Bresman et al., 2010, Simonin, 2004). Simonin (1999a), for instance, shows that tacitness and complexity would result in ambiguity and therefore these factors indirectly hinder the knowledge transfer process.

Traditionally, it was assumed that within the context of MNC, the only entity capable of developing new knowledge is the parent firm. According to this view, subsidiaries were only capable of using and applying parent firm's knowledge (Almeida and Anupama, 2004). However, this view has changed. The existing contributions on MNCs show that in addition to headquarters, other parts of the corporation increasingly engage in generating and transferring knowledge (Birkinshaw and Hood, 1998, Bartlett and Ghoshal, 1989). Foreign subsidiaries have access to new and unique sources of knowledge and ideas (originating from their local market) which could be used in other contexts; thus cross-border knowledge transfer is considerably crucial for the success of MNCs (Bartlett and Ghoshal, 1989). Doz and Santos (1997, P. 4) argue that, "*Leveraging internationally the know-how advantages derived from a home country competence cluster is no longer sufficient to underpin competitive advantage unless the home base remains the only crucible of new technologies, competencies and leading customers*".

Foreign subsidiaries are no longer considered simply a means of accessing markets or cheap labour, but they are also considered a sources of new knowledge (Dunning, 1994). They are increasingly involved in developing new knowledge and contributing to the existing knowledge of the MNC. However, while a large number of existing studies provide insight into understanding the process of knowledge transfer (Lyles and Salk, 1996, Minbaeva, 2007, Simonin, 1999b), there seems comparably scarce research examining subsidiary knowledge transfer (i.e. Gupta and Govindarajan, 2000, Noorderhaven and Harzing, 2009, Yamin, 1999). Therefore there remains ambiguity as to factors facilitating or hindering the process of reverse knowledge transfer. For example, the majority of the contributions on subsidiary knowledge transfer are based on the knowledge based view (KBV) (except Schulz, 2001, Håkanson and Nobel, 2001, Mu et al., 2007). This perspective assumes that knowledge is already residing within the firm's boundaries. As a result, these studies overlook the importance of a subsidiary's relationships with its local environment.

Furthermore, while internal and external linkages are the main source of subsidiary's competitiveness (Frost, 2001), majority of the existing studies focus only on one of these networks and thus underestimate the implications of the other one on reverse knowledge transfer. Therefore, this research simultaneously investigates the interrelationships between the characteristics of these networks and subsidiary knowledge transfer. In addition, although there exists a broad consensus on the fundamental role of willingness in subsidiary knowledge transfer (Szulanski, 1995, Simonin, 1999a), few studies have explored the association between them (Gupta and Govindarajan, 2000). According to Dyer and Singh (1998), willingness is one of the main predictors of knowledge transfer since the knowledge holder should have enough motivation to allocate time and resources related to knowledge sharing activities. Therefore, it is worth while not only to investigate the association between willingness and reverse knowledge transfer but also to check whether willingness mediates the impact of other factors on subsidiary knowledge transfer. Moreover, there are some valuable contributions investigating how different knowledge characteristics (e.g. complexity, desirability, ambiguity, tacitness, etc.) hinder or facilitate traditional knowledge transfer (i.e. Simonin, 2004, Szulanski, 1996, Zander and Kogut, 1995). However,

from reviewing the literature, it transpires that few studies have investigated the relationship between subsidiaries' knowledge transfer and the characteristics of knowledge (Håkanson and Nobel, 2000, Yang et al., 2008). As a result, the relationship between knowledge characteristics and reverse knowledge transfer remains relatively unexplored and thus requires further investigation.

One of the other limitations of the pertinent literature on international knowledge transfer and innovation is that despite the dramatic increase of FDI in services, the focus of the contemporary studies has been mainly on the manufacturing sector (e.g. Gupta and Govindarajan, 2000, Noorderhaven and Harzing, 2009, Håkanson and Nobel, 2000, Håkanson and Nobel, 2001). The reasons behind this ignorance are:

- Overstressing technical innovation and thus the focus is limited to manufacturing sectors (e.g. Lynskey, 2004, Becker and Dietz, 2004).

- Deficiency in appropriate firm-level micro data and conceptual problems (Koch and Strotmann, 2008).

- Traditional perception about services as *innovative laggards* and intensive users of technology and knowledge developed by manufacturing firms (Windrum and Tomlinson, 1999, Corrocher et al., 2009).

However, the findings of the previous studies show that there are major differences between service and manufacturing sectors. For instance, according to Yamin (1999), unlike subsidiaries of manufacturing sector, subsidiaries of service sector are more dependent on local knowledge than internal sources of knowledge (headquarters and sister subsidiaries) for developing knowledge. Contrary to manufacturing companies, patents are seldom used in services as a means of knowledge transfer (except software companies) (Grosse, 1996, Doloreux et al., 2008). Services are mainly intangible and thus tacit in nature; however, products are tangible and encompass highly codified knowledge (Koch and Strotmann, 2008). It means that, in contrast to the services, reverse engineering of products is considerably easier. Therefore, being innovative and pioneer are the keys to the success of manufacturing industry. However, within the context of service

industries, those MNCs are successful that are capable of not only developing new knowledge but also applying such knowledge globally (Moore and Birkinshaw, 1998). Drawing to the aforementioned arguments it could be concluded that the findings of previous contributions on international knowledge transfer are not generalisable across the service sector (Grosse, 1996). Consequently, this research focuses on subsidiary knowledge transfer within the context of Knowledge Intensive Business Services (KIBS). KIBS sector is one of the fastest growing in developed countries (Koch and Strotmann, 2008). Given that the main tasks of KIBS firms are developing and transferring knowledge (Miles, 2005, p. 40), these companies provide a very good platform for this study.

1.3. Research Questions

Based on the outlined gaps, this research tries to contribute to the literature on cross-border knowledge transfer by addressing the following questions:

1. What are the conditions under which subsidiaries develop knowledge?

2. Do subsidiaries engage in knowledge transfer?

    2.1. If they do, What Kind of knowledge is transferred?

    2.2. If they do, what factors influence knowledge transfer from a subsidiary to its parent company?

        2.2.1. To what extent do the characteristics of the subsidiary impact on the Reverse Knowledge Transfer?

        2.2.2. To what extent do the characteristics of knowledge impact on the Reverse Knowledge Transfer?

        2.2.3. To what extent do the characteristics of the relationship between subsidiary and parent company impact on the Reverse Knowledge Transfer?

1.4. Research context

In this research, MNCs are considered as a bundle of knowledge that can improve and sustain their competitive advantages only through transferring, integrating and combining knowledge residing in different parts of the corporation. Following the network view of the firm, the subsidiary's relationships (both internal and external relations) are considered as knowledge gathering devices that are not only necessary for the success of reverse knowledge transfer but also facilitate the subsidiary's knowledge development. Drawing on the KBV of the firm, it is assumed that knowledge is the most important resource of a firm and some firms are more successful than others since they are more capable of managing knowledge. Following the resource-based view (RBV), resources that are hard to be learned, imitated, substituted and observed are the main source of competitive advantages. Therefore this study assumes that amongst different types of knowledge, tacit and complex knowledge are the most valuable resources of the firm.

1.5. Research Aims

The aims of this study are as follows:

1. Investigating further the process of reverse knowledge transfer. Particularly, this research intends firstly to identify antecedents of subsidiary knowledge transfer from an in-depth review of the extant literature and secondly to examine the joint impact of these factors on reverse knowledge transfer within the context of the KIBS sector.

2. Identifying the facilitators of subsidiary knowledge development within the context of the KIBS sector. The aim is to investigate to what extent the characteristics of a subsidiary's network (internal and external) along with its organisational structures predict the extent of knowledge development.

1.6. Research Contributions

This research contributes to the pertinent literature by:

- Exploring the impact of knowledge characteristics on subsidiary knowledge transfer. The majority of studies on subsidiary knowledge transfer investigate the impacts of intra-firm relationships and sender or receiver characteristics on reverse knowledge transfer. In addition, the findings of prior studies on the relationship between traditional knowledge transfer and knowledge characteristics are not consistent. While some researchers demonstrate that tacitness and complexity significantly hinder international knowledge transfer, others find no significant association between these factors. Consequently, this research adds to the existing literature by investigating how tacitness and complexity affect reverse knowledge transfer.

- Providing a comprehensive taxonomy of reverse knowledge transfer facilitators and barriers. In other words, this research simultaneously investigates the impact of characteristics of knowledge, relationship and sender on subsidiary knowledge transfer. The extant literature already investigates the impacts of each of these determinants on either traditional or reverse knowledge transfer. However, investigating the joint impact of these determinants enable this research not only to identify the key predictor of reverse knowledge transfer but also to determine whether any of these factors outperform the impacts of other determinants.

- Investigating both subsidiary knowledge development and knowledge transfer within the context of the Knowledge Intensive Business Service sector. Prior studies mainly focus on knowledge transfer and knowledge development within the manufacturing sector. Therefore, this research contributes to the literature by identifying facilitators and impediments of subsidiary knowledge development and transfer within the KIBS sector.

1.7. Research Methodology

In developing the research model, firstly the main antecedents of reverse knowledge transfer and knowledge development were identified through an in-depth review of the literature. Those factors consistently highlighted by the extant literature were selected. Secondly, the determinants of reverse knowledge transfer were categorised into three main groups, namely the characteristics of the subsidiary, the characteristics of the relationship between sender and receiver and the characteristics of knowledge (see Chapter 2).

This research employed a quantitative approach to test the theoretical framework. The measures of the constructs were developed based on an in-depth review of the previous studies (see Chapter 3). The questionnaire was developed and implemented based on the 'tailored design method' approach (Dillman, 2000). This research focuses on the KIBS sector and the population for the study includes subsidiaries in the UK with a non-UK parent company. In total 11,900 companies were compiled from the FAME data base wherein only 10484 fit with the research criteria. In order to enhance the response rate and willingness of managers to take part in the study, the top 3000 subsidiaries (in terms of turnover) were called, but a final list of managers was limited to just over 500. The link to the online questionnaire were emailed for 523 managing directors, general managers, and chief executives however, 209 managers took part in the research representing a very high response rate of 39%. The data were collected through a web-based survey and analysed by Structural Equation Modelling (SEM), using LISREL 8 (see Chapter 4).

1.8. Outline of Thesis

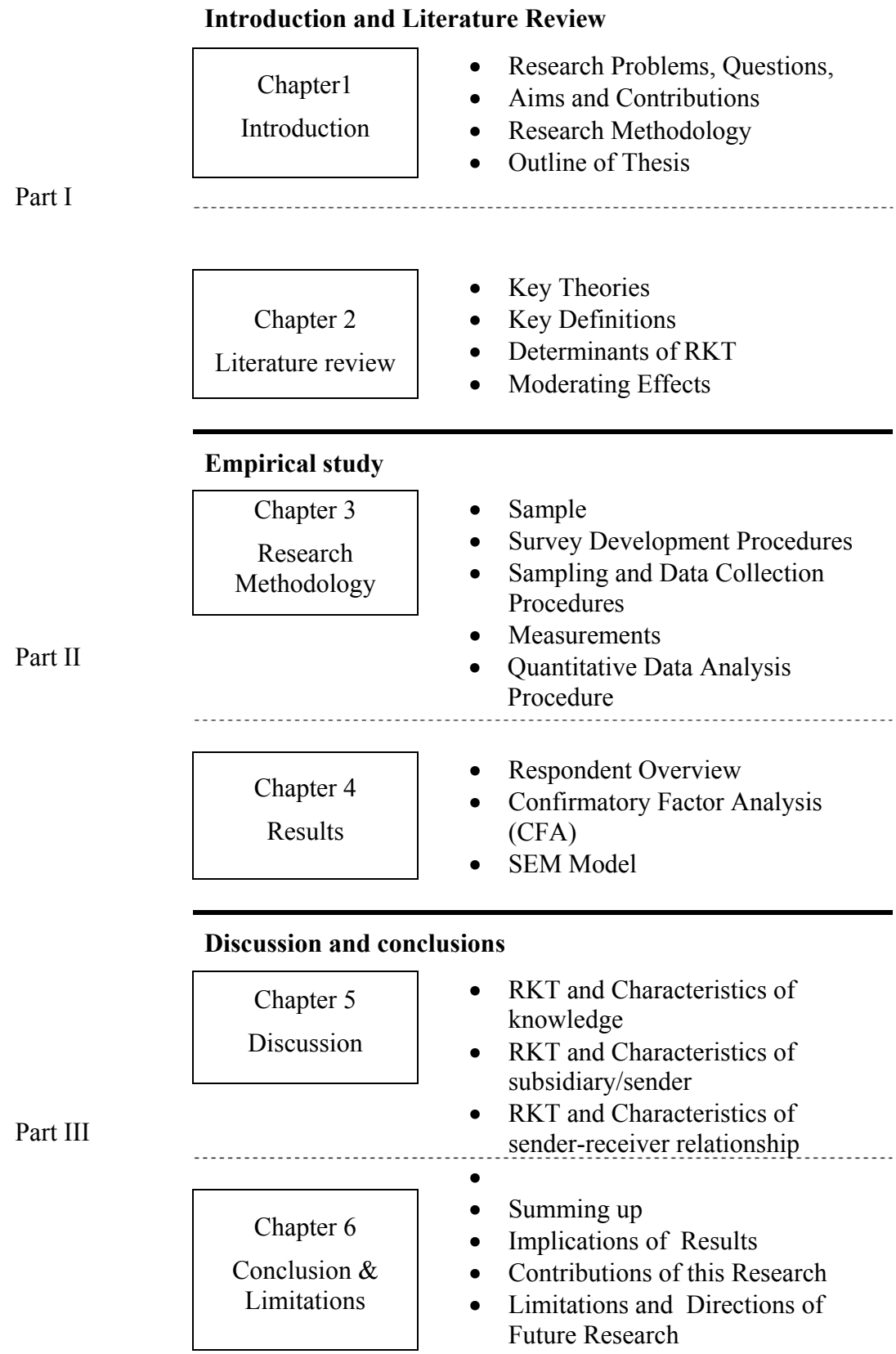
This research contains three main parts. Part I includes two chapters: Chapters 1 and 2. Chapter 1 presents limitations of the literature, research aims, research questions and contributions of the study. Chapter 2 begins with some explanations on the key theories and definitions based on which this research is developed. The theoretical framework and related hypotheses are developed afterwards, wherein the relationship between reverse knowledge transfer and its three determinants

(characteristics of the knowledge, characteristics of the relationship between sender and receiver, and the characteristics of the sender) are discussed thoroughly.

Part II contains the empirical part of the research. Chapter 3 presents some information regarding the research sample (industry, location, etc.). It also provides some explanation on (a) how the questionnaire was developed, (b) how the data were collected, (c) what measures were used for each construct, and (d) what statistical method was used for data analysis. Chapter 4 presents the results of the data analysis. It begins by illustrating the characteristics of the companies that participated in this study. Subsequently, the results of Confirmatory Factor Analysis are presented, together with the details of measurements' purification and construct validity. Chapter 4 finishes with the results of Structural Equation Modelling and group comparison.

Finally, Part III is related to the discussions and conclusions. In Chapter 5, the results of the SEM model and group analysis are discussed comprehensively. This chapter contains three main sections: characteristics of subsidiary/sender, characteristics of knowledge and characteristics of the sender-receiver relationships, in which the results related to each hypothesis are discussed further. The final chapter contains four sections. Section 6.2 provides the answer to the questions developed in the first chapter; Section 6.3 is related to the research implications for both subsidiaries and parents' firm. Contributions of the research are presented in Section 6.4 and the chapter ends by introducing the research limitations and directions for future studies.

Figure 1.1: Outline of thesis



CHAPTER 2

LITERATURE REVIEW

2.1. Introduction

This chapter begins by presenting the key theories which have been the basis for studies on international knowledge transfer and knowledge creations. The key theories in the field of cross-border knowledge transfer include three views of the firm: a) resource-based, b) knowledge-based and c) network. This chapter then provides some key definitions on knowledge, knowledge transfer, Reverse Knowledge Transfer and the KIBS sector.

Section 2.4 introduces the main determinants of reverse knowledge transfer, consisting of the impacts of knowledge characteristics, relationship characteristics, and subsidiary characteristics. Drawing on the extant literature, the impacts of all of these categories and also subcategories on subsidiary knowledge outflow will be extensively investigated. The final section presents the conceptual framework, related hypotheses and moderating effects.

2.2. Key Theories

2.2.1. Resource-Based View

The resource-based view (RBV) lays emphasis on the relationship between capabilities and strategic resources on the one hand and the firm's competitive advantages on the other (Barney, 1991, Grant, 1991). According to this perspective, each firm encompasses a different combination of tangible (property-based) and intangible (knowledge-based) capabilities and resources (Easterby-Smith and Prieto, 2008). As a result of these differences, firms differ from each other in competitive advantages and performance (Reed and DeFillippi, 1990, Barney, 1991, Amit and Schoemaker, 1993).

Generally, RBV is built on three assumptions: 1) not all resources can be completely transferred within firms, 2) the strategic importance of firms' resources are varied (Barney, 1991) and 3) firms' strategic resources are limited. Therefore, following the RBV, rare, inimitable, valuable and non-substitutable resources are the primary source of the firm's competitive advantage (Barney, 1991, Easterby-Smith and Prieto, 2008, Dunning and Lundan, 2008). Similarly, Pringle and Kroll (1997) argue that within the hierarchy of strategically important resources, those not applied by other competitors and which cannot be fully duplicated are ranked as the most important resources of the firm. Moreover, Peteraf (1993) argues that firms acquire superior profits or rents through possessing strategic resources rather than managerial resources, since the former are rare, valuable, inimitable and non-substitutable (Barney, 1991).

Within various resources of the firm, knowledge is ranked as one of the most important (Grant, 1996, Hansen, 1999). Focusing only on firms' capabilities is considered one of the limitations of the RBV. According to some scholars (Afuah, 2000, Uzzi, 1997, Granovetter, 1983), competitive advantages may originate from capabilities or resources residing in the network of inter-firm relations.

2.2.2. Knowledge-Based View

One of the main streams of research having tried to explain why MNCs exist is the knowledge-based view (KBV). According to this view, knowledge is the most strategically important resource of the firm, and the view is usually seen as an extension of the RBV (Grant, 1996, Kogut and Zander, 1992). The focus of the KBV is on the firm's stock of knowledge, on different typologies of knowledge and on identifying the best way of managing knowledge (Easterby-Smith and Prieto, 2008). According to the KBV, companies play a central role in the creation, assimilation and transfer of knowledge by providing a required social context (Kogut and Zander, 1992, Kogut and Zander, 1996). Kogut and Zander (1992, P. 383) even argue that firms exist due to their ability to transfer knowledge:

"…..*what firms do better than markets is the sharing and transfer of the knowledge of the individuals and groups within an organisation ... What is*

central to our argument is that knowledge is held by individuals, but is also expressed in regularities by which members cooperate in a social community"

Moreover, advocates of the KBV consider MNCs as networks of organisations which can create and sustain competitive advantages by using their ability to integrate and combine knowledge (Kogut and Zander, 1993, Grant, 1996, Almeida et al., 2002) or as "*a social community specializing in the speed and transfer of knowledge"* (Kogut and Zander, 1996, P. 503). In contrast to tangible resources, knowledge-based resources (intangible) are usually complex and hard to imitate, thus these resources may improve the competitive edge of firms in the long term (Alavi and Leinder, 2001).

Knowledge is the most important resource of the firm and the competitive advantage of the firm relies on acquiring and employing that knowledge (Kogut and Zander, 1992). According to the KBV there is a significant relationship between the characteristics of knowledge and the easiness or hardness of knowledge transfer (Gorovaia and Windsperger, 2010). Following this perspective, the choice of knowledge management mechanisms should be based on the degree of tacitness of knowledge (Gorovaia and Windsperger, 2010).

2.2.3. Network View

Generally, each business network contains number of nodes (e.g. organizations) which are linked to each other through business relations (Laumann et al., 1978). Therefore, the MNC can be conceptualized as a network wherein parent firms, subsidiaries, and subsidiaries' local actors (competitors, suppliers, customers, and etc) are the nodes, and they are linked to each other through business relationships. These business relationships could be between the parent firm and its subsidiaries, amongst subsidiaries of the same MNC, and between each subsidiary and its local environment (including suppliers, customers, research centres and etc).

Forsgren et al (2006) define "*business relations*" as *"...exchange relationships between firms doing business with one another"*. Forsgren et al. (2006) consider MNC as "*a unit primarily engaged in exchange activities and not necessarily as*

an entity engaged in international production". To Forsgren et al. (2006) exchange is the key element of competitive advantage and it is not limited to single market exchange but it is continuous. Relationship/exchange "*...is important because it has long term consequences for the firm as a whole as well as for individual sub-unit* " (Forsgren et al., 2006, p. 6).

As a result of interaction, the commitment of two companies to do business with each other is increasingly enhanced; in other words their business relationship is developed (Anderson and Weitz, 1992). Establishing and developing business relations usually takes time however, once established such relations are considered as valuable asset which could result in creation of competitive advantages. Nahapiet and Ghoshal (1998, p. 243) consider these relations as social capital and they define it as: "*the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit*". As a result of developing business relationships, two firms become more familiar with strategies, requirements, and competencies of each other. Furthermore, they learn how to decrease the cost associated with the exchange of resources through adapting each other activities (Zajac and Olsen, 1993).

If relationship is considered as a spectrum, on the one side of the spectrum are arm-length relationships/weak ties and on the other side are business relationships/strong ties. While the former is mainly associated with market exchange activities (Forsgren et al., 2006), the latter is related to the business relationships wherein the two parties are mutually depend on each other (Heide and John, 1988). In contrast to arm-length relationships, business relationships are not concern with "*immediate gains*" but these relations are long term oriented and they are strategically important in providing platform for the future developments (Forsgren et al., 2006). Strong ties may also influence the behaviour of a firm. For instance, according to Uzzi (1997) firms/subsidiaries are more likely to pursue collective gain rather than individual goals when they are surrounded by network of strong ties.

Within the literature on international business there are two streams trying to conceptualize MNC as an organization: instrumental and coalition view (Forsgren

et al., 2006). The first stream (e.g. Cyert and March, 1963) assumes that business environments are not fragmented and they are similar to each other. As a result, MNCs are able not only to fully understand the environment but also to align their activities with this understanding. In other words, the parent firm are capable of understanding the local environment wherein its subsidiary located, and thus it is able to design the subsidiary's strategy and select the proper organizational structure.

On the other hand, the second stream (Ghoshal and Nohria, 1989, Ghoshal and Nohria, 1997) considers each business environment as "*context specific"* and "*fragmented"* wherein it is impossible to completely analyse a particular environment without having direct interactions (Forsgren et al., 2006). Advocators of the second perspective consider organizations as units which are surrounded by a set/network of social relationships that shape and influence firms' actions and interests (Powell, 1990, Nohria and Eccles, 1992). Granovetter (1985), for instance, argue that the behaviour and decisions of actors are affected by their social context and relations. Therefore, given the differences amongst business environments, the organization's goals, decisions, actions, and performances are different. This is why Ghoshal and Nohria (1997) consider MNC as a "*differentiated network of linkages*".

Integration is one of the main challenges of multinational corporations. To be able to access the local knowledge and thus develop new knowledge, subsidiaries should be fully integrated into their local environment (Andersson et al., 2001). However, close relation with local environment can distract the subsidiary from the agenda of the whole corporation and thus create conflict (Asakawa, 2001, Andersson et al., 2002). Consequently, rather than exerting direct control (which is proved to negatively impact the subsidiary's performance), headquarters indirectly control their subunits through employing socialisation mechanisms (Gupta and Govindarajan, 2000), creating of shared values (Ghoshal and Nohria, 1997), and/or establishing close relations.

Similar to the KBV of the firm, the social network perspective highlights the importance of embedded relations/strong ties between the knowledge sender and receiver as a facilitator of knowledge transfer (Uzzi, 1997, Granovetter, 1982).

Within the context of international business, nodes and ties are considered as means of knowledge transfer amongst geographically dispersed units operating in different cultures, organisational routines, strategies and languages (Hansen, 1999, Tsai, 2001, Reagans and McEvily, 2003). According to Uzzi (1996), the embedded relations have three main attributes, namely trust, "*fine-grained information transfer*" and "*joint problem-solving arrangements*" (Uzzi, 1996, P. 677). In a similar vein, Saliola and Zanfei (2009) maintain that embeddedness is a process that takes time and it usually results in the creation of mutual trust and more efficient exchange of resources.

It is widely accepted that variation in the subsidiaries' ability to develop new knowledge is due to the differences in network attributes which presents significant learning opportunities (Powell, 1990). Those subsidiaries that have close relations are more capable of identifying new knowledge and technologies and thus they are more innovative (Andersson et al., 2007). On one hand, embedded relations enhance the availability of resources (including intangible resources such as tacit knowledge) residing either in the subsidiary's internal (headquarter and sister subsidiaries) and external networks (Hamel, 1991). On the other hand, embedded relationships decreases (a) the possibility of opportunistic behaviours and (b) cost associated with the exchange of resources. Thus, it can be concluded that the existence of embedded relationships increase (a) the learning intent and ability of headquarter and sister subsidiaries to fully understand and appreciate the potential of the knowledge existing in the focal subsidiary and (b) ability and willingness of the subsidiary to transfer its competences with other parts of the corporation.

Overall, this research adopts Forsgren et al. (2006) approach wherein they model MNC as "embedded multinationals" that has a number of subsidiaries embedded in a distinctive network of "business relationships". In this research it is assumed that differences in subsidiaries (e.g. knowledge development, willingness to contribute to the knowledge of the MNC) are due to not only the uniqueness of their business networks (Granovetter, 1982, Kang and Kim, 2010), but also to their degree of their embeddedness (or closeness of relationships) with parent firms, sister subsidiaries, and local actors of MNC.

2.2.4. Preliminary Conceptual Framework Using the Introduced Theories

Combining KBV, RBV, and network view of the firm, this research identifies four sets of determinants of reverse knowledge transfer: characteristics of sender, characteristics of receiver, characteristics of knowledge, and characteristics of relationship between sender and receiver.

- *Sender Characteristics:* Building on RBV of the firm; in this research it is assumed that resources residing at the subsidiary/sender level are the main sources of competitive advantages. These resources include both subsidiaries' stock of knowledge and network of relationships (Oliver/Ebers 1998). There exists a close association between subsidiary's ability to develop and maintain linkages with its internal and external actors on one hand, and its ability to develop knowledge and contribute to the knowledge base of its parent firms on the other (Powell, 1990, Andersson et al., 2007, Gupta and Govindarajan, 2000).

- *Receiver Characteristics:* Following RBV and organizational learning theories, in addition to the sender characteristics, receiver characteristics can also facilitate or hinder the process of inter-firm knowledge transfer. The organizational characteristics of the parent firm influence its ability to implement, ramp-up, and integrate the knowledge transferred by the subsidiary (Szulanski, 1996, Levinthal and March, 1993).

- *Knowledge Characteristics:* Following KBV, the most strategically important resources of the firm is knowledge, and knowledge transfer is one of the key determinants of MNCs' competitiveness (Grant, 1996, Kogut and Zander, 1996). Moreover, the characteristics of knowledge significantly influence the easiness and cost associated with knowledge transfer.

- *Inter-firm relationships:* Existence of embedded relationships eases the exchange of resources (including knowledge) between resource seeker and

holder. Following network view of the firm, tacit and complex knowledge can be transferred successfully only through embedded relationships (Forsgren et al., 2006, Powell, 1990).

The main aim of this research is to identify factors influencing subsidiaries' (sender) ability to contribute to the knowledge based of headquarters. As a result, out of four identified groups of determinants of reverse knowledge transfer, this study focuses on three groups: subsidiary characteristics, knowledge characteristics, and relationship characteristics. Figure 2.1 illustrates these factors along with related perspectives.

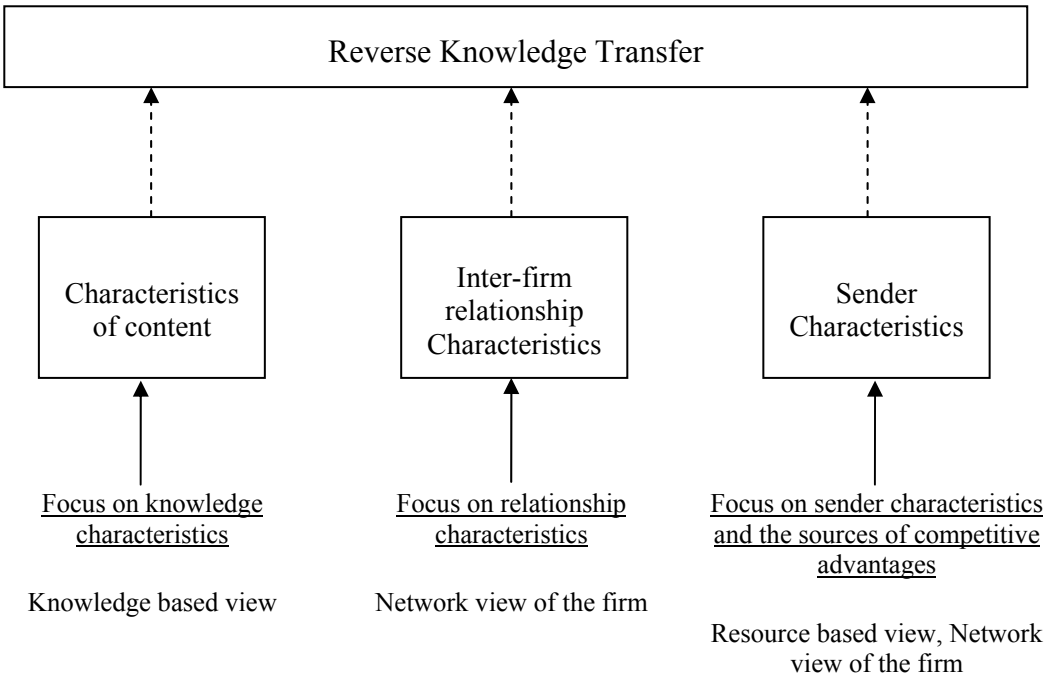


Figure 2.1: Preliminary Conceptual Framework Using the Introduced Theories

2.3. Key Definitions

2.3.1. Knowledge Transfer and Reverse Knowledge Transfer

There exists a broad consensus that the cross-border knowledge transfer, acquisition, and accumulation of knowledge are the MNCs' main sources of competitive advantage (Vernon, 1979, Bartlett and Ghoshal, 1989, Argote and Ingram, 2000). Some scholars (e.g. Lu et al., 2010, Gorovaia and Windsperger, 2010) even claim that the ability to transfer best practices will be a key source of competitive advantages for firms in the 21st century.

In the literature on international business, there exist various definitions of knowledge transfer. For instance, Lahti and Beyerlein (2000) consider knowledge transfer as "*…conveying and diffusing knowledge within a firm and among different firms*" (Lahti and Beyerlein, 2000, P. 68). Moreover, Lord and Ranft (2000) define knowledge transfer as "*dissemination of knowledge from one division to another division within the same firm*" (Lord and Ranft, 2000, P. 547). In his study of "*International Technology Transfer in Services*", Grosse (1996) describes the cross-border technology transfer as "*the diffusion of technology from the place of its introduction to other markets around the world*" (Grosse, 1996, P. 782). Szulanski (1996, 2000) defines knowledge transfer as mutual exchange of knowledge between knowledge holder and knowledge seeker.

Knowledge transfer may be categorised as vertical and horizontal (Grosse, 1996). Knowledge transfer from parent firm to its subsidiary and vice versa is considered as vertical knowledge transfer. On the other hand, horizontal knowledge transfer refers to transfer of knowledge or technology from a subsidiary to its peer subsidiaries. This research focuses only on knowledge transfer from subsidiary to its headquarters. This phenomenon is called reverse knowledge transfer. According to Håkanson and Nobel (2001), reverse knowledge transfer is "*the extent to which new technical knowledge is in fact transferred from foreign R&D units back to the parent organization or to other group companies*" (Håkanson and Nobel, 2001, p.396). Furthermore, Millar and Choi (2009) define reverse

knowledge transfer as "*the process of transfer of tacit and explicit knowledge from an MNC's subsidiaries to its headquarters*" (Millar and Choi, 2009, p.390).

In this research, reverse knowledge transfer is conceptualised as the extent to which the subsidiary transferred its sales and marketing know-how, strategy know-how, distribution know-how, service production strategy know-how, and management systems and practices know-how to its parent company.

2.3.2. Knowledge Intensive Business Services (KIBS)

2.3.2.1. What is KIBS sector?

Service is "*an activity or series of activities of more or less intangible nature that normally, but not necessarily, take place in interactions between the customer and service employees, and/or physical resources or goods and/or systems of the service provider, which are provided as solutions to customer problems*" (Grönroos, 1990, P. 27). Services can be generally divided into two main groups, namely those services that involve physical tasks (e.g. repair and maintenance, transport …) and those services that deliver knowledge or information tasks (including consultancies, computer services …) (Miles et al., 1995). The latter type is usually considered as KIBS sectors.

In the extant literature on services, scholars have used diverse terms such as "*high-tech services*", "*quaternary sector*" and "*the advanced service sector*" to describe KIBS (Miles et al., 1995, P. 23). While there are various definitions for KIBS, there is no general consensus on definition of KIBS (Muller and Doloreux, 2009, Wood et al., 2009). Table 2.1 presents the existing definition on KIBS.

Table 2.1: KIBS definitions

Author/s	Definition of KIBS
Muller (2001, P. 2)	"*KIBSs are firms performing, mainly for other firms, services encompassing a high intellectual value-added*"
Wood et al. (2009, p.37)	"*KIBSs are private sector firms that offer specialist professional, business, or technical expertise to other organizations*"
Miles et al. (1995 , p.18)	"*KIBSs are services that involved economic activities which are intended to result in the creation, accumulation, or dissemination of knowledge*"
Muller and Zenker (2001, p. 1502)	KIBS are "consultancy" firms "*performing, mainly for other firms, services encompassing a high intellectual value-added*"
Bettencourt et al. (2002, p.100-101)	KIBS are "*enterprises whose primary value-added activities consist of the accumulation, creation, or dissemination of knowledge for the purpose of developing a customised service or product solution to satisfy the client's needs*"
den Hertog (2000, p.505)	KIBS are: "*Private companies or organisations*", that a) highly dependent on "*professional knowledge, i.e. knowledge or expertise related to a specific (technical) discipline or (technical) functional domain*" and b) "*supplying intermediate products and services that are knowledge based"*
Muller and Doloreux (2009, p.65)	"*service firms that are characterised by high knowledge intensity and services to other firms and organisations, services that are predominantly non-routine*"

This research adopts Miles et al. (1995) definition in which KIBS are defined as "*services that involved economic activities which are intended to result in the creation, accumulation, or dissemination of knowledge*". KIBS firms can be considered as "*bridges and converters between technological and business expertise and localized knowledge and capabilities*" (Hauknes, 1998, P. 5). In other words, KIBS firms are "*bridges for innovation*" between manufacturing and science (Czarnitzki and Spielkamp, 2003, P. 26).

2.3.2.2. Characteristics of KIBS Sector

KIBS firms are mainly small to medium size enterprises or recently founded firms, and many of them are established as a result of outsourcing or "spin-off processes" (Koch and Strotmann, 2006, Koch and Strotmann, 2008). Terms such as "expertise" or "information rich" are usually used as a characteristics of KIBS (Muller and Doloreux, 2009). According to Koch and Strotmann (2008), the KIBS sector is one of the fastest growing in the most developed economies. Through interaction with other industries, the innovativeness of KIBS firms impacts positively on national innovation (Windrum and Tomlinson, 1999).

According to Koch and Strotmann (2008), KIBS firms serve as an external source of knowledge for their customers and they increasingly become knowledge generators. KIBS firms play an intermediate role between invention (including both scientific and technological innovations) and "*practical innovation*" (e.g. utilisation, dissemination…of innovation) (Miles et al., 1995, P. 37).

Clients of KIBS firms serve as 'co-producer' and 'co-creator' of new knowledge (den Hertog, 2000). Given the highly customised and complicated nature of KIBS firms' activities, their success depends solely on the effectiveness and efficiency of interaction and co-operation with customers (Bettencourt et al., 2002). The importance of communication with external actors and, in particular, customers on innovativeness of KIBS is also highlighted by Muller and Zenker (2001). They distinguish three attributes of the KIBS sector: a) high level of interaction with customers, b) '*knowledge-intensity*' of the provided services and c) providing '*problem solving*' tasks (Muller and Zenker, 2001, P. 1503-1504). In a similar vein, O'Farrell and Moffat (1995) argue that KIBS are those sectors providing intangible and '*potentially durable*' skills which are mainly related to problem solving and policy making.

In addition to networking abilities, Miles et al. (1995) highlight the importance of learning ability on the success of KIBS firms. KIBS firms must engage in accumulative learning activities and have access to '*specialised knowledge*' (Koch and Strotmann, 2008). This learning is reciprocal, which means that not only do

KIBS learn from their customers but also customers learn from them (Miles et al., 1995, Cowan et al., 2001).

In general, the majority of KIBS companies are involved in professional consultancy and outsourcing activities (Wood et al., 2009). In fact, KIBS involve themselves in developing new service for specific technology, and creation and diffusion of knowledge related to new technologies (Miles et al., 1995). Miles et al. (1995, P. 37) characterise KIBS sector activities in four main categories: 1) alleviating the interaction between the customers and their local environment, b) decreasing risk and complexity, c) '*co-ordination of tasks'* and d) '*standardisation'*, revision and development of functions. Moreover, according to Czarnitzki and Spielkamp (2003), KIBS firms simultaneously perform three main functions:

1. Purchaser: As a purchaser, KIBS purchase knowledge or equipment from manufacturing firms.

2. Provider: At the same time, as a provider they supply knowledge and services for both manufacturing and service companies.

3. Partner: Finally, KIBS act as a partner, since services provided by these companies are complementary to the products of manufacturing or other services firms.

With regard to sources of knowledge and innovation, R&D activities are less important for the KIBS sector (Miles, 2005). Doloreux et al. (2008) categorise the sources of KIBS innovation into three main groups: a) *market sources* such as customers, suppliers, competitors and consultancy firms, b) *research sources* including universities and other research institutes, and c) *other sources* such as journals, Internet, conferences and so on (Doloreux et al., 2008, P. 484). Furthermore, Czarnitzki and Spielkamp (2003) categorised KIBS firms' sources of knowledge into internal and external. They further subcategorised the companies' external knowledge resources into horizontal or vertical relationships. The latter are mainly associated with the linkages with competitors and other

service companies and the former mainly with those between a focal company and its customers, suppliers, etc.

2.3.2.3. Is Knowledge Transfer Different across Services and Manufacturing Industries?

While it is hard to distinguish services from products (Buckley et al., 1992) , the extant literature has identified some differences between services and manufacturing sectors. For instance, while the competitive advantage of the manufacturing firms is based on *proprietary*, the success of the service companies relies on *soft* technology: the technology that is knowledge/information-based (Grosse, 1996, P. 782). Furthermore, manufacturing firms supply products that are not only tangible but also contain a high degree of codified knowledge (Windrum and Tomlinson, 1999). However, services provided by KIBS sectors are highly customised, intangible, non-material and highly tacit in nature (Koch and Strotmann, 2008, Windrum and Tomlinson, 1999). According to Grosse (1996), the key technology of service sectors (i.e. knowledge/ experience, management skills, financial skills...) resides in employees rather than in goods or equipment.

Another major difference is that in contrast to manufacturing sectors that heavily rely on unique technologies; the competitive advantage of services is based on their ability to make use globally of their firm-specific knowledge (Moore and Birkinshaw, 1998). Finally, the latter argue that the success of services depends heavily on international transfer of their intangible assets including *proprietary* services, knowledge of the main customers, etc. (Moore and Birkinshaw, 1998, p. 82).

Given the aforementioned differences between service and manufacturing sectors, the findings of the previous contributions on knowledge transfer within the context of manufacturing sectors cannot be generalised across the service industry (Grosse, 1996). As a result, some researchers investigate whether knowledge transfer differs across the two sectors (e.g. Lindsay et al., 2003, Cowan et al., 2001). Lindsay et al. (2003), for instance, confirm that compared to the manufacturing industry, knowledge flow and also individuals are more crucial for

service firms. They highlight the role of individuals in services as a means of knowledge generators, knowledge transferors and relationship developers.

Moreover, Cowan et al. (2001) show that the two sectors use different transmission channels for transferring/acquiring knowledge. For example, while the links with academia is one of the key competitive advantages of manufacturing, the importance of these relationships varies across service sectors (i.e. banking and logistical services rely more on universities and research centres). The importance of patents also varies across the two sectors. In manufacturing firms, patents are used as a means of knowledge exchange. However, since the innovation cycle of the service sector is too short for prolonged patenting processes (Preissl, 2000, Cowan et al., 2001) and services activities are highly tacit in nature (Grosse, 1996, Doloreux et al., 2008), patents are rarely used in this sector (software companies mainly use patents). Moreover, Grosse (1996) argues that in contrast to manufacturing, there are no formal means (i.e. patent) for protecting the key technologies in services. As a result, compared to manufacturing sectors, services are more reluctant to transfer their skills and experiences.

Finally, Yamin (1999) found that within manufacturing sector there exists close relationship between acquiring parent firm knowledge and knowledge development of the subsidiary. However, in the case of service sector, to develop knowledge, subsidiaries should access and be cable of learning from their local environment. In other words, subsidiaries of service industry tend to rely more on the local knowledge rather than the parent firm knowledge. Furthermore, Yamin (1999) findings indicate that compared to manufacturing firms, service companies are less interested in engaging in the process of reverse knowledge transfer. This might be due to the fact that, knowledge resides in local environments is highly context specific and thus it requires the allocation of resources (e.g. human resources, time,...) to be transferred successfully.

2.4. Determinants of Reverse Knowledge Transfer

Compared to traditional knowledge transfer (knowledge transfer from parent companies to their subsidiaries), there are relatively few studies investigating the phenomenon of reverse knowledge transfer (Håkanson and Nobel, 2000, Yamin and Otto, 2004, Frost and Zhou, 2005). This might be due to various reasons: firstly, according to Pitelis (2009), reverse knowledge transfer is a relatively non observable phenomenon. Secondly, parent firms might underestimate the value of their subsidiary knowledge and thus refuse to acquire it due to the 'not invented here' syndrome (Katz and Allan, 1982). Finally, due to the traditional belief that knowledge transfer is 'path dependent', previous studies focus only on vertical knowledge transfer (from headquarters to the subsidiary) or at best on knowledge flow from the subsidiary to its sister subsidiaries (Pitelis, 2009).

Subsidiaries access to various source of local knowledge; findings of the contemporary studies on international business indicate that subsidiaries are increasingly involved in creating and developing new knowledge (Frost et al., 2002, Moore and Birkinshaw, 1998). Reverse knowledge transfer is a very important phenomenon that could result in creation of competitive advantage. The performance of the whole corporation can be improved considerably through (a) saving unnecessary costs associated with seeking and developing new knowledge and (b) reuse of knowledge in other parts of corporations.

Recent contributions on both knowledge transfer and reverse knowledge transfer have identified set of factors affecting the international exchange of knowledge. The results of prior studies indicate that characteristics of sender are one of the main determinants of international knowledge transfer. Value of the knowledge stock (Gupta and Govindarajan, 2000, Inkpen, 2000), innovativeness (Håkanson and Nobel, 2000), and sender's motivation and disposition ability (Minbaeva, 2007, Szulanski, 1996), and sender location (Ambos et al., 2006) are amongst the sender's attributes identified by the extant literature.

In addition to the sender characteristics, the receiver characteristics are also proved to influence the success of international knowledge transfer. In this regard,

absorptive capacity of the receiver is recognized as one of the key facilitators of inter-firm knowledge transfer (Lane et al., 2001, Cohen and Levinthal, 1990, Zahra and George, 2002). Additionally, some scholars show that learning intent strongly affects knowledge transfer activities (Wang et al., 2004, Gupta and Govindarajan, 2000).

Furthermore, previous studies found that knowledge characteristics such as tacitness (Hau and Evangelista, 2007, Pak and Park, 2004, Dhanaraj et al., 2004), accessibility (Inkpen, 2000, Buckley et al., 2009), relatedness (Yang et al., 2008, Lane et al., 2001), observability (Håkanson and Nobel, 2000, Zander and Kogut, 1995), ambiguity (Schulz, 2001, Simonin, 1999a, Szulanski, 1995), and complexity (Simonin, 1999a, Zander and Kogut, 1995) could also facilitate or hinder knowledge transfer. Finally, there exists a broad consensus on the significant impacts of relationship characteristics on international knowledge transfer. The sender-receiver relationship has been investigated from various perspectives including socialisation mechanisms (Noorderhaven and Harzing, 2009, Gupta and Govindarajan, 2000), conflict (Tsang, 2002, Pak and Park, 2004), shared values (Tsai and Ghoshal, 1998, Ambos et al., 2006), cultural distance (Anh et al., 2006, Weir and Hutchings, 2005, Zaidman and Brock, 2009), trust (Inkpen, 2000, Levin and Cross, 2004, Luna-Reyes et al., 2008), and integration (Håkanson and Nobel, 2001).

Following KBV, RBV, and network view, and combining the key studies on both knowledge transfer and reverse knowledge transfer, this research identifies characteristics of the sender, characteristics of the relationship (between sender and receiver) and characteristics of the knowledge as the main determinants of knowledge transfer. Given that this research focuses on subsidiary (sender) for the data collection, the characteristics of the receiver (parent firm) are excluded from this research.

In this research, characteristics of the sender include knowledge development and willingness. This research not only investigates the interaction between knowledge development and reverse knowledge transfer but also aims to identify the main antecedences of subsidiary knowledge development. Shared values, subsidiary-parent firm embeddedness and socialisation mechanisms represent

characteristics of the relationship between knowledge holder and seeker. It should be acknowledged that in this research internal embeddedness is divided into two main groups: subsidiary-sister subsidiaries embeddedness and subsidiary-parent firm embeddedness. Without this separation it is impossible to investigate the association between subsidiary-parent firm embeddedness and reverse knowledge transfer. Finally, with regard to knowledge characteristics this research focuses on complexity and tacitness. These aspects and also the relationship between these factors and reverse knowledge transfer will be discussed in depth in the following sections.

2.4.1. Characteristics of Knowledge

The impacts of knowledge characteristics on cross-border knowledge transfer have been consistently reported in the extant literature (i.e. Hansen, 1999, Kogut and Zander, 2003, Håkanson and Nobel, 2000). Tacitness (Lord and Ranft, 2000, Simonin, 1999b, McEvily and Chakravarthy, 2002) and complexity (Hansen, 1999, Zander and Kogut, 1995, McEvily and Chakravarthy, 2002) are the two knowledge characteristics that have been consistently cited as the major barriers of knowledge transfer (Simonin, 1999b, Zander and Kogut, 1995, Reed and DeFillippi, 1990). Therefore, amongst various aspects of knowledge, this research focuses only on tacitness and complexity.

2.4.1.1. Tacitness

Polanyi's (1967) notion that "we can know more than we can tell" has been largely accepted in the knowledge transfer studies and he divides knowledge into the two categories of tacit and explicit. Explicit or 'declarative' knowledge (Harvey and Anderson, 1996) is the knowledge that can be easily codified and stored in manuals and thus it can be easily articulated, acquired and transferred (Byosiere et al., 2010). In contrast, tacit or 'procedural' knowledge (Anderson, 1983) is the knowledge which resides in the firm's processes and individuals. Tacit knowledge is often described as "hidden knowledge" that individuals possess but cannot explain easily and comprehensively (Byosiere et al., 2010). According to Nonaka (1994), tacit knowledge is rooted in individuals' activities

and skills and it is highly context-specific. Consequently, it is very hard to be imitated, learnt and transferred (Simonin, 1999a). Kogut and Zander (1992, P. 386) define tacit knowledge as "*the accumulated practical skill or expertise that allows one to do something smoothly and efficiently*".

Van Baalen et al. (2005, P. 301) identified two main perspectives on the relationship between tacit and explicit knowledge. According to the first stream of research, which is also termed the *near tangible view*, under specific conditions, tacit and explicit knowledge can be transformed to each other (Nonaka and Takeuchi, 1995, Cowan and Foray, 1997). On the other hand, the second view, the *distributed view*, asserts that tacitness and explicitness are inseparable since every knowledge is to some extent tacit (Tsoukas, 2003). Following this perspective, knowledge transfer takes place only through observation and face-to-face interaction (Easterby-Smith and Araujo, 1999). Table 2.2 indicates the differences between tacit and explicit knowledge.

Table 2.2: Organisational knowledge: tacit vs. explicit

Tacit	Explicit
Practice	Possession
Knowing	Knowledge
Social	Cognitive

Source: Adapted from Easterby-Smith and Prieto (2008, P. 239)

According to the RBV of the firm, those resources that are hard to imitate and are non-substitutable are the firm's core of competitive advantages. Thus, compared to explicit knowledge, transfer and acquisition of tacit knowledge are expected to play a very important role in the success of MNCs. However, in comparison to explicit (articulated) knowledge, it is much harder to transfer tacit knowledge (Zander, 1991). Szulanski (1996) illustrated that the existing variances in knowledge transfer are mainly due to the tacitness-explicitness of knowledge. Since tacit knowledge is highly embedded in actions (Byosiere et al., 2010), it could be learned only through experience (Nonaka and Takeuchi, 1995, Nelson

and Winter, 1982), face-to-face interactions (Mudambi, 2002, Nonaka et al., 1996), and strong ties (Hansen, 2002, Szulanski, 1996). Teece (1985, P. 229) asserts that "*tacit knowledge is extremely difficult to transfer without ... teaching, demonstration and participation*''. According to Håkanson and Nobel (2000), transfer of technological knowledge is relatively hard since it resides in a group of individuals. Furthermore, since tacit knowledge is location-specific, it is very hard for the receiver to recognise instantly the value of the knowledge (Fang et al., 2010).

Knowledge existing in KIBS firms is highly tacit in nature (Koch and Strotmann, 2008, Windrum and Tomlinson, 1999). The success of KIBS companies depends heavily on transfer and acquisition of tacit knowledge or 'experience based knowledge' (Jensen et al., 2007). However, tacitness impacts negatively on knowledge transfer, not only through increasing the possibility of misinterpretation and misinformation, but also increasing cost (Buckley et al., 2009, Szulanski, 1996, von Hippel, 1994). Simonin (1999b) found the negative relationship between knowledge transfer and the extent of tacitness. Tacitness is usually associated with the level of ambiguity or conflict and thus has been identified as one of the impediments of cross-border knowledge transfer (Reed and DeFillippi, 1990, Simonin, 1999a). This leads to Hypothesis 1:

Hypothesis 1. The more the tacitness of the knowledge, the less the extent of Reverse Knowledge Transfer.

2.4.1.2. Complexity

Simonin (1999a) define complexity as "*the number of interdependent technologies, routines, individuals, and resources linked to a particular knowledge or asset*" (Simonin, 1999a, P. 600). Zander and Kogut (1995) described complexity as "*the number of distinctive skills, or competencies,*

embraced by an entity or activity" (Zander and Kogut, 1995, P. 82). In a similar vein, Hansen (1999) considers complexity as the number of interdependent elements constituting knowledge.

Similar to transfer of tacit knowledge, successful transfer of complex knowledge could help firms to sustain and even create competitive advantage (Delios and Beamish, 2001, Fang et al., 2010). High level of complexity minimises the probability of unwanted knowledge leakage. Reverse engineering of complex technologies takes longer time: on one hand greater number of components plus the relations amongst them should be identified; on the other, the information on overall impact of these components on functionality of a product should be gained from a greater number of employees (McEvily and Chakravarthy, 2002). They further argue that the knowledge seeker should restructure the fragmented knowledge (acquired from individuals) which is considerably time-consuming and entails more errors.

It is very hard for individuals to fully understand and learn complex knowledge, since it encompasses several individuals or even divisions (Simonin, 1999a). In other words, since the depth and scope of individuals' knowledge is limited, it is considerably hard, if not impossible, to fully absorb complex knowledge (Reed and DeFillippi, 1990). As a result, the knowledge seeker should have some knowledge about the system and individuals from where that knowledge originated (Hansen, 1999). The existence of strong ties also facilitates the transfer of complex knowledge (Hansen, 1999).

Complexity is proved to hinder the process of knowledge transfer (Hansen, 1999, Zander and Kogut, 1995). It has been argued that through increasing causal ambiguity, complexity deters the transfer of knowledge (Simonin, 1999a, Reed and DeFillippi, 1990). Moreover, McEvily and Chakravarthy (2002) found that complexity impacts negatively on international knowledge flows through increasing the costs and probability of 'imperfect imitation'. According to Hansen (1999), complexity hinders knowledge transfer through decreasing the ability of the knowledge seeker to identify, understand and integrate knowledge. Therefore, it is postulated that:

Hypothesis 2. The more the complexity of the knowledge, the less the extent of Reverse Knowledge Transfer.

2.4.2. Characteristics of Sender

In addition to the characteristics of knowledge, the sender's attributes are also proved to impact on the process of international knowledge transfer (Gupta and Govindarajan, 2000, Szulanski, 1996, Simonin and Özsomer, 2009). Since willingness has been frequently considered as one of the key determinants of successful knowledge transfer (Lahti and Beyerlein, 2000, Liu, 2009, Inkpen, 2000), this research focuses on willingness as one of the sender characteristics. In addition to willingness, the interest of the present research is not only in how subsidiary knowledge development impacts on reverse knowledge transfer, but also in identifying determinants of subsidiary knowledge development. More specifically, drawing on previous contributions by (i.e. Birkinshaw et al., 1998, Frost et al., 2002, Ghoshal and Bartlett, 1988), this research explores how external embeddedness, autonomy, and internal embeddedness with sister subsidiaries influence subsidiary ability to develop new knowledge.

2.4.2.1. Willingness

Recent literature on knowledge management denotes that the existence of physical instruments such as IT infrastructures does not alone guarantee effective knowledge sharing (Zhang et al., 2010). Instead, organisations should figure out how to increase the motivation of their individuals to share their knowledge (Davenport and Prusak, 1998, Foss et al., 2009). As Gooderham et al. (2010) argue, 'goodwill' increases the accessibility of resources and thus it is crucial for knowledge transfer. According to Buckley et al. (2009), geographical distances and differences in culture and language increase the costs associated with cross-border knowledge transfer through increasing the probability of misinterpretation and misunderstanding.

Since knowledge transfer is usually associated with some cost (e.g. human interactions, loss of monopoly…), companies should use incentive strategies for knowledge sharing (Kankanhalli et al., 2005, Moon and Park, 2002). One of these strategies introduced by the previous contributions is reward. Rewards could facilitate knowledge transfer through making the benefits higher than the costs associated with this process (Kang and Kim, 2010). Rewards could be in monetary (i.e. bonus) and non-monetary (i.e. recognition and training) forms (Zhang et al., 2010). The findings of the extant literature are not consistent with the relationship between rewards and knowledge sharing behaviour. For instance, some scholars (e.g. Choi et al., 2008, O'Neill and Adya, 2007, Gupta and Govindarajan, 2000) illustrate that rewards influence willingness of a sender positively to disseminate his/her knowledge. However, Zhang et al. (2010) argue that in the long term; rewards impact negatively on knowledge sharing through destroying the balance between knowledge contribution and employment.

The relationship between willingness and cross-border knowledge transfer has been investigated in many studies (i.e. Gupta and Govindarajan, 2000, Szulanski, 1996). Gupta and Govindarajan (2000), for instance, demonstrate that motivation positively influences knowledge sharing. Foss et al. (2009), on the other hand, develop three- fold typologies for motivation consisting of: intrinsic, introjected and external motivation. While external motivation is usually associated with achieving positive outcome (or preventing negative outcome), intrinsic motivation is related to intrinsic interest. Introjected motivations are developed based on external regulations rather than individuals' beliefs. They found that all of these typologies affect positively knowledge sharing activities.

Several factors have been identified by the previous contributions that might impact negatively on the motivation of the knowledge holder. For example, according to literature on knowledge management, time and costs associated with codifying knowledge (Ba et al., 2001, Zhang et al., 2010) and loss of monopoly and power (Goodman and Darr, 1998, Gupta and Govindarajan, 2000, Szulanski, 1996, Byosiere et al., 2010) are the main hurdles in knowledge sharing.

One of the main factors identified by Lahti and Beyerlein (2000) that affects the process of knowledge transfer within KIBS firms is willingness. They argued that

possessing knowledge is not enough for knowledge transfer to happen, the sender should also have enough motivation to share its knowledge with other parts of the corporation. There exist several factors that might reduce the willingness of KIBS subsidiaries to contribute to the knowledge base of the MNC. According to Cowan et al. (2001), willingness of the sender increases when knowledge is codified and decreases when competitive threats of a receiver are high. Therefore, since knowledge existing in KIBS firms is highly application-oriented (thus highly tacit in nature) (Johannisson, 1998, Buckley et al., 1992), individuals are reluctant to share their knowledge with other units (Burrows et al., 2005). Accordingly, a subsidiary should have enough motivation to allocate resources (including time and human resources) associated with the transfer of tacit knowledge.

Moreover, due to the ineffectiveness of patenting in protecting innovation in services (Grosse, 1996), there is always a high risk associated with knowledge sharing in these firms. Consequently, without enough motivation, it is unlikely that a subsidiary engages in the process of reverse knowledge transfer. Overall, it is expected that not only the willingness of a sender significantly impacts on the process but also it mediates the impact of other factors on it. Building on the aforementioned arguments, the following hypothesis is developed:

Hypothesis 3. The greater the willingness of the subsidiary, the greater the extent of Reverse Knowledge Transfer

2.4.2.2. Subsidiary Knowledge Development

One of the key issues impacting on the success and even survival of firms in the highly competitive environment is their ability to create new products and/or services (Revilla et al., 2010). In the context of MNCs, through transferring, acquiring and creating knowledge, subsidiaries play a very important role in

innovativeness of their corporations (Almeida and Anupama, 2004). While the extant literature is full of contributions trying to understand why some subsidiaries are more innovative (Miller et al., 1988, Nobel and Birkinshaw, 1998), few studies investigate directly the impact of subsidiaries' knowledge development on reverse knowledge transfer (Håkanson and Nobel, 2001).

Within the context of the KIBS sector, knowledge development could have both positive and neutral impacts on reverse knowledge transfer. To be innovative, KIBS firms should be engaged in accumulative learning activities and should also have access to 'specialised knowledge' (Koch and Strotmann, 2008). Specialised knowledge is usually context-specific and, thus, highly tacit and complex. Consequently, not only is it very hard and resource consuming for subsidiaries to transfer such knowledge to other parts, but also it is very hard for parent firms to identify the possible benefits of acquiring such knowledge. Furthermore, the parent firm might be reluctant to acquire such knowledge since it is context-specific and thus might not be related to the activities of the parent company.

On the other hand, findings of some publications show that the subsidiary's knowledge development facilitates reverse knowledge transfer (Håkanson and Nobel, 2001). In a similar vein, Gupta and Govindarajan (2000) argue that subsidiaries can contribute to the knowledge of other units (including headquarters) only if they are capable of developing 'non-duplicative' knowledge. Their findings show that subsidiary knowledge outflow is significantly influenced by its stock of knowledge. Building on these arguments, the following relationship is hypothesised:

Hypothesis 4. The greater the extent of the subsidiary knowledge development, the greater the extent of Reverse Knowledge Transfer

2.4.2.3. Determinants of Subsidiary knowledge development

Exploitation and explorations are the two themes usually used in the literature on innovation (e.g. Rothaermel and Deeds, 2004), organisational learning, and strategy (e.g. Levinthal and March, 1993, Bierly and Chakrabarti, 1996). Exploration concerns organisational learning (Revilla et al., 2010, Hoang and Rothaermel, 2010) and encompasses activities such as search, variation, risk taking, experimentation, discovery and innovation (March, 1991, P. 71). In other words, exploration is about developing new knowledge instead of reinforcing the existing one (March, 1991). On the other hand, exploitation involves a different sort of activities including reinforcement, implementation, production, efficiency, selection and execution (March, 1991). In fact, exploitation is about use of the existing resources (including skills and experiences) for both economising the efficiency of the existing resources (Levinthal and March, 1993) and creating new ones (Revilla et al., 2010).

According to some studies (e.g. Tushman and O'Reilly, 1996, Lubatkin et al., 2006), firms should engage in exploitation and exploration activities simultaneously. March (1991) argues that there should be a balance between exploration and exploitation. The aims of exploration activities are to find new alternatives for the future needs. As a result, companies that emphasise too much exploration may suffer from dealing with too many uncertainties and immature ideas. In contrast, exploitation activities concern with finding the best alternative solution for the present needs. Focusing too much on exploitation activities might lock companies into *suboptimal stable equilibria* (March, 1991, P. 71).

Leonard (1992) argues that organisations should explore existing knowledge and new knowledge to develop new knowledge successfully. As a result, to be successful in knowledge development, subsidiaries should firstly use the knowledge already existing in other parts of the MNCs (exploitation) and also search for new knowledge in their local environment (exploration). This is in line with the findings of Yamin and Otto (2004) who found that the internal and external knowledge sharing significantly impacts on MNE innovative performance.

Subsidiaries can be categorized into two main groups: competence exploiting and competence creating (Cantwell and Mudambi, 2005). While subsidiaries of the former group are mainly engage in implementing competences developed in other units, subsidiaries of the former group are increasingly capable of developing knowledge and thus contributing to the knowledge based of their MNCs. However, over time, *competence exploiting* subsidiaries become less dependent on the competencies existing in their headquarters and become more capable of developing knowledge themselves (Cantwell and Mudambi, 2005). There is a substantial body of literature which tries to identify facilitators and impediments of subsidiary's knowledge development (Birkinshaw and Morrison, 1995, Birkinshaw, 1997, Ghoshal and Bartlett, 1988, Gupta and Govindarajan, 1991, Andersson et al., 2002).

The results of these studies show that the attributes of subsidiaries' internal and external relationships significantly impacts their ability to develop knowledge (Gupta and Govindarajan, 1991, Mudambi et al., 2007). Prior studies focus on relationship from different perspective: intensity of interactions (Nobel and Birkinshaw, 1998, Harzing and Noorderhaven, 2006), degree of internal and local embeddedness (Andersson et al., 2005, Håkanson and Nobel, 2001), and level of autonomy (Birkinshaw et al., 1998, Grevesen and Damanpour, 2007). In addition to relationship attributes, location and formalization have been also recognized as the main antecedences of knowledge development (Cantwell and Mudambi, 2005, Ghoshal and Bartlett, 1988, Nobel and Birkinshaw, 1998).

Koch and Strotmann (2008) claim that in order to remain competitive, KIBS firms and in particular young KIBS should be able to develop new knowledge. Identifying the factors affecting the ability of the KIBS firms to develop new knowledge has been the focus of contemporary contributions (Windrum and Tomlinson, 1999). Since tacit knowledge plays a pivotal role in KIBS (Johannisson, 1998), in order to acquire this type of knowledge and thus be innovative, the existence of face-to-face interaction, trust, cooperation and communication are crucial for KIBS firms (Howells, 2002). Moore and Birkinshaw (1998) also highlight the importance of interaction with internal and external actors as the primary source of knowledge for global service companies.

Malerba and Torrisi (1992) illustrate that internal capabilities are not alone sufficient for software firms to generate new knowledge; rather, in order to be innovative, these firms require to access various sources of knowledge through internal and external networks. According to Koch and Strotmann (2008), the interactive behaviour of the firm, including networking and coordination, has significant influence on the firm's innovation.

To sum up, it is expected that the extent of integration (internal and external embeddedness) of KIBS with both their external actors (such as universities, suppliers, customers and so on) and internal actors (other sister subsidiaries) substantially impacts on knowledge development of KIBS companies. Furthermore, while empirical evidence on the association between autonomy and knowledge development capability of the KIBS sector has so far been missing, there is evidence for this relationship from other studies on the manufacturing sector (e.g. Birkinshaw et al., 1998, Grevesen and Damanpour, 2007, Mudambi et al., 2007). Ambos and Reitsperger (2004), for instance, demonstrate that a low level of autonomy impacts negatively on a subsidiary's absorptive capacity since it stops a subsidiary from becoming fully embedded in its local environment. Consequently, it is expected that a low level of autonomy reduces the ability of KIBS firms to develop knowledge through weakening the linkages between a firm and its local actors: crucial channels of knowledge for KIBS companies.

2.4.2.3.1. External Embeddedness

According to the RBV and KBV, having access to external knowledge is one of the key requirements of innovation (Grant, 1996, Eisenhardt and Schoonhoven, 1996, Nonaka et al., 2000, Simonin and Özsomer, 2009, Ghoshal and Bartlett, 1988). The findings of the contemporary contributions are also in line with this perspective (i.e. Almeida and Anupama, 2004, Gulati, 1999, Dunning and Lundan, 1998). Almeida and Anupama (2004), for instance, argue that learning from the local environment can be an important source of competitive advantage for MNCs. Moreover, according to Liu et al. (2010), in the highly competitive environment it is essential for firms to have access to market knowledge so as to improve their competitive advantages.

Given the differences in technological diversity, knowledge linkage and technological richness of subsidiaries' networks, they are not equally innovative (Almeida and Anupama, 2004). According to Saliola and Zanfei (2009), establishing embedded relations is one of the main challenges of MNCs and it requires extensive interactions with local companies which ultimately promote the exchange of knowledge. Embeddedness is usually associated with mutual adaptation of activities and/or processes and this adaptation results not only in better performance but also helps multinationals firm to penetrate more into foreign markets (Saliola and Zanfei, 2009).

In the extant literature, there exists a broad consensus on the positive impact of external embeddedness on competitiveness of the subsidiary through assisting the subsidiary to attain market knowledge (Yamao et al., 2009, Frost et al., 2002). Marketing knowledge is one of the two key types of knowledge recognised influencing the creation and sustaining of subsidiaries' competitive advantage (Anand, 2002, Roth et al., 2009). Fang et al. (2010, p.30) defined marketing knowledge as "*the capability to analyse market trends, build and maintain brands, and formulate plans to develop and market products and services*". They explain that this type of knowledge is mainly about understanding the requirements, culture, priorities and norms of clients and the local environment (Fang et al., 2010).

To be able to develop new knowledge, KIBS firms require to access and acquire the knowledge of their local environment (Miles, 2005). However, knowledge intensive companies are located in an environment in which the level of uncertainty and instability is high (Williams and Nones, 2009). As a result, although the knowledge residing in the local environment is a core competitive advantage of foreign subsidiaries, absorbing such knowledge is not an easy task. Unlike information, market knowledge is highly tacit and context-specific (Fritsch and Kauffeld-Monz, 2010). As Dilley (1999) argues, context "*environs the object of our interest and helps by its relevance to explain it*" (Dilley, 1999, P. 3). Moreover, Zaidman and Brock (2009) claim that context is the devices that "*reveal hidden meanings and deeper understandings or to forward certain kinds of interpretation and explanation*" (Zaidman and Brock, 2009, P. 300).

Since market knowledge is highly location-specific and thus tacit (Anand, 2002, Fang et al., 2010, Roth et al., 2009), it should be acquired through social and professional interactions (Porter, 1990). In other words, subsidiaries should be fully integrated into their local environment in order to acquire the context-specific knowledge (Sternberg and Arndt, 2001, Andersson et al., 2005). For KIBS firms having close and strong ties with external actors is considerably important (Miles et al., 1995). Muller and Zenker (2001) illustrate that having frequent interaction with customers significantly influence knowledge development in KIBS firms.

The findings of prior studies also confirm the important relationship between external embeddedness and the ability of the firm to development knowledge (Birkinshaw, 1996, Kotabe et al., 2003, Håkanson and Nobel, 2001). For instance, for Kotabe et al. (2003) and Birkinshaw (1996), technological reliance on local actors is the main source of a subsidiary's competitiveness. Anupama (2004) and Håkanson and Nobel (2001) found that the subsidiary's knowledge development is related to its linkages to local actors. Close relations promote firms' knowledge development firstly by reducing the risk and costs associated with exchange of resources and secondly through increasing the accessibility of knowledge (Malmberg and Maskell, 2002, Fritsch and Kauffeld-Monz, 2010).

Thus, building on the earlier studies, the following hypothesis is formulated:

Hypothesis 5. The more embedded the subsidiary is in the host economy, the more it will be capable of developing new knowledge.

2.4.2.3.2. Internal Embeddedness with other Sister Subsidiaries

In addition to external environment and headquarters, subsidiaries can benefit from the knowledge existing in other parts of corporations (including sister subsidiaries). Sister subsidiaries have access to various markets and 'technological

specialisation' (Almeida and Anupama, 2004). Existing research on innovation shows that access to various sources of knowledge (i.e. knowledge of sister subsidiaries) facilitates the creation of new ideas (Turner and Fauconnier, 1997, Frost, 2001) or can even be considered as the main source of innovation (Buckley and Carter, 1996). According to Dyer and Singh (1998), the competitive advantages of the firms depends on using the resources residing in both firm level and dyadic and network relations. Similarly, Zander and Solvell (2000) argue that the quality of innovation in MNCs can be improved by transferring and recombining the knowledge in a dispersed network of firms. According to Hoang and Rothaermel (2010), sister subsidiaries possess knowledge the focal subsidiaries lack and thus use of that knowledge would facilitate the development of new knowledge.

To benefit from the knowledge of other subsidiaries, there should be strong informal ties between focal subsidiaries (Ghoshal and Nohria, 1989). In fact, these ties can be considered as a stock of knowledge in which knowledge is accumulated and dispersed over time (Yamao et al., 2009). Zander and Solvell (2000) assert that the existence of close relations is the central factor for managing geographically diversified R&D and innovation activities. It is highly probable to attain valuable knowledge in innovation networks (Fritsch and Kauffeld-Monz, 2010), since companies collaborating in them generally pursue similar goals and interests (Cowan et al., 2000). Rogers and Larsen (1984) also illustrate that the existence of close relationships enables firms to access the knowledge resources of the other companies, which usually results in process and product innovation (Buckley et al., 2009).

Additionally, embedded relations lead to the development of new knowledge and ideas through the *problem-solving arrangements* and provision of *rapid and explicit feedback* (Uzzi, 1996, P. 679). Embedded relations decrease opportunistic behaviours and misuse of knowledge and consequently increase the openness of the knowledge holder (Squire et al., 2009).

The main function of KIBS firms is to develop new knowledge (Muller and Zenker, 2001), and their competitive advantage relies on absorbing and diffusing knowledge (Bettencourt et al., 2002). However, knowledge residing in the KIBS

sector is highly tacit in nature and is embedded in employees' experiences and skills (Grosse, 1996, Doloreux et al., 2008). Therefore this knowledge can be transferred effectively within KIBS only through embedded relationships (Windrum and Tomlinson, 1999, Beaverstock, 2004). According to Schreiner et al. (2009), close relations not only promote reciprocal collaboration and create trust but they also ease knowledge sharing. Likewise, Buckley et al. (1992) found that within service companies inter-personal relations are crucial facilitators of cross-border knowledge transfer.

Hypothesis 6. The more embedded the relationship between the subsidiary and other sister subsidiaries, the more it will be capable of developing new knowledge.

2.4.2.3.3. Autonomy

Autonomy is usually defined as the extent to which subsidiaries are allowed to make decisions about their most strategically important activities or issues. Traditionally, due to the assumption that the probability of transferring relevant knowledge is higher in inter-dependent units, it was assumed that a low level of autonomy influences positively the knowledge flow between the subsidiary and its parent firm (Egelhoff, 1988). However, the finding of the recent contributions is not in line with the traditional view. According to Gupta and Govindarajan (1991), the level of autonomy should be varied based on subsidiary typology. For instance, the level of autonomy should be high for Global Innovators (subsidiaries highly involved in knowledge development activities) but low for Implementers (subsidiaries rarely developing new knowledge). Harzing and Noorderhaven (2006) found that a high level of autonomy enables innovative subsidiaries to address the requirements of their customers.

Organisational studies agree, in general, that the level of autonomy can significantly affect firms' ability to develop new knowledge (Birkinshaw et al., 1998, Nobel and Birkinshaw, 1998, Cantwell et al., 2010). For example, according to Schotter and Bontis (2009) and Cantwell and Piscitello (1999), a higher level of autonomy influences positively subsidiary knowledge development since it allows a subsidiary to decide quickly and independently. Frost et al. found that autonomous subsidiaries are highly capable of developing knowledge since they can freely recognize and pursue local opportunities (Frost et al., 2002). Moreover, the findings of some contributions (Birkinshaw, 1997, Frost et al., 2002) support a link between autonomy and development of centre of excellence. In contrast, a high level of centralisation influences knowledge development negatively through diminishing risk taking and openness to new ideas (Miller et al., 1988, Grevesen and Damanpour, 2007). Ghoshal and Bartlett (1988) argue that low level of autonomy hinders subsidiary knowledge development by limiting the freedom to experience.

Although there exist a broad consensus on positive relationship between high level of autonomy and subsidiary knowledge development, headquarters still need to use control mechanisms to make sure that the activities of their subsidiaries are in line with the entire organisation. Control mechanisms are usually considered as a means of aligning actions and goals of employees with those of corporations (Merchant, 1985, Cyert and March, 1963). Child (1973 pp. 117) defined control as "*regulation of activities within an organization so that they are in accord with the expectations established in policies and targets*".

To be innovative, KIBS firms not only need to be integrated in their local environment but they should also be capable of learning (Miles et al., 1995). However, a low level of autonomy could affect the ability of a subsidiary negatively through: a) impacting negatively on learning patterns (Damanpour, 1991, Miller et al., 1988) and b) prohibiting subsidiaries to become fully embedded in their local environment (Ambos and Reitsperger, 2004). Hence, the following hypothesis is formulated:

Hypothesis 7. The more the level of a subsidiary's autonomy, the more it will be capable of developing new knowledge.

2.4.3. Characteristics of Relationship between Sender and Receiver

Ghoshal and Bartlett (1990) define multinational enterprises as "*a group of geographically dispersed and goal disparate organizations that include its headquarters and the different national subsidiaries*''(Ghoshal and Bartlett, 1990, P. 603). Therefore relationships serve as a means of international information gathering (Rogers and Larsen, 1984). Several studies on international business highlight the roles of relationships as a necessity factor for cross-border knowledge transfer (e.g. Bresman et al., 1999, Gupta and Govindarajan, 2000, Simonin, 1999b). For instance, Kogut and Zander (1993) argue that the existence of 'established routines of cooperation' and 'shared identities' results in "*a set of capabilities that are easier to transfer within the firm than across organisations and constitute the ownership advantage of the firm"* (Kogut and Zander, 1993, P. 517).

According to some scholars (e.g. Kang and Kim, 2010, Reagans and McEvily, 2003), at an individual level, the social relationship between knowledge holder and recipient significantly influences knowledge sharing behaviour. For instance, if the knowledge holder feels that her/ his knowledge is employed and/or receives a positive feedback from the receiver/s, he/she will be engage in knowledge sharing activities again (Zhang et al., 2010).

According to Nahapiet and Ghoshal (1998), each relationship has three interrelated dimensions: structural, relational and cognitive. The structural dimension concerns the overall pattern of relationship between individuals or units. In other words, it represents the existence or non-existence of the network ties, network configuration or monopoly. On the other hand, the relational

dimension refers to the *actor bonds*. Trust, *norms and sanctions*, *obligations and expectations* and *identity and identification* are the key facets of relational dimensions (Nahapiet and Ghoshal, 1998, P. 244). Finally, the cognitive dimension represents those capabilities that provide the *shared representations*, *interpretations* and *systems of meanings* (Nahapiet and Ghoshal, 1998, P. 244).

Building on the Nahapiet and Ghoshal (1998) classification (specifically structural and cognitive dimension) and drawing on the extant literature (Gupta and Govindarajan, 2000, Noorderhaven and Harzing, 2009), in this research embeddedness, shared values and socialisation mechanisms are considered as components of relationship between a subsidiary and its parent firm.

2.4.3.1. Socialisation Mechanisms

Distance between sender and receiver is one of the main reasons behind unsuccessful knowledge transfer (Eisenhardt and Santos, 2002). Use of socialisation mechanisms decreases the uncertainties about the partner's motivations and capabilities (Schreiner et al., 2009). In addition, as Granovetter (1992) argues, the existence of formal and informal socialisation mechanisms facilitate knowledge development by creating trust and mutual exchange of knowledge. This is mainly because social interactions enhance 'depth', 'breadth' and effectiveness of reciprocal knowledge exchange (Lane and Lubatkin, 1998), increase the accessibility of resources (Ibarra, 1993) and reduce the amount of time and resources necessary for acquiring information (Molina-Morales and Martínez-Fernández, 2009). Since a low level of autonomy may hamper subsidiary's knowledge development (Nobel and Birkinshaw, 1998, Ambos and Reitsperger, 2004), parent firm sometimes uses socialisation mechanisms to control their foreign subsidiaries informally and indirectly (Harzing and Noorderhaven, 2006, Chen et al., 2009).

Furthermore, according to information richness theory, there should be a fit between the uncertainty of a task and the richness of communication mechanisms (Gorovaia and Windsperger, 2010). Following Mudambi (2002), rich communication mechanisms enable teamwork and face-to-face interactions that decrease 'transmission losses' which usually happens during the transfer of tacit

and complex knowledge (Mudambi, 2002). In a similar vein, according to the KBV (Kogut and Zander, 1993, Nonaka et al., 1996, Håkanson, 2005, Gorovaia and Windsperger, 2010) for the transfer of highly tacit or complex knowledge, richer transmission mechanisms such as face-to-face interactions, training and visits should be used. Likewise, Szulanski (1996) argues that transfer of tacit knowledge usually takes quite a long time and requires intensive interactions between the sender and the receiver. Conversely, to transfer explicit knowledge, transmission channels with a lower degree of richness, such as emails, intranet, manuals, and databases could be used. This is mainly due to the fact that social interactions may ease the transfer of tacit knowledge (Verbeke, 2010, Bresman et al., 1999, Zander and Kogut, 1995, Hansen, 2002).

Following Gorovaia and Windsperger (2010, P. 14), rich transmission channels should posses four characteristics: "*feedback capability, availability of multiple cues (voice, body, gestures, words), language variety, and personal focus (emotions, feelings)*". They further argue that the richness of a transmission channel depends on the extent to which it possesses these characteristics. For instance, amongst different transmission channels, face-to-face interaction is the richest transmission channel since it possesses all the aforementioned characteristics.

There exists a substantial body of literature which emphasises the positive impact of socialisation mechanisms on international knowledge transfer (Gupta and Govindarajan, 2000, Noorderhaven and Harzing, 2009, Björkman et al., 2004, Mäkelä and Brewster, 2009). Noorderhaven and Harzing (2009), for instance, use a sender-receiver model, in which social interaction is considered as channels that possess required 'bandwidth' for transfer of highly tacit and complex knowledge. They illustrate that socialisation mechanisms not only impact significantly on knowledge sharing, but also mediate the impacts of other factors on this phenomenon. Moreover, Fang et al. (2010) assert that socialisation mechanisms and in particular expatriates could be used as facilitators of knowledge transfer. Gupta and Govindarajan (1994) used the term "integrating mechanisms" and show that these mechanisms are the important predictors of subsidiary knowledge inflow and out flow. Furthermore, Björkman et al. (2004) demonstrate that visits,

joint training programmes, international committees, teams and task forces facilitate subsidiary knowledge outflow. Schultz (2003) also found a positive relationship between subsidiary knowledge outflow and informal relations. Hansen et al. (2005) found that frequent interaction increases awareness and negative perception.

Bresman et al. (2010) divided socialisation mechanisms into two groups: normal (such as face-to-face interactions and other media) and protracted (including joint training programmes, visits…). They argue that the communications between sender and acquirer facilitate knowledge transfer through creating *social community* or *supportive environment*, decreasing the anxiety relating to propaganda and easing the interaction between sender and receiver (Bresman et al., 2010). Cohen and Levinthal (1990) argue that communication alleviates reciprocal knowledge through increasing the absorptive capacity of the receiver.

According to capability-based theories, awareness about the possible benefits of knowledge is one of prerequisites of knowledge transfer (Subramaniam and Venkatraman, 2001). However, knowledge existing in KIBS companies is highly tacit in nature and therefore it is very hard for parent firms to understand the possible benefits of knowledge residing in their subsidiaries. Moreover, since tacit knowledge is 'constrained' to individuals, the transfer of such knowledge usually required direct interactions between sender and receiver (Polanyi, 1967, Teece, 1981, von Hippel, 1994, Asheim and Isaksen, 2002). According to Jensen et al. (2007), KIBS firms could learn and acquire such knowledge only through 'doing, using, and interacting'. Therefore, it is expected that the use of socialisation channels impacts considerably on reverse knowledge transfer through increasing the awareness of a parent firm (Katz and Tushman, 1979, Monteiro et al., 2008) and creating common values and language (Håkanson and Nobel, 2001).

One of the major issues for multinational knowledge-intensive companies is integrating into their internal environment (Williams and Nones, 2009). Williams and Nones (2009) argue that MNCs can overcome this issue by appropriate training programmes and rotation of the key employees. Having frequent contacts could also lead to the creation of strong bonds (Schreiner et al., 2009) and shared values (Dyer and Nobeoka, 2000). Consequently, within the context of

professional service firms, socialisation mechanisms are considered not only as essential mechanisms to transfer tacit knowledge (Beaverstock, 2004, Grosse, 1996) but are also expected to improve the quality of relationships and developing of shared values between sender and receiver (Lindsay et al., 2003), thus:

Hypothesis 8a. The more socialisation mechanisms are employed, the more embedded the subsidiary is with its headquarters.

Hypothesis 8b. The more socialisation mechanisms are employed, the more would be the extent of shared values between the subsidiary and its headquarters.

Hypothesis 8c. The more socialisation mechanisms are employed, the greater is the extent of Reverse Knowledge Transfer.

2.4.3.2. Shared Values

Shared values is defined as the degree to which two units are similar in organisational ambition, aims, business practices, and culture (Tsai and Ghoshal, 1998). Ambos et al. (2006) illustrate that shared value impacts positively on the effectiveness of subsidiary knowledge outflow. Moreover, findings of prior studies show that lack of shared values between alliances hinder information sharing activities (Lyles and Salk, 1996) and knowledge transfer (Mowery et al., 1996) through creating conflicts. Tsai and Ghoshal (1998) argue that the existence of shared values may result in creation of trust. Trust is the crucial aspect of international relations since it decreases both the possibility of opportunistic behaviours and ambiguity and transaction costs (Buckley et al., 2009, Dyer and Singh, 1998). As a result, the existence of shared values could avoid

misunderstanding, increase trustworthiness and therefore smooth the exchange of resources (Tsai and Ghoshal, 1998).

One of the most significant barriers in international knowledge transfer is the existence of spatial, cultural and organisational differences (Zaidman and Brock, 2009, Bresman et al., 1999). Organizational differences decrease the knowledge development in alliances through hampering their ability to understand and absorb the marketing know-how (Simonin, 1999b). Håkanson and Nobel (2001) found that cultural differences impact negatively on the process of reverse knowledge transfer through decreasing sender-receiver integration. According to Simonin (1999b), organisational differences result in ambiguity and therefore they have a negative impact on knowledge transfer.

The existence of shared values assures headquarters that its subsidiaries' aims and activities are in line with the corporation agenda and thus avoid conflict. According to Kogut and Zander (1992), shared values ease and boost the integration of the whole corporation. Competitive advantages of service firms and in particular KIBS is based on cross-border transfer of tacit knowledge (Moore and Birkinshaw, 1998). Understanding newly developed tacit knowledge could be very hard for parent firms. Lane and Lubatkin (1998) illustrate that the similarities in organisational context and compensation mechanisms augment absorptive capacity. Likewise, relatedness of business activities increases the inter-organisational learning of the receiver and therefore facilitates knowledge exchange (Lane et al., 2001). Li et al. (2007) found that since shared values decrease the cost and difficulties associated with knowledge sharing activities, it promotes subsidiary knowledge outflow. The following hypothesis will hence be tested:

Hypothesis 9a. The greater the shared values between a subsidiary and its parent company, the greater the extent of Reverse Knowledge Transfer.

The existence of shared values could increase the willingness of subsidiary to share its knowledge through two different ways: Firstly, existence of shared

values creates a sense of identity between a subsidiary and its parent firm. According to some scholars (Bresman et al., 2010) there exists a strong relationship between the willingness of individuals to engage in knowledge exchange activities and 'a sense of identity'. Secondly, the existence of cognitive similarity decreases the costs associated with knowledge transfer (Reagans and McEvily, 2003). Thus, the more the subsidiary and its parents firm have shared values, the cheaper and easier will be the reverse knowledge transfer which increases subsidiary's willingness to engage in knowledge transfer activities, thus:

Hypothesis 9b. The greater the shared values between a subsidiary and its headquarters, the greater the willingness of the subsidiary to transfer its knowledge to its parent firm.

2.4.3.3. Internal Embeddedness with Parent Company[1]

There exists a broad consensus in the literature on international knowledge transfer asserting that the existence of embedded relations impacts positively on cross-border knowledge flows. For instance, according to Szulanski (1996), the existence of strong ties facilitates knowledge transfer through reducing the effects of motivational and cognitive problems. Similarly, Fritsch and Kauffeld-Monz (2010) demonstrate that the existence of a cohesive network promotes knowledge transfer. Moreover, embedded and successful relations create trust (Dwyer et al., 1987), which is usually considered as a crucial factor for cooperation and knowledge exchange (Powell et al., 1996, Buckley et al., 2009, Dyer and Singh, 1998). Instead of embeddedness, Håkanson and Nobel (2001) use the term "integration" and they illustrate that integration impacts positively on the process of reverse knowledge transfer through decreasing the cost associated with knowledge transfer.

[1] It should be acknowledged that within the extant literature embeddedness is usually used in the network context. However, in this research, embeddedness is used as a modified concept and it represents dyadic relationships between the subsidiary and its parent firm.

The existence of close relationships is crucial, particularly when it comes to transfer of tacit and complex knowledge (Bresman et al., 2010, Fritsch and Kauffeld-Monz, 2010, Byosiere et al., 2010). Uzzi (1996) demonstrates that compared to arm's length relations, embedded relationships are more capable of transferring tacit knowledge. Tacit knowledge resides in individuals, cannot be transferred as a separate unit (Wong et al., 2006) but it can be transferred only through embedded relations (Lane and Lubatkin, 1998, Cantwell and Piscitello, 1999, Nobel and Birkinshaw, 1998).

Therefore, in services or in particular in the KIBS sector, wherein knowledge is highly tacit, individuals relations are considered as a fundamental factor for cross-border knowledge transfer (Buckley et al., 1992). According to Lindsay et al. (2003), in the context of the service sector, close relationships facilitate the transfer and accumulation of knowledge. Moreover, Beaverstock (2004) argued that the competitive advantage of professional service firms is based on the knowledge embodied in their employees and this knowledge should be transferred through inter-personal relationships. The findings of the other researchers also confirmed the impact of relationships on the success and effectiveness of international knowledge transfer within services (Windrum and Tomlinson, 1999). It is expected that the closeness of relationship between a subsidiary and its headquarters plays a pivotal role in the success of the reverse knowledge transfer.

Drawing on the earlier studies, the following hypotheses are formulated:

Hypothesis 10 a. The more embedded is the relationship between the subsidiary and its headquarters, the more the subsidiary engages in the process of Reverse Knowledge Transfer.

Effective knowledge transfer should encompass commitment of both sender and receiver. One of the main impediments of international knowledge transfer is the cost associated with such activities. Transfer of tacit knowledge is sometimes very time consuming and requires resources (i.e. training, face-to-face interactions and

so on). Embedded relations between a sender-receiver serve as means of knowledge transfer that could considerably increase subsidiary willingness through decreasing the associated costs. Moreover, following incentive based theory, the existence of embedded relations boosts willingness of the knowledge holder to share its knowledge (Lane and Lubatkin, 1998), thus:

Hypothesis 10 b. The more embedded is the relationship between the subsidiary and its headquarters, the more willing the subsidiary is to engage in Reverse Knowledge Transfer.

Embedded relations could not only facilitate reverse knowledge transfer but also enhance the extent of traditional knowledge transfer (knowledge transfer from parent company to its subsidiary). Prior studies show that there exists a positive association between accessing different sources of knowledge and knowledge development (Turner and Fauconnier, 1997, Frost, 2001). For instance, Frost (2001) highlights the importance of dual embeddedness (internal and external embeddedness) on a subsidiary's ability not only to develop new knowledge but also to contribute to the knowledge base of the MNC. Therefore it could be concluded that subsidiary-parent firm embeddedness facilitates subsidiary knowledge development:

Hypothesis 10 c. The more embedded the relationship between the subsidiary and its headquarters, the more will be subsidiary knowledge development.

2.5. Moderating Effects: Impacts of Age and Mode of Entry

In the literature on international knowledge transfer, it has been broadly agreed that the length of relationship between the subsidiary and its parent firm positively influences reverse knowledge transfer (i.e. Frost and Zhou, 2005, van Wijk et al.,

2008, Dhanaraj et al., 2004). On one hand, longer relationships increase the trust and familiarity between a subsidiary and its parent firm (Williams and Nones, 2009). Following the social capital view, trust and familiarity ease the exchange of resources between the sender and receiver. In a similar vein, Squire et al. (2009) argue that long relationships promote knowledge transfer through increasing embeddedness, developing shared understanding and decreasing opportunistic behaviours. Håkanson and Nobel (2001) also show that ageing facilitates reverse knowledge transfer through increasing the embeddedness between a subsidiary and its parent firm.

In the long run, norms of reciprocity between knowledge transferor and seeker emerge (Gouldner, 1960) which would result in bilateral transfer of knowledge (Squire et al., 2009). It is due to the fact that long relations facilitate knowledge transfer not only through developing required knowledge transfer mechanisms (Cavusgil et al., 2003), but also through increasing absorptive capacity of the receiver (Cohen and Levinthal, 1990). Furthermore, Kotabe et al. (2003) show that over time knowledge transfer between the firm and its suppliers would become more effective due to the establishment of relation-specific resources. It has been argued that ageing boosts knowledge development of the subsidiary through increasing the embeddedness between a subsidiary and its local actors (Zander, 1999).

In addition to age, the importance of mode of entry on cross-border knowledge transfer has been consistently emphasised by prior studies (Håkanson and Nobel, 2001, Belderbos, 2003). Each mode of entry, acquisition and greenfield, has its own advantages. Acquired subsidiaries are popular since they have already been integrated into their local environment, which takes lots of time and effort. This means that they have access to unique sources of knowledge that can help them in developing new knowledge. As a result, parent firms may prefer acquired subsidiaries in the light of their access to new sources of knowledge (Belderbos, 2003) and that knowledge is less duplicative than that of greenfield subsidiaries (Gupta and Govindarajan, 2000).

On the other hand, greenfield subsidiaries have their own advantages. As these subsidiaries are established by the parent firm itself, their structure is similar to

that of its parent company (Håkanson and Nobel, 2001). As they are considerably dependent on the knowledge base of their parent firm, this reliance results in a high level of embeddedness between the subsidiary and its parent (Håkanson and Nobel, 2001).

As for the acquired subsidiaries, since they had already existed before acquisition, these have their own structure and culture. Consequently, acquired subsidiaries might sometimes be reluctant to have close relationships with their headquarters. They are highly embedded in their local environment and the more the embeddedness, the higher will be the context-specificity of the relationships (Andersson et al., 2002). In such circumstances, the subsidiary might prefer to allocate more time and resources to those relations-specific relations rather than to contribute to the knowledge resources of the MNC. This could sometimes create more conflict between a subsidiary and its parent company.

2.6. Model Summary

Figure 2.2 presents the conceptual framework of the research and the hypotheses outlined above. The incident of reverse knowledge transfer is assumed to influences by subsidiary characteristics, relationship characteristics, and knowledge characteristics. The model investigates the possibility of association between couple of determinates. Firstly, it is expected that subsidiary-parent firm embeddedness and shared values positively influence willingness. Secondly, it is assumed that there exists positive association between use of socialisation mechanisms on one hand and subsidiary-parent firm embeddedness and shared values on the other. Finally, the subsidiary's internal and external relations are considered as the main predictors of knowledge development. An overview of the developed hypotheses is presented in table 2.3.

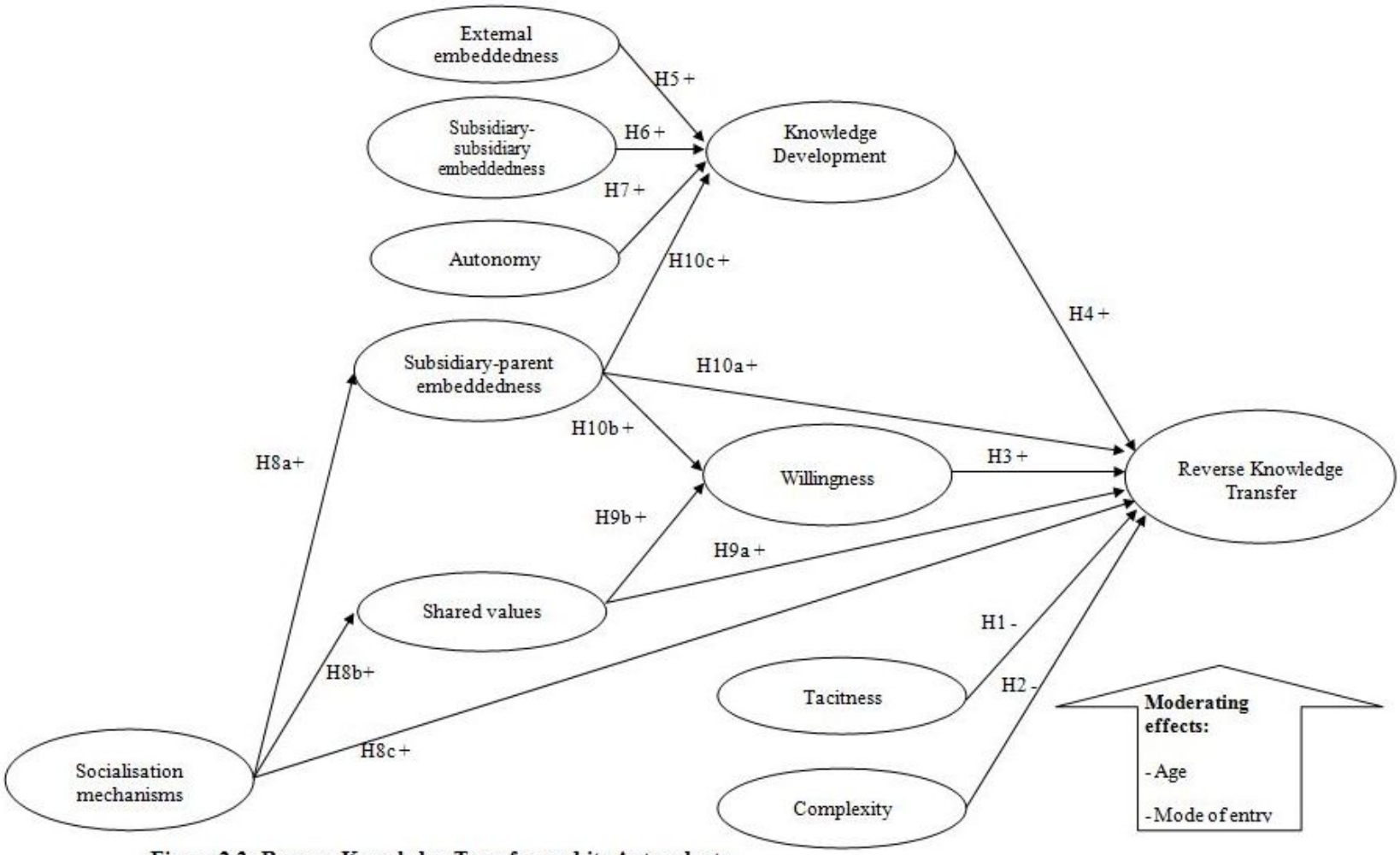


Figure 2.3: Reverse Knowledge Transfer and its Antecedents

Table 2.3: Developed hypotheses

Hypothesis 1.	The more the tacitness of the knowledge, the less the extent of Reverse Knowledge Transfer.
Hypothesis 2.	The more the complexity of the knowledge, the less the extent of Reverse Knowledge Transfer.
Hypothesis 3.	The greater the willingness of the subsidiary, the greater the extent of Reverse Knowledge Transfer
Hypothesis 4.	The greater the extent of the subsidiary knowledge development, the greater the extent of Reverse Knowledge Transfer
Hypothesis 5.	The more embedded the subsidiary is in the host economy, the more it will be capable of developing new knowledge.
Hypothesis 6.	The more embedded the relationship between the subsidiary and other sister subsidiaries, the more it will be capable of developing new knowledge.
Hypothesis 7.	The more the level of the subsidiary's autonomy, the more it will be capable of developing new knowledge.
Hypothesis 8a.	The more socialisation mechanisms are employed, the more embedded the subsidiary is with its headquarters.
Hypothesis 8b.	The more socialisation mechanisms are employed, the more are the shared values between the subsidiary and its headquarters.
Hypothesis 8c.	The more socialisation mechanisms are employed, the greater is the extent of Reverse Knowledge Transfer.
Hypothesis 9a.	The greater the shared values between a subsidiary and its parent company, the greater the extent of Reverse Knowledge Transfer.
Hypothesis 9b.	The greater the shared values between a subsidiary and its headquarters, the greater the willingness of the subsidiary to transfer its knowledge to its parent firm.
Hypothesis 10a.	The more embedded the relationship between the subsidiary and its headquarters, the more the subsidiary engages in the process of Reverse Knowledge Transfer.
Hypothesis 10b.	The more embedded the relationship between the subsidiary and its headquarters, the more willing the subsidiary is to engage in Reverse Knowledge Transfer.
Hypothesis 10c.	The more embedded the relationship between the subsidiary and its headquarters, the more will be subsidiary knowledge development.

2.7. Conclusion

The literature review began with outlining the theoretical foundation of the study. Each of these theories provided unique insight, guideline, and perspective on the process of reverse knowledge transfer. After presenting the fundamental definitions, in the section 2.4, the facilitators and impediments of subsidiary knowledge transfer were comprehensively investigated through reviewing several streams of literature: knowledge transfer, reverse knowledge transfer, knowledge development, and organizational learning.

Drawing on the extant literature, knowledge characteristics, relationship characteristics and sender characteristics were identified as the main predictors of reverse knowledge transfer. Sections 2.4.1.1 and 2.4.1.2 investigated how tacitness and complexity impact negatively on the reverse knowledge transfer. Moreover, section 2.4.2 explored the positive impacts of sender characteristics (willingness and knowledge creation) on reverse knowledge transfer. Then the relationship between the sub-categories of relationship characteristics (shared values, subsidiary-parent embeddedness and socialisation mechanisms) and subsidiary knowledge transfer were investigated in Section 2.4.3. The moderating effects of age and mode of entry on reverse knowledge transfer were explained in the last section. Finally, the model summary and an overview of the developed hypotheses were presented in Section 2.6.

Part II

EMPIRICAL STUDY

CHAPTER 3

RESEARCH METHODOLOGY

3.1. Introduction

The purpose of this chapter is to explain the research method employed in conducting this research. In Section 3.2 the method used for conducting this study is discussed. Section 3.3 provides some information (such as classification and selected attributes) on the KIBS sector. In Section 3.4 it will be explained how the questionnaire developed over four stages. The details of questionnaire pre-testing are presented in Section 3.5. Section 3.6 illustrates how the questionnaire was administrated (i.e. questionnaire design, development and implementation) and Section 3.7 contains some details on operationalisation of both dependent and independent measurements. In the Section 3.8 some information on response rate is presented. Non-response, late response, and common method biases are also checked in this section. The general information on basic respondent sample demographics (i.e. subsidiary's number of employees, age, mode of entry and geographic locations of subsidiaries' parent firm) is illustrated in Section 3.8.2. In Section 3.8.2.5; it is explained how this study deals with missing values. The final section has presentation of the statistical techniques and software used to analyse the data.

3.2. Research Methodology

This research aims to investigate the impacts of three main groups (subsidiary, knowledge, and relationship characteristics) on reverse knowledge transfer. Furthermore, this study intends to identify the determinants of subsidiary knowledge development.

As for the characteristics of knowledge this research focuses on tacitness and complexity. The relationship between these factors and reverse knowledge

transfer will be empirically tested in Hypotheses 1 and 2. Moreover, subsidiary characteristics group includes willingness and knowledge development. These factors will be tested in Hypotheses 3 and 4 respectively. As mentioned previously, one of the main aims of this research is to determine facilitators of subsidiary knowledge development. The research focuses on the association between knowledge development and four sets of determinants: external embeddedness, subsidiary-sister subsidiary embeddedness, autonomy, and subsidiary-parent firm embeddedness. All of these factors will be empirically tested in Hypotheses 5, 6, 7, and 10c.

Finally, relationship characteristics group contains three factors: shared values, subsidiary-parent firm embeddedness and socialisation mechanisms. The related relationships will be empirically tested in Hypotheses 8a, 8b, 8c, 9a, 9b, 10a, and 10b.

The analysis of these factors will enable this research to address the following research questions developed in this study:

Based on the outlined gaps, this research tries to contribute to the literature on cross-border knowledge transfer by addressing the following questions:

- What are the conditions under which subsidiaries develop knowledge?
- Do subsidiaries engage in knowledge transfer?
- What Kind of knowledge is transferred?
- To what extent do the characteristics of the subsidiary impact on the Reverse Knowledge Transfer?
- To what extent do the characteristics of knowledge impact on the Reverse Knowledge Transfer?

- To what extent do the characteristics of the relationship between subsidiary and parent company impact on the Reverse Knowledge Transfer?

Considering the nature of research aims and questions quantitative approach is considered as the most appropriate method for this research.

Quantitative approach is "*...one in which the investigator primarily uses postpositivist claims for developing knowledge (i.e. cause and effect thinking, reduction to specific variables and hypotheses and questions, use of measurement and observation, and the test of theories) employs strategies of inquiry such as experiments and surveys, and collect data on predetermined instruments that yield statistical data*" (Creswell, 2003, p.18)

The main characteristics of quantitative research are depicted in Table 3.1.

Table 3.1 The attributes of quantitative research

Seeks the facts/causes of social phenomena
Obstructive and control measurements
Objective
Removed from the data: the 'outsider' perspective
Ungrounded, verification oriented, reductionist, hypothetico-deductive
Outcome oriented
Reliable: hard and replicable data
Generalisable

Source: Adapted from Oakley (1999, p.156)

Quantitative approach considers social world as objective (Burrell and Morgan, 1979), wherein pinpointing existing causal relations is the best way to understand

a problem or phenomena under study (Pugh and Hickson, 1976). Therefore, given that the main aim of this research is to specify the relationships between reverse knowledge transfer and three main groups of determinants (relationship, subsidiary, and knowledge characteristics), quantitative approach is the most appropriate way.

The most popular tool in quantitative approach is survey (Creswell, 2003, Desai and Potter, 2006). This research considers an online survey as the most appropriate research method since the literature and also theories on international knowledge transfer are well developed. This method enables this research to build a large firm level database through which the relationships between reverse knowledge transfer and its antecedences can be tested.

3.3. Sample

The population of this research consists of the largest UK subsidiaries (in terms of turnover) with non-UK headquarters. This research model is tested within the context of the Knowledge Intensive Business Service (KIBS) sector. The research focuses on that sector because, firstly, few studies on international knowledge transfer have focused on services and in particular the KIBS sector (Grosse, 1996). Consequently, it is not clear whether the findings of the existing contributions on manufacturing are generalisable across this sector. These industries are highly dependent on transfer and acquisition of knowledge. Thus, the nature of this sector provides a very good platform for this research.

Secondly, the KIBS sector is one of the fastest growing in the most developed economies (Koch and Strotmann, 2008). Table 3.1 presents the changes in the percentage of its exports. In all cases (except Finland and France), there is a considerable increase in the export of KIBS/business services from 1995 to 2003. As indicated in Table 3.2, the export of UK business services approximately doubled during this period.

Table 3.2: KIBS share of exports and imports in trade and in GDP, 1995 and 2003

	Exports of business services			
	In total exports		In GDP	
	1995	2003	1995	2003
Australia	1.7	3.3	0.3	0.6
Austria	13.3	12.2	5.0	6.3
Canada	3.1	4.1	1.2	1.6
China	2.5	3.8	0.5	1.3
Denmark	7.2	12.9	2.6	5.8
Finland	6.2	4.4	2.3	1.7
France	6.6	5.5	1.5	1.4
Germany	3.5	4.5	0.9	1.6
India	5.6	16.9	0.6	2.4
Ireland	2.8	16.6	2.1	13.9
Italy	4.5	5.8	1.2	1.5
Sweden	2.7	9.9	1.0	4.4
UK	5.7	11.5	1.6	3.0
US	4.0	6.8	0.4	0.6

Source: OECD (2007)

3.3.1. KIBS Sector Selected Attributes

KIBS firms "*are enterprises whose primary value-added activities consist of the accumulation, creation, or dissemination of knowledge for the purpose of developing a customised service or product solution to satisfy the client's needs*" (Bettencourt et al., 2002, P. 100-101). In contrast to the traditional contributions that consider services as the user of technologies, the findings of the current studies on service sectors illustrate that this is not the case anymore. In fact, the competitive advantages of KIBS companies rely on creating new knowledge and they are increasingly considered as *bridges for innovation* between manufacturing and science (Czarnitzki and Spielkamp, 2003, P. 26). Figure 3.1 demonstrates the innovation density of selected sectors (i.e. manufacturing, business services, wholesale and retail trade, etc.) amongst European companies. As can be seen, on

average, the business services sector is more innovative than even manufacturing firms.

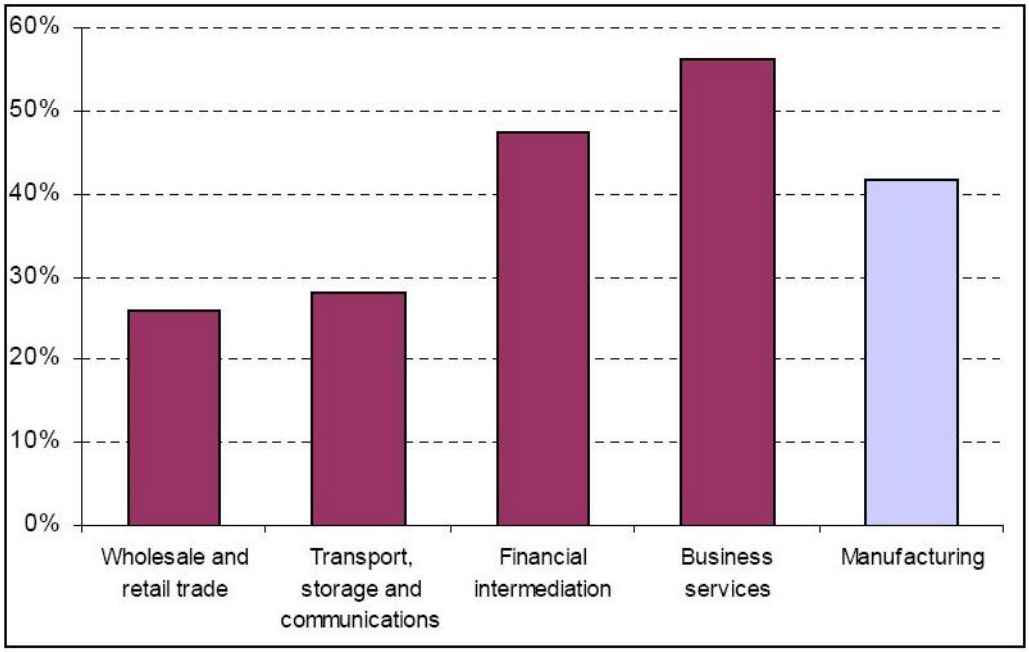
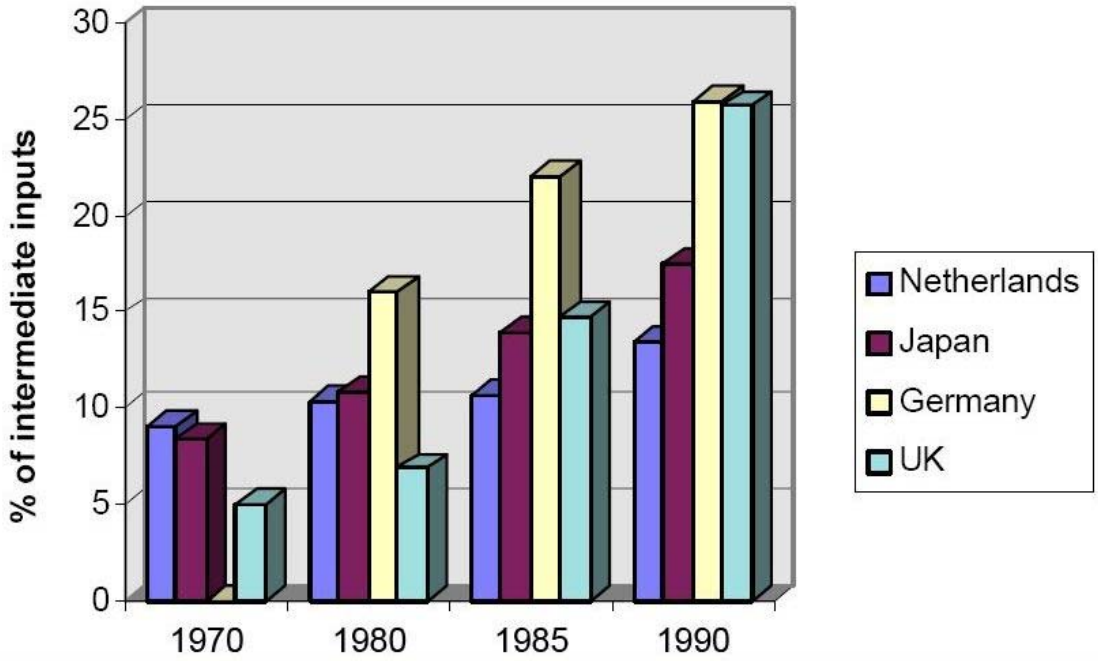


Figure 3.1: Average innovation density of selected industries amongst European firms between 2002 and 2004.

Source: OECD (2007)

Given that the services provided by KIBS companies are very costly, usually the main customers of KIBS sector are companies rather than individuals. This is in line with findings of den Hertog (2000, P. 505) wherein he asserts that KIBS firms are mainly involved in providing *intermediate products and services* for other companies. Figure 3.2 illustrates how the share of the KIBS sector as an intermediate input to other sectors in selected countries has increased over the two decades. According to Figure 3.2, this share is the highest in the UK and Germany,respectively, in 1990.



Source: Windrum and Tomlinson (1999, P. 9), based on OECD (1995).

Figure 3.2: Share of KIBS sectors as intermediate input to all industries 1970 to 1990.

3.3.2. Classification of KIBS

While there is no standard definition of KIBS, there is now fair agreement about the sub-sectors that constitute the KIBS sector (Simmie and Strambach, 2006). Most of the previous studies on KIBS are based on a classification proposed by the European classification of economic activities, NACE. According to the NACE classification, the KIBS sector comprises computer and related services (including data processing, hardware consultancy, database activities, etc.), research and development (including research and experimental development in natural sciences, engineering…) and other business activities (including legal activities, business and management consultancy activities…). Table 3.3 lists the KIBS sector and its subsectors.

Table 3.3: Major KIBS sub-sectors

NACE	Branch
72	Computer and related services
721	Hardware consultancy
722	Software consultancy and supply
723	Data processing
724	Database activities
725	Maintenance and repair of office, accounting and computing machinery
726	Other services related with data processing
73	Research and development
7310	Research and experimental development in natural sciences and engineering
7320	Research and experimental development in social sciences and humanities
74	Other business activities
741	Legal, accounting, book-keeping and auditing activities; tax consultancy; market research and public opinion polling; business and management consultancy; holdings
7411	Legal activities
7412	Accounting, book-keeping and auditing activities; tax consultancy
7413	Market research and public opinion polling
7414	Business and management consultancy activities
742	Architectural and engineering activities and related technical consultancy
743	Technical testing and analysis
744	Advertising
7484	Other business activities n.e.c.

Source: Adapted from Muller and Doloreux (2009, P. 66)

On the other hand, based on the nature of activities, Miles et al. (1995, P. 29-30) identified two main groups of KIBS: 1. *Traditional Professional Services* and 2. *Technology-Based KIBS*. Table 3.4 illustrates the categories and sub-categories of both groups.

Table 3.4: Two main categories of KIBS

KIBS I Traditional Professional Services, liable to be intensive users of new technology	Marketing/advertising
	Training (other than in new technologies)
	Design (other than that involving new technologies)
	Some financial services (e.g. securities and stock-market-related activities)
	Office services (other than those involving new office equipment, and excluding "physical" services like cleaning)
	Building services (e.g. architecture; surveying; construction engineering, but excluding services involving new IT equipment such as Building Energy Management Systems)
	Management Consultancy (other than that involving new technology)
	Accounting and bookkeeping
	Legal services
	Environmental services (not involving new technology, e.g. environmental law; and not based on old technology e.g. elementary waste disposal services)
KIBS II: New Technology-Based KIBS	Computer networks/telematics (e.g. VANs, on-line databases)
	Some telecommunications (especially new business services)
	Software
	Other computer-related services (e.g. Facilities Management)
	Training in new technologies
	Design involving new technologies
	Office services involving new office equipment
	Building services (centrally involving new IT equipment such a Building Energy Management Systems)
	Management Consultancy involving new technology
	Technical engineering
	Environmental services involving new technology (e.g. remediation; monitoring; Scientific/laboratory)

Source: Adapted from Miles et al. (1995, p. 29-30)

Traditional Professional Services (such as marketing/advertising, training and so on) are quoted as KIBS I and their main aim is to ease the interaction between their customers and social systems. According to Lowendahl (1997, P. 20), the main characteristics of professional service firms are:

- *Value creation is knowledge intensive and delivered by highly educated employees*
- *Services based on professional diagnosis by experts*
- *Services involve high degrees of personal judgement by experts*
- *Partners legally accountable for liability*
- *Services customised to meet client's needs*
- *Delivery involves high degree of interaction with client for diagnosis and delivery*
- *Individuals trained with standardised body of knowledge certified by professional regulators*
- *Services constrained by professional norms and practices.*

KIBS I are mainly the users of new technology and they rarely develop new services (Miles et al., 1995). On the other hand, KIBS II are usually involved both in creating new services for specific technology and developing and diffusing knowledge about new technology (Miles et al., 1995). KIBS II companies are mainly involved in computer-related activities such as computer networks/ telematics, software and so on.

Following Miles et al. (1995), this research focuses on both categories of KIBS sector, Traditional Professional Services and Technology-Based KIBS, with NACE of 72 and 74 and their subcategories.

3.3.3. Companies List Development Procedure

The FAME data base was used to identify the list of subsidiaries in the UK classified as KIBS companies. From the FAME data base 11,900 companies were

compiled however, the initial list contained numerous errors. The frequent problems were as follow:

- Some subsidiaries that had UK parent firms were included
- Some of the subsidiaries were no longer in business market
- The details of the companies including name and telephone numbers were either not provide or incorrect
- Some of the companies were manufacturers

The purification of companies list took considerable amount of time. In many cases the contact details of companies were incorrect or not provided. Thus to avoid unnecessary contacts, the details of the top 3000 companies (in terms of turnover) were checked through their website before the first contact. As a result of purification, the total number of companies was decreased to 10,484. In addition, a considerable number of companies (especially large firms) have 'No name policy'. Checking companies' website sorted out this problem to some extent since the details of MDs, CEOs, and GMs were sometimes available online.

3.4. Survey Development Procedures

All the measurements were developed from an in-depth review of the literature. However, the questionnaire was drafted five times (see appendix C). The main limitations of these drafts are as follow: Some of the questions were not suitable for service sectors and therefore they were removed from the survey. Furthermore, although all of the questions were adapted from the extant literature, some of them contained academic terms which were hard for non-academics to understand. To address this problem, some explanations were added to the survey. Moreover, in few cases the authors of contributions (based on which questions were developed) were contacted to check whether their respondents had any problem in understanding a question. Finally, appearance of the survey and logical flow of the questions are one of the most important features of each questionnaire.

Likewise, optimizing the appearance and order of the questions were one of the main challenges in each stage.

Table 3.5 includes some information on the problem associated with each draft.

Table 3.5: Survey Development Procedures and related pitfalls

Drafts	Problems
First draft	- Some of the questions were too general and vague - Use of academic terminologies - Some of the questions were not suitable for services - Order of questions - No covering letter - Five Likert scale
Second draft	- The covering letter was too short and not standard - Some of the questions were repeated and too general - Large number of questions - some problems related to grammatical errors and using the right phrase - Five Likert scale
Third draft	- The logical order of the questions - Use of academic terminologies - Some of the questions were too general - Five Likert scale
Fourth draft	- Five Likert scale - Using wrong terms (know-how instead of knowledge and adapted instead of affected) - Appearance of the survey - Questions of the general information section were not comprehensive

3.5. Questionnaire Pre-Testing

The last version of the questionnaire was pre-tested by selected academics, 15 PhD students and 130 companies. The main aim of pre-testing the survey questionnaire was to check its face validity (Creswell, 2003, Fink, 1995). The structure of the covering letter was changed several times based on the feedback received, and some questions were added to the questionnaire. For instance, to the internal and external section, on the subsidiary influence/power in the multinational corporation and on subsidiary autonomy. One of the limitations of the internal and external embeddedness section identified by the selected academics was related to the term "affected". In order to make it simpler for respondents, in the previous drafts "adapted" was replaced by "affected". The problem was that many things can affect activities of the firm and it is too far from "adaptation" that happens intentionally.

For the section on knowledge characteristics, a very useful suggestion was received from a targeted academic. The aim of this part was to identify the extent to which the knowledge of a particular subsidiary was tacit. However, in many parts, instead of "knowledge", "know-how" was used, which was one of the indicators of tacit knowledge.

The questionnaire was also pre-tested with 15 PhD students who had different backgrounds. The main changes were related to grammatical changes and the appearance of the survey. Based on the suggestions, some questions were added to the general information section. These were related to the number of years that a subsidiary had been in the MNC, the main function of the subsidiary, the location of the headquarters, the number of foreign top management employees working in a subsidiary, the percentages of a subsidiary's sales and purchases within the corporation. Also, based on the feedback received, this part was moved to the last page of the survey. Moreover, some questions were rephrased and revised.

One of the other reasons behind pre-testing the questionnaire within 130 knowledge-intensive service industries was to identify firstly the best way for administrating the survey (e.g. posting, on-line…) and secondly the most

appropriate respondents (Baker, 1994, Fowler, 1995). Firstly, the survey questionnaire was posted to 50 companies for which details of managers, including names and positions, were identified, and also a return envelope was attached. Out of 50, only 5 companies completed the survey. Secondly, the questionnaire was emailed to 30 companies. The managers of these companies were contacted by phone directly and they agreed to participate in the research. However, only 2 out of 30 responded. Being time consuming and lacking knowledge required for working with the application (i.e. not being able to access the attached file or generally the process of downloading the survey, answering it and again attaching it to email) were among the main reasons behind this poor result.

Consequently, instead of emailing, for the remaining 50 companies the web-based survey was employed. The link to the online survey was emailed for respondents and by using this method, the respondent did not require saving or doing any additional thing but answering the questions. Based on the feedback received from selected academics, one option, "not applicable", was added to all questions; also the appearance of the last version was slightly different in colour and font. In addition to that, in the final version, some logos (e.g. Manchester Business School logo and CIBER logo) were added.

As mentioned earlier, identifying the most appropriate respondent was one of the main aims of pre-testing the survey (Babbie, 1990). In the pre-test stage, various levels of manager, including marketing manager, finance manager, operational manager, chief executives and general managers were targeted. The most accurate answers were provided by managing directors, chief executives and general managers. As a result, it was concluded that these managers are the most appropriate respondents for completing the research survey. Moreover, contacting managers directly was proved to be very important, since without talking directly to them, even when the email or letter was personalised, few managers would complete the questionnaire, which could result in low response rate.

Therefore, the procedures for implementing the questionnaire were as follows: firstly, managers were contacted directly by phone and the link to the survey was emailed exactly after the telephone conversation for those accepting to participate

in the research. In the case of not receiving a response after seven days, managers were contacted again by phone (a) to make sure that they received the questionnaire and (b) to remind them to answer it. Those managers not completing the questionnaire as they promised were contacted after two weeks for the last time.

3.6. Sampling and Data Collection Procedures

This research focuses on the KIBS companies in the UK which have a non-UK parent firm. The data for this study were collected from February 2009 to July 2009. The survey design and implementation were based on the Dillman's (2000) tailored design method approach. The following steps guided the development of the survey instrument: (a) All the measures were developed by in-depth review of the literature on three main research streams, namely reverse knowledge transfer, knowledge transfer from the parent company to its subsidiary and knowledge development/innovation (see Section 3.8 for more details). (b) Questionnaire was pre-tested by selected academics, 15 PhD students and 80 KIBS firms to check the face validity and the relevance and to identify the most suitable respondents (see Section 3.6 for further details).

Given that the survey focuses mainly on intra-firm activities (i.e. knowledge transfer and acquisition) and organisational overall issues, it was addressed to managing directors, general managers and chief executives of subsidiaries. Moreover, data were collected in early 2009 by means of a web-based survey. The FAME data base was used to identify the list of subsidiaries in the UK classified as KIBS companies, having a non-UK parent firm. In total 11,900 companies were compiled from the FAME data base wherein only 10484 fit with the research criteria. Moreover, to create a web-based survey, "Survey Monkey" software were used. This software is very flexible and reliable and it allows users a variety of personalisation (including size, font, colour, etc.). In addition, one of the main features of this software is that it enables users to identify each respondent along with the time he/she started and finished completing a survey.

The process of data collection was significantly hard and it took considerable amount of time and energy. The present researcher should deal with not only common difficulties associated with data collection but also other issues related to key informants and timing of the study. This study was conducted during the recession and end of the financial year. In many cases top managers refused to help since they had no time or enough motivation. In addition, targeting CEOs, MDs, and GMs of companies as a key informant noticeably made the process more difficult. Personal assistants were the most difficult obstacles to talking with managers. In addition to personal assistants, the managers themselves were not available (either at meeting or business trip). As a result, out of approximately 3000 phone calls to companies (which usually took between 5 to 10 minutes) the present researcher managed to talk to only 523 managers.

In order to identify the appropriate manager, companies' websites were browsed to check whether managers' details were available. Moreover, each company in the sample was directly contacted several times. To collect the data, firstly, the MDs, CEOs or GMs of subsidiaries were contacted by phone. Some scholars argue that the response rate may be increase by pre-contacts (Harvey, 1987, Church, 1993). Secondly, following Dillman's (2000) instructions, a personalised email which contained a covering letter and the link to the online survey was sent to those managers who agreed to collaborate. To avoid unwanted responses, access to the survey was limited by the invitation email. Finally, in order to increase response rate, two follow-ups were done to make sure that (a) all the non-respondents received the link to the survey and (b) to remind them. In some cases where the respondent was not comfortable with completing the web-based questionnaire, the questionnaire was posted to them.

To motivate respondents to take part in the research, managers were offered the executive summary of the results. Those managers interested in receiving it were asked to include their details at the end of the questionnaire. The survey also contained an introductory letter including some information on the aims of the research and promises on confidentiality of results. Following Dillman (2000), for each respondent a unique code was allocated to avoid unnecessary follow-ups.

Personalised gratitude emails were sent to respondents. Figure 3.3 presents a summary of data collection procedures.

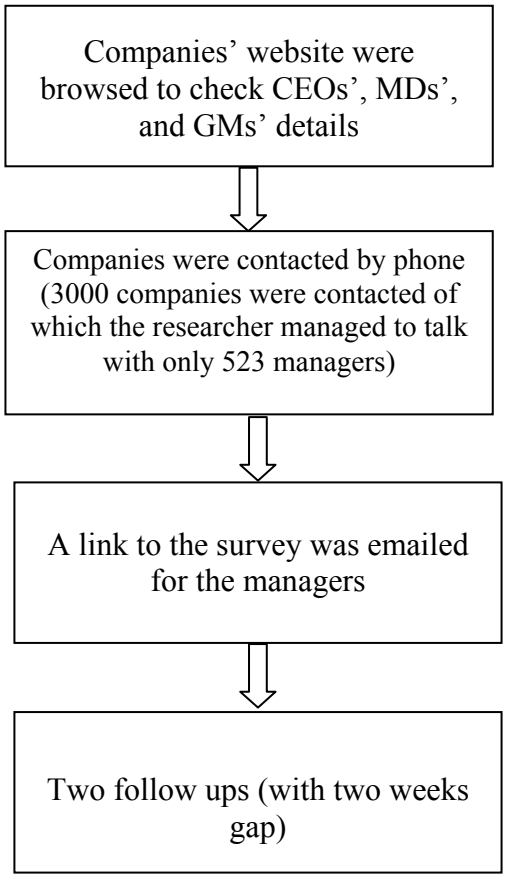


Figure 3.3: Data Collection Procedures

3.7. Measurements

As mentioned earlier, measures were developed by in-depth review of the literature. In particular, measurements were developed based on the prior contributions on subsidiary knowledge transfer, knowledge transfer from the parent company to its subsidiary, and knowledge development/innovation. Before presenting the measurements related to each construct, the definition of knowledge and different categories of knowledge will be presented.

3.7.1. Knowledge

Recent contributions on different aspect of organisation have recognised knowledge as one of the most, if not the most important strategic resources of the firm (McEvily and Chakravarthy, 2002, Szulanski, 1996). Davenport and Prusak (1998) define knowledge as:

"*A fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. In organisations, it often becomes embedded not only in documents or repositories but also in organisational routines, processes, practices, and norms*" (Davenport and Prusak, 1998, P. 5).

This research adopts the Davenport and Prusak (1998) definition of knowledge since it is one of the most comprehensive and cited and it highlights the coexistence of tacit and explicit forms of knowledge.

The literature on international knowledge transfer presents different types of knowledge. The existing contributions can be categorised into two main groups: (a) those studies that focus on only one type of knowledge (e.g. Zander and Kogut, 1995, Håkanson and Nobel, 2000, Lord and Ranft, 2000) and (b) those studies that employ various types of knowledge (e.g. Lyles and Salk, 1996, Tsang, 2002). Table 3.6 summarises knowledge typology/ies used in previous studies.

Table 3.6: Knowledge types

Key articles	Knowledge type/s
Zander and Kogut (1995)	Manufacturing capabilities
Tsang (2002)	- Skills and competencies - Knowledge of overseeing and managing the joint venture itself, - Knowledge of doing business
Håkanson and Nobel (2000, 2001)	Technological knowledge
Schulz (2001)	Organisational knowledge: - Technological knowledge - Sales and marketing knowledge - Strategy knowledge
Gupta and Govindarajan (2000)	- Marketing know-how - Distribution know-how - Packaging design/technology know-how - Product designs know-how - Process designs know-how - Purchasing know-how - Management systems and practices know-how
Bresman et al. (1999)	Technological know-how
Lord and Ranft (2000)	Local market knowledge
Simonin (1999b)	Marketing know-how
Lyles and Salk (1996)	Knowledge about: - Product development - Foreign cultures

Building on the Gupta and Govindarajan (2000) and Schulz (2001) contributions and considering the nature of the KIBS sector, this study focuses on five types of knowledge, namely sales and marketing, strategy (knowledge about customers, suppliers and competitors), service production strategy, distribution, and management systems and practices know-how. Strategy know-how refers to

knowledge about customers, suppliers and competitors. Other categories of knowledge were not included in this study for various reasons; including the large number of questions and not being applicable to this study (some of the categories are related to the manufacturing sector rather than service industry).

3.7.2. Dependent Variables

3.7.2.1. Reverse Knowledge Transfer

Reverse knowledge transfer is referred to "*the extent to which new technical knowledge is in fact transferred from foreign R&D units back to the parent organization or to other group companies*" (Håkanson and Nobel, 2001, P. 396). The measures for reverse knowledge transfer were taken from the Yang et al. (2008) and Gupta and Govindarajan (2000) contributions. On a 7-point scale (ranging from 1 "not at all"to 7 "to a very great extent"), respondents were asked to indicate "To what extent, during the last three years, did your company transfer the following knowledge to its headquarters?" The Cronbach's Alpha for this scale was 0.9.

3.7.2.2. Knowledge Development

The majority of studies on innovation measured knowledge development on the basis of number of registered patents (i.e. Håkanson and Nobel, 2001, Zander, 1994). However, given that (a) patenting processes are too long for the short innovation cycle of the service sector (Preissl, 2000, Cowan et al., 2001) and (b) the activities of service companies are highly tacit in nature, patents are not usually used in service firms (except software companies). Therefore, following Andersson (2005), this research uses perceptual measures. The measurements for knowledge development were adapted from Holm and Pedersen (2000) and Andersson (2005). Similar to reverse knowledge transfer, this research focuses on development of the following types of knowledge: sales and marketing know-how; strategy know-how, distribution know-how; service production strategy know-how; and management systems and practices know-how. On a 7-item scale ranging from 1 "not at all" to 7 "to a very great extent", the respondents were asked to address the following question: "To what extent during the last three

years did your company develop the … knowledge which is superior to that of headquarters, sister companies or competitors?" Alpha reliability of this scale was 0.837. Targeting subsidiaries to address this question comprises both advantages and disadvantages. On one hand, the subsidiary's managers are the most knowledgeable people to indicate the extent to which their firm developed knowledge during the specific period (especially when it comes to developing a highly tacit knowledge). On the other hand, it should be acknowledged that when it comes to evaluating whether developed knowledge is superior to that of other units (including internal and local actors), the perceptions of these managers might not be completely accurate.

3.7.2.3. Willingness

As mentioned earlier, this research tries to identify the factors influencing reverse knowledge transfer from the subsidiary's perspective. Consequently, if the knowledge holder (here subsidiary) is asked directly about motivation or generally behaviour towards knowledge sharing activities, the response is not reliable (Minbaeva, 2007). In other words, the probability that a subsidiary reflects its honest opinion is very low (a subsidiary will never admit that it is reluctant to transfer its knowledge to the parent firm).

On a 7-point scale (ranging from 1 "not at all" to 2 "to a very great extent"), the respondents were asked to indicate: (a) "the extent to which a subsidiary saw benefits in sharing its knowledge with the parent company", (b) "the extent to which the parent company motivated/encouraged (financially or emotionally) a subsidiary to transfer its knowledge", and (c) "the extent to which a subsidiary committed physical, financial, organisational and logistical resources to transfer its knowledge to the parent company". These measures were built on the contributions of Gupta and Govindarajan (2000), Szulanski (1996) and Simonin (1999b), wherein they operationalised closely related concepts such as "lack of motivation", "protectiveness" and "motivational disposition of the source unit". Alpha reliability of this scale was 0.837.

3.7.2.4. Subsidiary-HQs Embeddedness

Inter-unit relationships can be characterised on the basis of level of embeddedness. Embeddedness can be defined as the extent to which the interpersonal relations could serve as a source of knowledge (Andersson et al., 2005). Prior studies (i.e. Andersson et al., 2005, Forsgren et al., 2006, Lane and Lubatkin, 1998, Andersson et al., 2001) operationalised embeddedness in terms of mutual adaptation of activities and/or practices.

Following these contributions, anchored in 1 "not at all" and 7 "to a very great extent", the respondents were asked to estimate "The extent to which the relationship between a subsidiary and a parent company has caused mutual adaptation concerning a) sales and marketing practices, b) distribution practices and c) management practices". Cronbach's alpha for this variable was 0.888.

3.7.3. Independent Variables

3.7.3.1. Autonomy

Autonomy is usually defined as the extent to which subsidiaries are allowed to make decisions about their most strategically important activities or issues. Subsidiary autonomy could be considered as a spectrum wherein at one end is a fully decentralised subsidiary and at the other end a completely centralised one. Centralisation is related to control mechanisms the parent firm employs to make sure that the activities of its subunits are in line with the entire corporation agenda (Grevesen and Damanpour, 2007, Nobel and Birkinshaw, 1998).

The development of measurements of autonomy was based on the contributions of Ghoshal and Bartlett (1988) and Ghoshal and Nohria (1989). Respondents were asked to indicate the overall influence of the subsidiary and its parent company in deciding upon the following issues for the subsidiary: introduction of new services: changes in services, restructuring of the subsidiary organisation involving creation or elimination of departments and hiring and firing of the subsidiary's top managers. The questions were based on 7-point scale ranging

from 1 “decided by headquarters” to 7 “decided by subsidiary”. Cronbach’s alpha for this scale was 0.882.

3.7.3.2. External Embeddedness

External embeddedness is related to the existing relationships between a firm and its most important local actors and how these relations will result in mutual adaptation of activities. In this research, universities and research institutes, customers, suppliers and competitors are considered as external or local actors.

On a 7-point scale (ranging from 1 “not at all” to 2 “to a very great extent”), respondents were asked to indicate “the extent to which the subsidiary’s most important external relationships with customers, suppliers, universities, and research institutes have caused mutual adaptation concerning a) sales and marketing practices, b) distribution practices and c) management system and practices.” The measures were developed from the contributions of Lane and Lubatkin (1998), Andersson et al. (2005) and Andersson et al. (2001). Alpha reliability of this scale was 0.756.

3.7.3.3. Shared Values

Tsai and Ghoshal (1998) defined shared value as the degree to which the two units are similar in terms of organisational ambition, aims and context. This construct was operationalised based on the contributions of Tsai and Ghoshal (1998), Simonin (1999b) and Li et al. (2007). Subsidiaries’ managers were asked to indicate the extent to which they agreed or disagreed with the following statements: (a) “generally, business practices are very similar across the two companies”, (b) “the two companies have a shared understanding of doing business”, (c) “the two companies have coherent and similar organisational culture”, (d) “our company shares the same goals with the parent company”, (e) “the two companies provide the same range of services”. All the questions were based on 7-point scale ranging from 1 “fully disagree” to 2 “fully agree”. Alpha reliability of this scale was 0.807.

3.7.3.4. Socialisation Mechanisms

The measurements were adapted from the contributions of Björkman (2004), Noorderhaven and Harzing (2009) and Gupta and Govindarajan (2000). On a 7-point scale (ranging from 1 "not at all" to 2 "to a very great extent", respondents were asked to indicate the prevalence of participation of employees/top managers in the following activities: (a) joint training programmes, (b) movement of employees/top managers between both firms (for at least one month), (c) visits to your company by your headquarter's top managers, (d) visits to parent company by your company's top managers, (e) top managers/employees from both units participate in corporate inter-unit committees/ teams/ task forces, and (f) constituting project groups to work on headquarters problems. Alpha reliability of this scale was 0.864.

3.7.3.5. Subsidiary-Other Subsidiaries Embeddedness

Similar to external embeddedness and following the contributions of Andersson et al. (2005), Forsgren et al. (2006) and Lane and Lubatkin (1998), subsidiary-other subsidiaries embeddedness is considered as the level of mutual adaptation of activities. The respondents were asked to estimate the extent to which the relations between their company and other sister subsidiaries have resulted in mutual adaptation concerning the following practices: sales and marketing, distribution, and management. All questions were operationalised using a 7-point Likert scale anchored in 1 "not at all" and 7 "to a very great extent". Cronbach's alpha for this variable was 0.919.

3.7.3.6. Tacitness

Kogut and Zander (1992) define tacit knowledge as "*the accumulated practical skill or expertise that allows one to do something smoothly and efficiently*" (Kogut and Zander, 1992, P. 386). The measures of tacitness were adopted from the Simonin (2004), Zander and Kogut (1995) and Bresman et al. (1999) studies. On a 7-point scale (ranging from 1 "fully disagree" to 7 "fully agree"), the respondents were asked to indicate the extent to which they agreed or disagreed with the following statements: (a) "our… knowledge can be easily documented in manuals

and reports", (b) "our… knowledge can be easily learnt", and (c) "our… knowledge is more tacit than explicit". The focus of the aforementioned questions was on five types of knowledge: sales and marketing; distribution; service production strategy; strategy, and management systems and practices. Cronbach's alpha for this scale was 0.836.

3.7.3.7. Complexity

According to Simonin (1999a) complexity refers to "*the number of interdependent technologies, routines, individuals, and resources linked to a particular knowledge or asset*" (Simonin, 1999a, P. 600). Complexity was operationalised following the Simonin (2004) and Tyre (1991) contributions. Using a 7-point Likert scale anchored in 1 "fully disagree" to 7 "fully agree", the subsidiaries' managers were asked to indicate the extent to which they agreed or disagreed with the following statement: (a) "our… knowledge is the product of many interdependent routines, individuals, and resources" and (b) "our… knowledge includes many novel skills or competencies". Similar to tacitness, the aim of this question is to identify the extent of complexity of the following categories of knowledge: sales and marketing, distribution, strategy (knowledge about customers, suppliers and competitors); service production strategy and management systems and practices knowledge.. Alpha reliability of this scale was 0.900.

Table 3.7 illustrates the details of the operationalisation of the research construct.

Table 3.7: Construct Operationalisation

Constructs	Indicators	Sources
Reverse Knowledge Transfer) Measured on 7-point scale: 1=not at all, to 7=to very great extent	To what extent, during the last three years, did your company transfer following knowledge to its headquarters? • Sale and marketing know-how; • Strategy know-how; • Service production strategy know-how; • Distribution know-how; • Management systems and practices know-how.	Yang et al. (2008) Gupta and Govindarajan (2000)
Knowledge Development Measured on 7-point scale: 1=not at all, to 7=to very great extent	To what extent during the last three years did your company develop following knowledge superior to that of headquarters, sister companies or competitors? • Sales and marketing know-how; • Strategy know-how; • Service production strategy know-how; • Distribution know-how; • Management systems and practices know-how.	Holm & Pedersen (2000) Andersson (2005)
Willingness Measured on 7-point scale: 1=not at all, to 7=to very great extent	Please indicate extent to which … • Your company feels benefit in sharing its knowledge with HQ; • Your company allocates resources to transfer knowledge to HQ; • Your HQ motivates (financially and emotionally) your company to transfer your knowledge.	Gupta and Govindarajan (2000) Szulanski (1996) Simonin (1999b)
Subsidiary-parent firm embeddedness Measured on 7-point scale: 1=not at all, to 7=to very great extent	In thinking of your relationships with your HQ, please indicate extent to which they have caused adaptations concerning: • Sale and marketing practices; • Distribution practices; • Management systems and practices.	Andersson et al. (2005) Forsgren et al. (2006) Lane and Lubatkin (1998)
Subsidiary Autonomy Measured on 7-point scale: 1=decided by headquarters, 4=decided by both, to	Please estimate relative overall influence of subsidiary and its parent company in deciding on following for subsidiary: • Introduction of new services; • Restructuring of subsidiary organisation involving creation or elimination of departments;	Ghoshal and Bartlett (1988)

7=decided by subsidiary	• Changes in services • Hiring and firing of subsidiary's top managers.	
External embeddedness Measured on 7-point scale: 1=not at all, to 7=to very great extent	In thinking of your relationships you're your customers, competitors, suppliers, and universities please indicate the extent to which they have caused adaptations concerning: • Sale and marketing practices; • Distribution practices; • Management systems and practices.	Andersson et al. (2005) Forsgren et al. (2006) Lane and Lubatkin (1998)
Shared Values Measured on 7-point scale: 1=fully disagree, to 7=fully agree	In thinking of existing similarities between your company and its headquarters, please indicate extent to which you agree or disagree with following statements: • Generally, business practices are very similar across two companies; • Two companies provide the same range of services; • Two companies have coherent and similar organisational culture; • Our company shares same goals with parent company; • Two companies have shared understanding of doing business.	Tsai & Ghoshal (1998) Simonin (1999b) Li et al. (2007)
Socialisation Mechanism Measured on 7-point scale: 1=not at all, to 7=to a very great extent	In thinking of different socialisation mechanisms, please indicate extent to which following activities were prevalent during last three years in both your company and your parent company: • Participate in corporate inter-unit committees/ teams/ task forces; • Constituting project groups to work on headquarters' problems; • Movement of personnel between both firms (for at least one month); • Participating in joint training programmes; • Visits to parent company by your company's top managers; • Visits to your company by your headquarters' top managers.	Björkman (2004) Noorderhaven and Harzing (2009) Gupta and Govindarajan (2000)
Subsidiary-sister subsidiaries Embeddedness Measured on 7-point scale: 1=not at all, to	In thinking of your relationships with your sister subsidiaries, please indicate extent to which they have caused adaptations concerning: ➢ Sale and marketing practices; ➢ Distribution practices;	Andersson et al. (2005) Forsgren et al. (2006) Lane and

7=to a very great extent	➢ Management systems and practices.	Lubatkin (1998)
Tacitness Measured on 7-point scale: 1=fully disagree, to 7=fully agree	In thinking of your company's knowledge, please indicate the extent to which you agree or disagree with the following statements. • Our sales and marketing knowledge … o Can be easily documented in manuals and reports; o Can be easily learnt; o Is more explicit than tacit. • Our strategy knowledge … o Can be easily documented in manuals and reports; o Can be easily learnt; o Is more explicit than tacit. • Our service production strategy knowledge … o Can be easily documented in manuals and reports; o Can be easily learnt; o Is more explicit than tacit. • Our distribution knowledge … o Can be easily documented in manuals and reports; o Can be easily learnt; o Is more explicit than tacit. • Our management systems and practices knowledge … o Can be easily documented in manuals and reports; o Can be easily learnt; o Is more explicit than tacit.	Simonin (2004) Zander and Kogut (1995) Bresman et al. (1999)
Complexity Measured on 7-point scale: 1=fully disagree, to 7=fully agree	In thinking of your company's knowledge, please indicate extent to which you agree or disagree with following statements. • Our sales and marketing knowledge … o Product of many interdependent routines, individuals and resources; o Includes many novel skills or competencies. • Our strategy knowledge … o Product of many interdependent routines, individuals and resources; o Includes many novel skills or competencies. • Our service production strategy	Simonin (2004) Tyre (1991)

	knowledge… o Product of many interdependent routines, individuals and resources; o Includes many novel skills or competencies. • Our distribution knowledge … o Product of many interdependent routines, individuals and resources; o Includes many novel skills or competencies. • Our management systems and practices knowledge … o Product of many interdependent routines, individuals and resources; o Includes many novel skills or competencies.	

3.8. Respondent Overview

3.8.1. Response Rate

The link to the questionnaire was emailed for the CEOs, MDs and GMs of subsidiaries with a non-UK parent company and active in the KIBS sector. While the link to the online survey was emailed for 523 top managers (who were contacted directly and accepted to participate in the research), 209 took part in the research out of which 187 were usable. This resulted in a very high response rate of 39%, even more surprising considering the sensitive nature of some questions, the portfolio of respondents and the timing of survey implementation (the data were collected during the recession). 31 cases were discarded for various reasons: some had more than 15% missing values; some did not have non-UK headquarters and some were manufacturing companies.

Following Gerbing and Anderson (1988), non-response bias was tested. Non-responding companies were compared with responding companies based on subsidiary's age, number of employees and headquarters' country. The t-test revealed no significant difference across the two groups and thus it can be concluded that non-response bias is not a problem in this research. In addition, respondents were categorised into two groups: early responses and late responses. Late responses were those companies responding on the reminder and the early responses were those responding on the first contact. These groups were then compared using the research's key variables (reverse knowledge transfer, knowledge development and willingness) (Armstrong and Overton, 1977). Since no significant differences were found across the two groups, late-response bias does not play an important role in this study.

Finally, since data were collected from a single informant for each company (the dependent and independent variables were addressed by the same person), it was necessary to check the possibility of common method bias (Podsakoff et al., 2003). According to the latter, there are two methods for controlling common method bias: procedural and statistical remedies. Regarding procedural remedies,

following the Podsakoff et al. (2003) instructions, at the beginning of the questionnaire it was mentioned that there were no right or wrong answers and respondents should be honest in addressing each question. Furthermore, according to Podsakoff et al. (2003) and Tourangeau et al. (2000), the presence of ambiguous terms and concepts increases the possibility of common method bias. Therefore, in designing the survey, academic terms were avoided as much as possible. Also, in cases where academic concepts were used some explanations were provided.

For statistical remedies, following Konrad and Linnehan (1995) and Podsakoff and Organ (1986), Harman's one-factor test was used. The logic undermining this technique is that either a single factor is recognised by factor analysis or one factor accounts for the majority of the covariance across the measures (Podsakoff et al., 2003). Principle Components Factor (PCF) analysis was applied to all measurements items, extracting 11 factors with eigenvalues above 1 (which accounted for 76.62% of the total variance) and with the first factor accounting for 20.547% of the variance. As a result, since no single factor emerged as dominant, it can be concluded that correlations across items are not driven purely by method bias. In the extant literature, the possibility of common method variance is also tested using Confirmatory Factor Analysis (CFA) technique (i.e. Iverson and Maguire, 2000, Mossholder et al., 1998). Common method bias is thus tested through CFA technique. While the fundamental assumption of this CFA technique is the same as Harman's one-factor technique, the process is different. This technique compares the fit indices across the models that vary in terms of complexity. If the fit indices of the simpler model are as good as the more complex model, it can be concluded that a common method bias is a problem (Korsgaard and Roberson, 1995). In this research, two models were developed. The first model contained only 1 construct and 39 indicators. The second model contained 11 constructs and 39 indicators. Since the chi-square improved significantly from 3681.3 with 702 degrees of freedom (first model) to 1051.58 with 647 degrees of freedom in the second (see section 4.3.1.2), method bias is not a problem in this research.

3.8.2. Basic Respondent Sample Demographics

3.8.2.1. Sample Composition by Subsidiary Number of Employees

The subsidiaries' number of employees is categorised into three main groups: fewer than 99 employees, between 100 and 999 employees and more than 1000 employees. According to Table 3.8, more than half (56.684%) of the subsidiaries in this research had fewer than 99 employees[1]. This is in line with the findings of Koch and Strotmann (2006, 2008) in which they argue that the majority of KIBS firms are small to medium size corporations. Furthermore, 24% of the subsidiaries had between 100 and 999 employees. Finally, results show that 24 out of 187 subsidiaries had 1000 employees or more which accounts for only 12.90% of the whole sample size.

Table 3.8: Composition by subsidiary size

Subsidiary size range	Frequency (%)
< 99 employees	106 (56.684%)
100 - 999	45 (24.064%)
1000 +	24 (12.834%)
Total	175 (93.582%)
Missing	12 (6.417%)
Total	187 (100%)

3.8.2.2. Sample Composition by Subsidiary Age

Table 3.9 illustrates various groups of subsidiaries' age. The subsidiary age is categorised into four year groups: "under 10", "10-19", "20-29" and "30 and over". Approximately a quarter of subsidiaries were established less than 10 years

[1] A large number of small subsidiaries could impact the results of hypothesis testing.

ago. Similarly, out of 174 subsidiaries, more than ½ (that is 33% of the whole sample size) were subsidiaries aged between 10 and 19 years old. About 18% of subsidiaries were more than 20 and less than 29 years old. The rest of the subsidiaries were more than 30 years old. Out of 187 subsidiaries, 13 of them did not provide any subsidiary age data.

Table 3.9: Composition by subsidiary age

Subsidiary age range	Frequency (%)
< 10 years old	59 (31.550%)
10-19	62 (33.155%)
20-29	33 (17.647%)
> 30 years old	20 (10.695%)
Total	174 (93.048%)
Missing	13 (6.951%)
Total	187 (100%)

3.8.2.3. Sample Composition by Mode of Entry

Regarding mode of entry, the majority of the subsidiaries (52.941%) were created as a Greenfield operation. The rest (41.711%) became a part of the MNC as a result of an acquisition/ merger. Ten out of 187 did not provide any answer to this question. Table 3.10 depicts the details related to mode of entry.

Table 3.10: Composition by mode of entry

Mode of entry	Frequency (%)
Acquired subsidiaries	78 (41.711%)
Greenfield subsidiaries	99 (52.941%)
Total	177 (94.652%)
Missing	10 (5.347%)
Total	187 (100%)

3.8.2.4. Sample Composition by Geographic Location of Subsidiaries' Parent Firm

Parent firms' countries of origin were categorised by the continent in which they are located (America, Europe, Asia, Africa, Australia). According to Table 3.11, the majority of subsidiaries' parent firms are in either America (39.6%) or Europe (36. 9%). However, only 8.6% of subsidiaries had an Asian parent firm. In a similar vein, small percentages of parent firms were in Australia (6.417%) and Africa (3.374%). Nearly 5% of subsidiaries did not provide any data on the location of their headquarters.

Table 3.11: Geographic locations of subsidiaries' parent firm

Continent	Frequency (%)
America	74 (39.572%)
Europe	69 (36. 898%)
Australia	12 (6.417%)
Africa	7 (3.374%)
Asia	16 (8.556%)
Total	178 (96.256%)
Missing	9 (4.812%)
Total	187 (100%)

3.8.2.5. Missing Data

Sensitive nature of a question, not understanding a question and not knowing the answer are recognised as the main reasons for missing values (Schafer and Olsen, 1998). One of the main problems of every empirical study is how to deal with missing data. In particular, the existence of missing values causes problems for scholar using SEM for analysing the data. Choosing a wrong strategy to deal with missing values may cause serious problems (Kristina and Jürgen, 2001).

In dealing with this problem, the majority of studies have used either listwise or pairwise deletion. However, these methods are proved to have major limitations. The main issue regarding the listwise approach is that it radically decreases the number of cases. On the other hand, pairwise deletion may decrease the reliability of the results since the components of the covariance matrix might be related to different groups of subjects (Carter, 2006).

This research uses maximum likelihood estimation to deal with missing values. This approach is one of the most popular and it generates non-biased estimations (Allison, 1987). Myung (2003) argues that: "*MLE has many optimal properties in estimation: sufficiency (complete information about the parameter of interest contained in its MLE estimator); consistency (true parameter value that generated the data recovered asymptotically, i.e. for data of sufficiently large samples); efficiency (lowest-possible variance of parameter estimates achieved asymptotically); and parameterization invariance (same MLE solution obtained independent of the parametrization used)*" (Myung, 2003, P. 90).

In order to avoid missing values and also not making the respondent answer questions (either because of not having enough knowledge or confidentiality-related issues), "Not applicable" was added to multiple choices. Those cases containing not applicable responses were then replaced with the construct mean. Moreover, those questions containing a high number of not applicables were excluded from the analysis.

3.9. Quantitative Data Analysis Procedure

The research model will be tested through Structural Equation Modeling (SEM) using LISREL 8 (Jöreskog and Sörbom, 2001). Hair et al. (2009) defined SEM as a "*family of statistical models that seek to explain the relationships amongst multiple variables*" (Hair et al., 2009, P. 634). Indeed, one of the advantages of SEM technique is that it enables a researcher to examine more than one relationship at a time. Furthermore, the SEM model not only provides some information on the characteristics of measurements (i.e. loading) but also at the same time assesses the relationships between variables. SEM is appropriate for

testing models containing interdependence relations (Hair et al., 2009). None of the other statistical techniques has the same capabilities.

According to Hair et al. (2009), SEM is a six stage process. In the first stage all constructs should be defined. For instance, in the measurement section of this chapter, each construct is defined and then the related measures are developed. In the second stage, the theoretical framework is developed. In this stage, the relationships between the variables are specified: in other words, the related hypotheses are developed. The third stage is associated with data collection.

In the fourth stage, the measurements will be assessed by means of Confirmatory Factor Analysis (CFA). The output of the CFA model provides some valuable information on the loadings of measurements and also cross-loadings between items. Using this information will not only enable a researcher to purify the measurements but also improve the fit indices. If the measurements' model is valid, then the structural model can be run.

The process finishes by assessing the validity of the structural model. This can be done by evaluating the fit indices provided in the output. LISREL 8 is used for data analysis. So far, Chapters 2 and 3 have already dealt with the first three stages of the SEM process. In the next chapter, the fourth, fifth and last stages will be implemented. Figure 3.4 depicts the six stages of the SEM process.

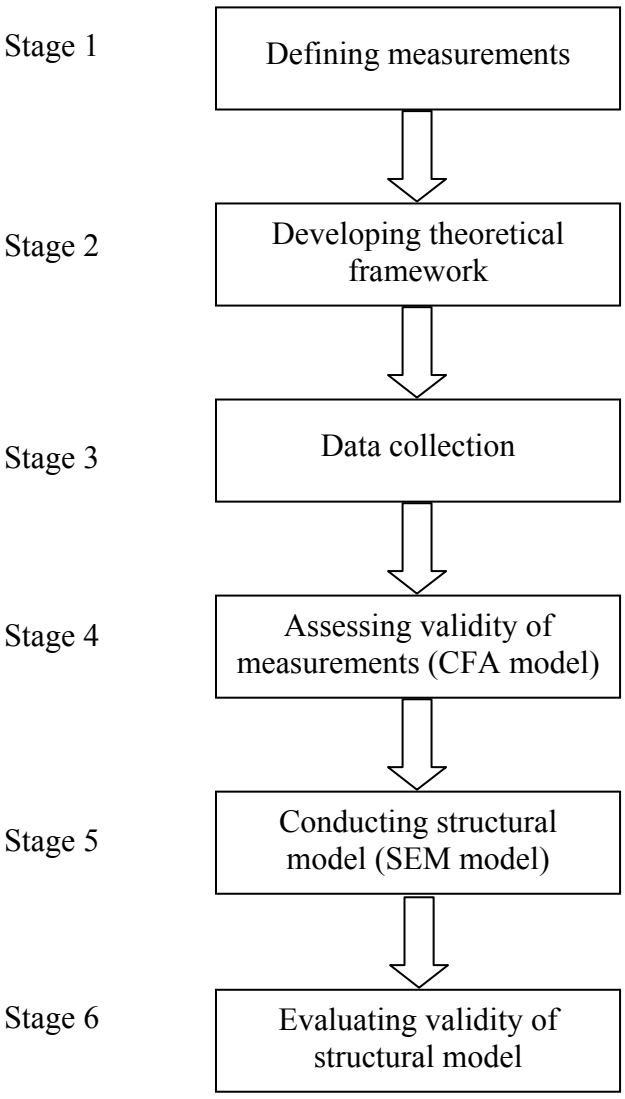


Figure 3.4: Outline of SEM process

3.10. Conclusion

This chapter began with presenting some information on the KIBS sector, the industry in which the research has been conducted. This information contained some selected characteristics of KIBS companies and the classification of this sector. In the second section, the process of questionnaire development was explained comprehensively. The details of questionnaire pre-testing including the aims and the changes resulting were presented afterwards.

The construct measurements (the resources and items) were presented in section 3.7. This section contains three main sub-sections: measures of dependent variables, measures of independent variables and the general information on the subsidiary. The Section 3.8 provided some information on response rate and the issues related to non-response bias, late response bias, and common method bias. Section 3.8 also included some information on basic respondent sample demographics, consisting of subsidiaries' number of employees, age, mode of entry and geographic locations of subsidiaries' parent firm. Finally, some explanations on how this research deals with missing values were presented. This chapter finished with some explanations on the statistical methods used to analyse the data.

CHAPTER 4

RESULTS

4.1. Introduction

The main aim of this research is to present the result of statistical analysis. The data were analysed within two main steps: CFA and SEM model. In the first section the Confirmatory Factor Analysis (CFA) model is presented and analysed (first stage). Details of measurements loading and cross loading between items are included in the output of CFA model. This information enables the researcher to purify the measurements and also to improve the fit indices. Explanations on how the measures were purified using path estimates, standardised residuals and modification indices are also presented in this section. The fit indices of a new CFA model are presented and evaluated. The validity of the measurements was tested using various techniques: convergent validity, discriminant validity, and Explanatory Factor Analysis (see Section 4.2.2.1, 4.2.2.2, and 4.2.2.3).

After purifying the measures, the relationships between variables are tested through conducting the structural model (second stage). The output of SEM model enables a researcher to specify whether a hypothesis is supported or rejected. Section 4.3 begins with evaluation of the SEM model fit indices. Furthermore, the results of hypothesis testing (hypotheses related to knowledge, sender and relationship characteristics) and also group analysis are discussed at the end of the section.

4.2. Confirmatory Factor Analysis (CFA)

The CFA model helps researchers to determine the model's constructs, variables' measures and also the existing interrelations (Hair et al., 2010). The model usually serves as a means of testing constructs' reliability and validity (Shaw and Shiu,

2002). Moreover, the CFA model enables scholars to specify whether their theoretical factor structure is supported by empirical findings.

Following Hair et al (2010), the CFA model is used since it assists this researcher to: (a) purify the measurements of the construct/s, (b) calculate Convergent , Discriminant and Nomological validity, (c) ensure there are no cross-loadings and uncorrelated errors, (d) test construct reliability[1].

4.2.1. Purification of Constructs' Measurements

One of the main reasons behind running the CFA model is to identify those construct indicators with low loading. In the following sections, firstly, all the indicators are included in the CFA model. The fit indices of the first model are as follow: CFI=0.85, IFI=0.85 and NNFI=0.85. All of these fit indices are lower than desirable (0.9) (Byrne, 2001). There are two main reasons for this poor result: firstly, as will be illustrated in the following sections,, the loading of some of the indicators are considerably low; secondly, the number of variables (11) and their indicators (63) is high considering the number of collected cases (187). As a result, the measurements needed to be modified. In doing so, the Hair et al. (2009) approach is employed. They introduce three criteria for checking and diagnosing the problems associated with the CFA model: path estimates, standardised residuals and modification indices.

4.2.1.1. Path Estimates

The first step is to identify those indicators with loading less than 0.5. However, following the key studies on cross-border knowledge transfer that have used SEM for data analysis (i.e. Simonin, 1999b, Simonin, 2004), in this research only those

[1] As mentioned above, CFA model helps a researcher to improve the fit indices by identifying and removing the problematic items. However, one of the limitations of the CFA model is the selectivity of processes. In other words, while the fit indices are improved as a result of purification of constructs, there is a high possibility that the removed items could have significantly changed the results.

measures with loading estimate more than 0.6 will be included. In other words, those indicators with loading less than 0.6 will be excluded from the model. Table 4.1 presents some information on indicators and related codes and loadings.

Table 4.1: Constructs' loadings and related codes

Constructs	Indicators	Codes	Loadings
Reverse Knowledge Transfer	Transfer of sale and marketing know-how	RKT1	0.72
	Transfer of distribution know-how	RKT2	0.85
	Transfer of service production strategy know-how	RKT3	0.86
	Transfer of strategy know-how	RKT4	0.89
	Transfer of management systems and practices know-how	RKT5	0.82
Knowledge Development	Development of sale and marketing know-how	KD1	0.78
	Development of distribution know-how	KD2	0.77
	Development of service production strategy know-how	KD3	0.75
	Development of strategy know-how	KD4	0.78
	Development of management systems and practices know-how	KD5	0.71
Willingness	Feeling benefit in sharing knowledge with HQ	Will1	0.81
	Allocating resources to transfer knowledge to HQ	Will2	0.83
	HQs motivate (financially and emotionally) subsidiary to transfer our knowledge	Will3	0.76
Subsidiary-parent firm embeddedness	Adaptations of sale and marketing practices	HQemb1	0.85
	Adaptations of distribution practices	HQemb2	0.89
	Adaptations of management systems and practices	HQemb3	0.82
Subsidiary Autonomy	Relative overall influence of subsidiary and parent company in introduction of new services;	Auto1	0.86

	Relative overall influence of subsidiary and parent company in restructuring subsidiary organisation involving creation or elimination of departments	Auto2	0.79
	Relative overall influence of subsidiary and parent company in hiring and firing of subsidiary's top managers	Auto3	0.83
External embeddedness	Adaptations of sales and marketing practices	Exemb1	0.65
	Adaptations of distribution practices	Exemb2	0.70
	Adaptations of management systems and practices	Exemb3	0.80
Shared Values	Generally, business practices very similar across the two companies	SV1	0.72
	Both companies provide same range of services	SV2	0.40
	Both companies have coherent and similar organisational culture	SV3	0.77
	Our company shares same goals with parent company	SV4	0.71
	Both companies have shared understanding of doing business	SV5	0.84
Socialisation Mechanism	Participate in corporate inter-unit committees/ teams/ task forces	SM1	0.73
	Constituting project groups to work on HQ problems	SM2	0.75
	Movement of personnel between both firms (for at least one month)	SM3	0.68
	Participating in joint training programmes	SM4	0.65
	Visits to parent company by subsidiary's top managers	SM5	0.63
	Visits to subsidiary by HQ top managers	SM6	0.76
Subsidiary-sister subsidiaries' embeddedness	Adaptations of sales and marketing practices	Subemb1	0.88
	Adaptations of distribution practices	Subemb2	0.88
	Adaptations of management systems and practices	Subemb3	0.91
Tacitness	Sales and marketing knowledge can be easily documented in manuals and reports	Tac1	0.73
	Sales and marketing knowledge can be easily learnt	Tac2	0.72
	Sales and marketing knowledge is more explicit than tacit	Tac3	0.25
	Strategy knowledge can be easily documented in manuals and reports	Tac4	0.82
	Strategy knowledge can be easily learnt	Tac5	0.78

	Strategy knowledge more explicit than tacit	Tac6	0.04
	Service production strategy knowledge can be easily documented in manuals and reports	Tac7	0.75
	Service production strategy knowledge can be easily learnt	Tac8	0.77
	Service production strategy knowledge more explicit than tacit	Tac9	0.16
	Distribution knowledge can be easily documented in manuals and reports	Tac10	0.62
	Distribution knowledge can be easily learnt	Tac11	0.68
	Distribution knowledge more explicit than tacit	Tac12	0.09
	Management systems and practices knowledge can be easily documented in manuals and reports	Tac13	0.78
	Management systems and practices knowledge can be easily learnt	Tac14	0.80
	Management systems and practices knowledge is more explicit than tacit	Tac15	0.10
Complexity	Sales and marketing knowledge is product of many interdependent routines, individuals and resources	Cmx1	0.64
	Sales and marketing knowledge includes many novel skills or competencies	Cmx2	0.58
	Strategy knowledge product of many interdependent routines, individuals, and resources	Cmx3	0.81
	Strategy knowledge includes many novel skills or competencies	Cmx4	0.67
	Service production strategy knowledge product of many interdependent routines, individuals and resources	Cmx5	0.62
	Service production strategy knowledge includes many novel skills or competencies	Cmx6	0.60
	Distribution knowledge is the product of many interdependent routines, individuals, and resources	Cmx7	0.78
	Distribution knowledge includes many novel skills or competencies	Cmx8	0.78
	Management systems and practices knowledge product of many interdependent routines, individuals and resources	Cmx9	0.80
	Management systems and practices knowledge includes many novel skills or competencies	Cmx10	0.68

According to Table 4.5, the loading estimates of the following indicators were less than 0.6: Cmx2 (0.57), Cmx6 (0.60), Tac3 (0.25), Tac6 (0.04), Tac9 (0.16), Tac12 (0.09), Tac15 (0.10) and SV2 (0.40). Consequently, all of the aforementioned factors were removed from the model. These eliminations improved the fit indices considerably. The new fit indices are as follows (previous indices in brackets): CFI (0.89), IFI (0.89) and NNFI= (0.88).

4.2.1.2. Standardised Residuals and Modification Indices

The second way introduced by Hair et al. (2009) for evaluating measures is standardised residuals. According to the LISREL 8 output, the largest standardised residual was 9.29. This residual was related to Tac10 and Tac11. Since the loading of Tac10 was less than Tac11, it was removed from the CFA model. The model was re-run and the new standardised residual was 8.49 relating to Tac7 and Tac8. Since the loading of the former was less, Tac7 was removed from the analysis. This process was repeated several times and the following indicators were removed from the model: SV1, Tac2, Tac3, Tac4, Tac9, Tac12, Tac14, Tac15, Cmx1, Cmx2, Cmx4, Cmx5, Cmx6 and Cmx10. Wherever the loadings of indicators were close (i.e. Cmx7&8, Tac1&2, Cmx1&5), modification indices were used to identify the worst indicator that cause problem for other indicators. In other words, modification indices provide this opportunity to identify the cross-loading (Hair et al., 2009). The results of primarily factor analysis suggest the elimination of the following factors since they yield high loading across other factors: Aut5, Tac6, RKT3, Tac11, SV2, KD2, SM3 and SM5.

The process of purification was continued until the fit indices of CFA model reached the acceptable level. The details of fit indices of the final CFA model are as follows: NNFI= 0.94, CFI = 0.94, IFI = 0.94. Overall, the final model includes 11 variables (dependent and independent) and 39 indicators. Following Hair et al. (2009), for the models with more than 30 observed variables, the CFI model should be more than 0.92 thus there is no problem with regard to CFI, IFI and NNFI. In general, all of the fit indices are very good since they are more than 0.9. Hair et al. (2009) argue that CFI, IFI and NNFI are not enough for evaluating the goodness of fit. It is better to supplement these criteria with other fit indices such

as RMSEA and chi-square. The combination of these criteria (CFI, RMSEA and chi-square) usually provides unique information on assessing the research model.

The $\chi 2$ (chi-square) = 1051.58 (P-value= 0.00) with Degrees of Freedom (df) = 647. Since the number of observed variables in this research is more than 30, $\chi 2$ should be significant, which is the case in this research (Hair et al., 2009). Furthermore, the ratio of $\chi 2$ to df is frequently employed in the extant literature to evaluate the model. This ratio should be less than 3.0 and the result of the CFA model is in line with this ($\frac{\chi^2}{df}$ = 1.625) (Bollen, 1980, Hu and Bentler, 1999, Marsh et al., 1988). While the previous criteria provide valuable information on goodness of fit, RMSEA and SRMR represent badness of fit. According to Hair et al. (2009), for models with more than 30 observed variables, RMSEA should be less than 0.08. The RMSEA= 0.05 in this research. Furthermore, SRMR in this research is equal to 0.058 which is very good (should be less than 0.09) (Kline, 2005). Table 4.2 presents the correlation matrix of variables.

Table 4.2: Correlation Matrix of Variables

	1	2	3	4	5	6	7	8	9	10	11
(1) Reverse Knowledge Transfer	1.000										
(2) Knowledge Development	0.61	1.000									
(3) Willingness	0.48	0.23	1.000								
(4) Subsidiary- parent firm embeddedness	0.39	0.39	0.26	1.000							
(5) Autonomy	0.13	0.21	-0.02	-0.03	1.000						
(6) External embeddedness	-0.62	0.55	0.30	0.40	0.01	1.000					
(7) Shared Values	0.28	0.03	0.38	0.27	-0.10	-0.01	1.000				
(8) Socialisation Mechanism	0.46	0.29	0.41	0.26	0.05	0.20	0.51	1.000			
(9) Subsidiary-sister subsidiaries embeddedness	0.27	0.20	0.11	0.41	0.02	0.17	0.09	0.22	1.000		
(10) Tacitness	-0.20	-0.12	0.01	-0.02	-0.05	-0.01	-0.78	0.05	-0.06	1.000	
(11) Complexity	-0.31	-0.06	-0.08	-0.03	0.09	0.03	-0.16	-0.16	-0.03	0.13	1.000

N=187, NNFI= 0.94, CFI = 0.94, IFI = 0.94

4.2.2. Assessing New Measurement Model

One of the main aims of the CFA model is to evaluate the validity of constructs. Hair et al. (2009) defined construct validity as "*the extent to which a set of measured items usually reflects the theoretical latent construct those items are designed to measure*" (Hair et al., 2009, P. 708). There are different ways for assessing the validity of the model. Following (Hair et al., 2009), in this research the following methods are used to evaluate the constructs' validity: Convergent validity and Discriminant validity.

4.2.2.1. Convergent Validity

According to convergent validity, the construct indicators should cover a high percentage of variance in common. To assess convergent validity, three items (Factor Loading, Average Variance Extracted (AVE) and Construct Reliability) should be considered. As mentioned previously, the loadings of all constructs should be more than 0.5 and ideally 0.7. AVE is equal to squared standardised factor loading divided by the number of items ($AVE = \frac{\sum_{i=1}^{n} \lambda_i^2}{n}$). Finally, to calculate construct reliability the following formula should be used: $CR = \frac{(\sum_{i=1}^{n} \lambda_i)^2}{(\sum_{i=1}^{n} \lambda_i)^2 + (\sum_{i=1}^{n} \delta_i)}$ wherein λ is the items loading and δ is the error variance. CRs equal to or more than 0.7 suggest adequate convergent validity. Table 4.7 depicts the mean, standard deviation, AVE, factor loading, t-value and R^2-value for reverse knowledge transfer constructs.

According to Table 4.7, the reverse knowledge transfer items' loadings are all above 0.6, as required for convergent validity. Moreover, the AVE should be equal to or more than 0.5. In this research, AVE = 0.68 ((0.5184+0.7225+ 0.6889+0.81)/4), thus it is adequate for convergent validity. Finally, a good rule of thumb is a CR equal to or higher than 0.7. CR for this construct is 0.896

(12.1502/(1.2602+12.1502)), which is satisfactory for convergent validity. Moreover, the results for knowledge development are sufficient for convergent validity since, firstly, all the loadings are above 0.6; secondly, AVE= 0.557 (should be equal or higher than 0.5); finally, CR=0.8339, that is, more than the minimum acceptable value of 0.7 (8.8804/(1.7682+8.8804)).

All the items loading related to willingness are above 0.7. Furthermore, the AVE is equal to 0.7232. Finally, CR of this construct is 0.8867. Consequently, it can be concluded that all of the aforementioned criteria are adequate for convergent validity. The loadings of subsidiary-parent firm embeddedness are more than even desirable value (0.7). The AVE is 0.7231 and CR=0.8867. As mentioned earlier, a good rule of thumb is a loading of 0.6 or higher, AVE of 0.5 or higher and CR of 0.7 or higher. Since the results are in line with these requirements, convergent validity is no problem for this construct.

With regard to autonomy, similar to the previous constructs, convergent validity is not a problem. The loadings of all items are more than 0.7. The AVE is more than 0.5 (=0.6573) and the CR is more than 0.7 (=0.8845). Furthermore, the result for CR, loading and AVE of external embeddedness address the requirements of convergent validity since all the loadings are more than 0.6. However, these loadings are not more than a preferable level of 0.7. Since following the Hair et al. (2009) instructions, all the constructs should have equal to or more than three measures, these items were not removed from the final CFA and SEM model. Additionally, the AVE and CR related to external embeddedness are 0.5156 and 0.7608, respectively, which are more than the minimum levels of 0.5 and 0.7, correspondingly.

As to shared values, all the loading are above 0.7. The AVE for shared value is 0.6173 and the CR for this construct is 0.8279. Consequently, it can be concluded that there is no problem with regard to convergence in the case of shared values. Furthermore, while three of the socialisation mechanism items are higher than 0.7, one of them is less than the desirable level. However, since it is more than 0.6, this item was not removed from the analysis. With regard to AVE, since it is equal to 0.6216, it is adequate for convergent validity. Moreover, the CR is 0.8662, thus it is sufficient for convergent validity.

There exists no problem with regard to convergent validity of subsidiary-subsidiary embeddedness. On the one hand, all the loadings are very high (more than 0.8). On the other, AVE and CR are more than the required level (0.7925 and 0.9197, correspondingly). Regarding tacitness, the loadings of all items are relatively high (all more than 0.7). Furthermore, AVE= 0.5631 and CR= 0.8374, which are higher than the required level of 0.5 and 0.7. Overall, the evidence provides initial support for the convergent validity of tacitness. Finally, for complexity, since (a) the loadings of all items are more than 0.7 (all of them more than 0.8), (b) AVE=0.6987 and (c) CR= 0.9025, there exists sufficient support for the convergent validity of complexity.

Table 4.3: Constructs' validity

Items	**Codes**	**AVE**	**Mean**	**SD**	**λ**	**t-value**	**R^2-value**
Reverse Knowledge Transfer Cronbach's Alpha= 0.900	RKT1	0.684	4.58	1.715	0.72	11.43	0.52
	RKT2		3.75	1.786	0.85	14.33	0.72
	RKT4		3.52	1.862	0.83	13.91	0.69
	RKT5		4.04	1.753	0.90	15.59	0.81
Knowledge Development Cronbach's Alpha=0.837	KD1	0.557	4.54	1.605	0.77	11.90	0.59
	KD3		4.33	1.795	0.71	10.78	0.51
	KD4		4.99	1.520	0.82	12.76	0.67
	KD5		4.35	1.778	0.68	10.07	0.46
Willingness Cronbach's Alpha=0.837	Will1	0.636	5.64	1.369	0.82	12.42	0.67
	Will2		5.39	1.591	0.83	12.71	0.69
	Will3		4.99	1.539	0.74	11.43	0.55
Subsidiary-parent firm embeddedness Cronbach's Alpha=0.888	HQemb1	0.723	4.54	1.652	0.85	13.79	0.72
	HQemb2		4.54	1.695	0.88	14.76	0.78
	HQemb3		4.73	1.576	0.82	13.07	0.68
Autonomy	Auto1	0.657	2.92	1.381	0.76	11.67	0.57

Cronbach's Alpha=0.882	Auto2		3.48	1.266	0.86	14.07	0.74
	Auto3		3.05	1.423	0.81	12.71	0.65
	Auto4		3.68	1.318	0.81	12.86	0.66
External embeddedness Cronbach's Alpha= 0.756	Exemb1	0.515	4.80	1.489	0.68	9.05	0.47
	Exemb2		4.57	1.477	0.69	9.58	0.47
	Exemb3		4.55	1.463	0.78	11.28	0.61
Shared Values Cronbach's Alpha= 0.807	SV3	0.617	4.72	1.797	0.74	10.68	0.54
	SV4		5.76	1.261	0.74	10.79	0.55
	SV5		5.57	1.402	0.87	14.07	0.75
Socialisation Mechanism Cronbach's Alpha= 0.864	SM1	0.621	3.91	1.845	0.88	14.83	0.78
	SM2		3.78	1.897	0.87	14.35	0.75
	SM3		3.61	1.820	0.73	11.14	0.54
	SM4		3.65	1.937	0.65	9.63	0.43
Subsidiary-sister subsidiaries Embeddedness Cronbach's Alpha= 0.919	Subemb1	0.792	3.62	1.623	0.88	14.86	0.78
	Subemb2		3.68	1.621	0.87	14.80	0.76
	Subemb3		3.45	1.615	0.92	15.81	0.84
Tacitness Cronbach's Alpha= 0.836	Tac1	0.563	4.33	1.891	0.73	10.49	0.53
	Tac5		4.66	1.809	0.77	11.35	0.59
	Tac8		4.04	1.815	0.78	11.89	0.61
	Tac13		4.77	1.691	0.72	10.58	0.52
Complexity Cronbach's Alpha= 0.900	Cmx3	0.698	5.02	1.673	0.81	12.86	0.65
	Cmx7		4.79	1.633	0.90	15.30	0.81
	Cmx8		4.70	1.597	0.83	13.43	0.69
	Cmx9		5.01	1.661	0.80	12.81	0.64

4.2.2.2. Discriminant Validity

Discriminant Validity refers to "*the extent to which a construct is truly distant from other variables*" (Hair et al., 2009, P. 710). In other words, Discriminant Validity helps researchers to investigate whether the construct measures a unique phenomenon that is not captured by other constructs. For discriminant validity, all average variance extracted (AVE) should be larger than the corresponding squared inter-construct correlation estimates (SIC).

Table 4.8 illustrates the Inter-construct Correlations (Φ matrix) and the related AVE. According to Table 4.4, all the related AVEs are larger than SIC consequently, thus discriminant validity is not a problem in this study. Bold numbers on the diagonal represent AVEs.

Table 4.4: Squared Inter-Construct Correlation Estimates and related AVEs

	1	2	3	4	5	6	7	8	9	10	11
(1) Reverse Knowledge Transfer	**0.684**										
(2) Knowledge Development	0.3721	**0.557**									
(3) Willingness	0.2304	0.0529	**0.636**								
(4) Subsidiary- parent firm Embeddedness	0.1521	0.1521	0.0676	**0.723**							
(5) Autonomy	0.0169	0.0441	0.0004	0.0009	**0.657**						
(6) External Embeddedness	0.3844	0.3025	0.09	0.16	0.0001	**0.515**					
(7) Shared Values	0.0784	0.0009	0.1444	0.0729	0.01	0.0001	**0.617**				
(8) Socialisation Mechanism	0.2116	0.0841	0.1681	0.0676	0.0025	0.04	0.2601	**0.621**			
(9) Subsidiary-sister subsidiaries Embeddedness	0.0729	0.04	0.0121	0.1681	0.0004	0.0289	0.0081	0.0484	**0.792**		
(10) Tacitness	0.04	0.0144	0.0001	0.0004	0.0025	0.0001	0.6084	0.0025	0.0036	**0.563**	
(11) Complexity	0.0961	0.0036	0.0064	0.0009	0.0081	0.0009	0.0256	0.0256	0.0009	0.0169	**0.698**

N=187, NNFI= 0.94, CFI = 0.94, IFI = 0.94

4.2.2.3. Explanatory Factor Analysis

Explanatory Factor Analysis (EFA) was done to (a) test whether all the items are loading on their expected constructs and (b) double check the cross-loadings in the new model (cross-loadings were also checked through modification indices, see Section 4.3.1.2.). As can be seen in Table 4.5, there are no cross-loadings and the EFA model identified 11 separate constructs with eigenvalues more than one (there are 11 constructs in the conceptual framework) and all items are loaded on their expected construct. These 11 constructs explain 76.62% of total variance. In addition, all of the loadings are above the normal cut-off value of 0.50 (Hair et al., 2006).

Table 4.5: Explanatory Factor Analysis

		Component										
		1	2	3	4	5	6	7	8	9	10	11
Reverse Knowledge Transfer	RKT1	.864										
	RKT2	.797										
	RKT4	.793										
	RKT5	.618										
Shared Values	SHVAL4		-.851									
	SHVAL5		-.795									
	SHVAL3		-.747									
Complexity	CMX7			.895								
	CMX8			.876								
	CMX3			.866								
	CMX9			.858								
Autonomy	AUT2				.876							
	AUT3				.863							
	AUT4				.854							
	AUT1				.829							
Subsidiary-Sister Subsidiaries Embeddedness	SUBEMB3					.933						
	SUBEMB1					.910						
	SUBEMB2					.894						
Tacitness	TAC1						.848					
	TAC5						.823					
	TAC13						.801					

	TAC8						.760					
Willingness	WILL2							.899				
	WILL1							.836				
	WILL3							.740				
Subsidiary-Parent Firm Embeddedness	HQEMB3								-.916			
	HQEMB2								-.868			
	HQEMB1								-.819			
External Embeddedness	EXTEM1									-.833		
	EXTEM3									-.794		
	EXTEM2									-.663		
Socialisation Mechanisms	SM2										-.846	
	SM1										-.843	
	SM4										-.827	
	SM3										-.656	
Knowledge Development	KD3											-.821
	KD5											-.755
	KD4											-.702
	KD1											-.567

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalisation.

a. Rotation converged in 12 iterations.

4.3. SEM Model

4.3.1. Fit Indices of SEM Model

The SEM model fit indices are slightly different from those of the CFA model. Usually, the fit indices of the former are slightly lower compared to those of the latter. For instance, while in SEM model, NNFI= 0.93, CFI = 0.94, IFI = 0.94, in CFI model, NNFI is 0.94. However, these fit indices represent good results considering Hair et al. (2009) fit indices' criteria. Although many contributions provide only these fit indices, it is better to consider other fit indices as well. The χ^2 of the CFA model is 1051.58 (P-value= 0.00) with df= 647. However, the χ^2 of the SEM model is 1141.24 (P-value = 0.0) with df= 672. Although, χ^2 has increased, this causes no problem given that (a) the P-value is still significant (it should be significant for models with more than 30 variables) and (b) the ratio of χ^2 to df is less than three ($\frac{\chi^2}{df}$ = 1.698) (Gefen et al., 2000, Browne and Cudeck, 1993). Finally, there are some differences between SRMR and RMSEA of the SEM and CFA model. For CFA model, RMSEA was 0.05 and SRMR was 0.058; these fit indices for the SEM model are 0.054 and 0.084, respectively. However, both of these indices are below 0.08 and 0.09 thresholds, which is satisfactory.

4.3.2. Hypothesis Testing

Figure 4.1 presents the result of hypothesis testing in which the dotted lines are rejected hypotheses. The results of the SEM model will be presented separately, based on knowledge, sender and relationship characteristics.

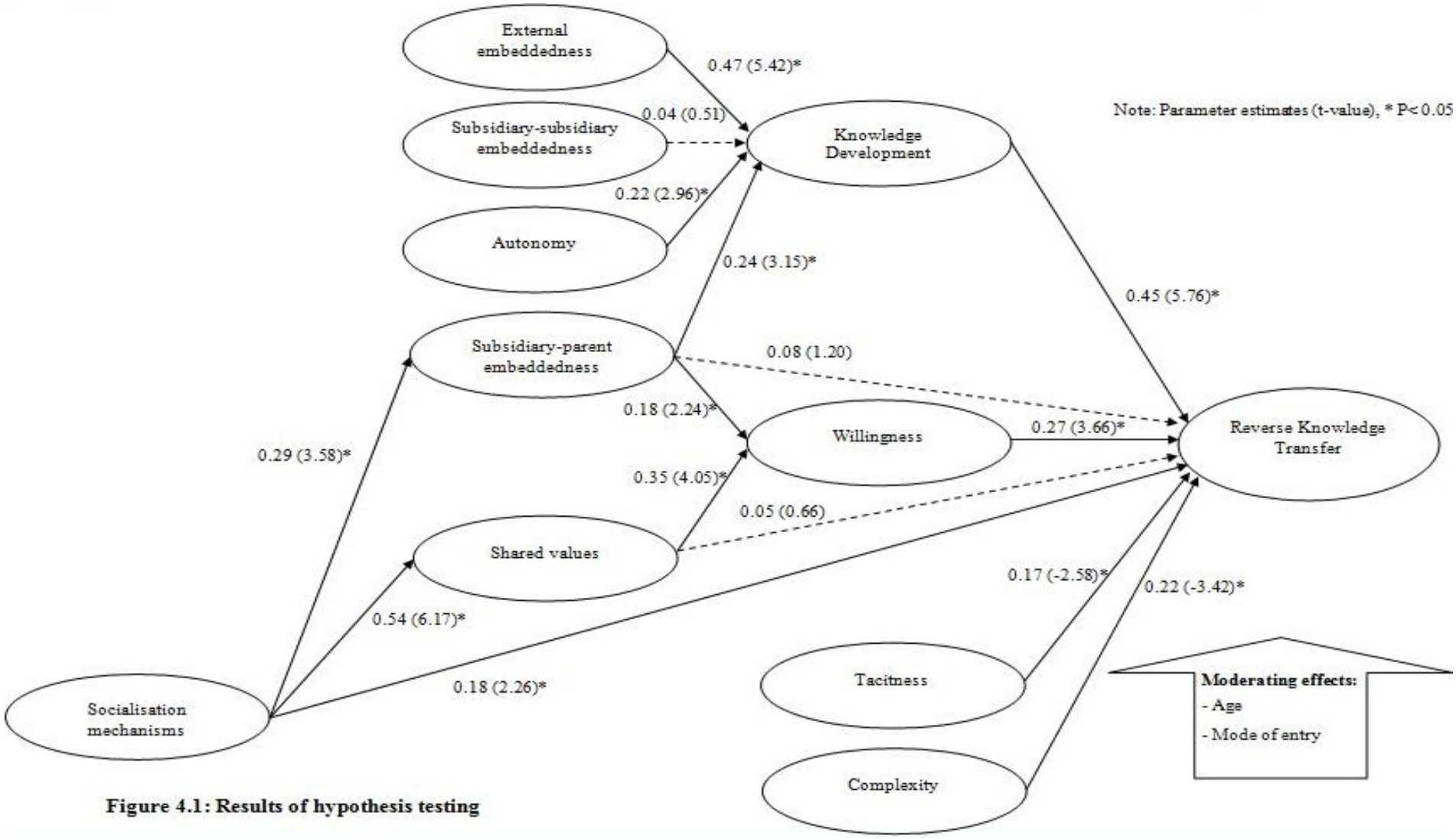


Figure 4.1: Results of hypothesis testing

4.3.2.1. Characteristics of Knowledge

Each relationship contains the information on parameter estimate and t-value. The research focuses on tacitness and complexity as characteristics of knowledge. The main aim was to understand how knowledge characteristics impact on the extent of knowledge transfer. In this regard, two hypotheses were developed. Hypothesis 1 anticipates the negative relationship between tacitness and the extent of reverse knowledge transfer. The results of SEM are also in line with this anticipation.

The t-value = -2.58, which shows that tacitness significantly and negatively influences the extent of reverse knowledge transfer. Hypothesis 1 is therefore supported.

Hypothesis 2 is related to negative impact on of complexity on subsidiary knowledge outflow. The results show that there is a significant negative interrelation between these two variables. The t-value for this hypothesis was -3.42, thus Hypothesis 2 is supported.

4.3.2.2. Characteristics of Subsidiary/Sender

Characteristics of sender were categorised into two groups: willingness and subsidiary knowledge development. According to Hypothesis 3, the more a subsidiary is willing to transfer its knowledge the more will be the extent of reverse knowledge transfer. Results strongly support this hypothesis (t-value 2.24), therefore Hypothesis 3 is supported. As to subsidiary knowledge development, this research is interested in investigating two main issues. Firstly, how subsidiary knowledge development impacts on the extent of reverse knowledge transfer. Secondly, what factors facilitate and/or hinder subsidiary knowledge development. In particular, the focus is on the impact of autonomy, external embeddedness, subsidiary-subsidiary embeddedness and subsidiary-parent firm embeddedness on subsidiary knowledge development.

According to the results, there is a strong positive relationship between subsidiary knowledge development and the extent of reverse knowledge transfer (t-value 5.76). Therefore, Hypothesis 4 is supported. Hypothesis 5 predicted that external

embeddedness positively influences the extent of knowledge development. The results are in line with this hypothesis (t-value 5.42) thus Hypothesis 5 is accepted. It is a very interesting finding since according to Table 4.2, there exists a negative correlation between external embeddedness and reverse knowledge transfer. However, according to the results of the SEM model, subsidiary external embeddedness positively and indirectly influences reverse knowledge transfer through increasing knowledge development. In other words, the impact of external embeddedness on subsidiary knowledge transfer is mediated by knowledge development. According to Hypothesis 6, there is a positive association between subsidiary-subsidiary embeddedness and the extent of subsidiary knowledge development. However, the results are not in line with this hypothesis, therefore Hypothesis 6 is rejected (t-value 0.51). Hypothesis 7 asserts that there exists a positive relationship between subsidiary knowledge development and the level of subsidiary autonomy. Results support this hypothesis (t-value 2.96) which is accepted.

4.3.2.3. Characteristics of Relationships

The relationship characteristics between sender and receiver were divided into three main categories: shared values, socialisation mechanisms and subsidiary-parent firm relationships. Hypothesis 8a anticipated a positive impact of socialisation mechanisms on subsidiary-parent firm embeddedness. The t-value, 3.58, for this relation is significant. As a result, Hypothesis 8a is strongly supported. According to Hypothesis 8b, the more socialisation mechanisms are employed, the more will be the extent of shared value between the subsidiary and its parent firm. The results strongly support this hypothesis (t-value 6.17). Finally, Hypothesis 8c concerns the interaction between socialisation mechanisms and the extent of subsidiary knowledge transfer. The results show that the employment of socialisation mechanisms positively and significantly increases the extent of reverse knowledge transfer. Consequently, Hypothesis 8c is supported.

The second set of hypotheses is related to the association between shared values, willingness and reverse knowledge transfer. Firstly, it was hypothesised in Hypothesis 9a that shared values impact positively on the extent of reverse knowledge transfer. However, results indicate that while there is a positive

relationship between these two constructs, this relationship is not significant (t-value 0.66). Therefore, Hypothesis 9a is rejected. Secondly, Hypothesis 9b anticipates that shared values indirectly facilitate reverse knowledge transfer through increasing subsidiary willingness and the results yield strong support for this hypothesis (t-value 4.05).

The last set of hypotheses is associated with the extent of embeddedness between the subsidiary and its parent firm. According to the results, while there is a positive association between subsidiary-parent firm embeddedness and the extent of reverse knowledge transfer, this relationship is not significant (t-value 1.20). Consequently, Hypothesis 10a is rejected. On the other hand, results show that subsidiary-parent firm embeddedness positively and significantly influences willingness (t-value 2.24). Therefore, Hypothesis 10b is supported. Finally, according to the results, there exists a strong link between subsidiary-parent firm embeddedness and knowledge development (t-value 3.15). Thus, Hypothesis 10c is strongly supported.

Table 4.6 summarises the major findings of the research.

Table 4.6: Summary of results of hypothesis testing

Hypothesis 1.	The more the tacitness of the knowledge, the less the extent of Reverse Knowledge Transfer.	Supported
Hypothesis 2.	The more the complexity of the knowledge, the less the extent of Reverse Knowledge Transfer.	Supported
Hypothesis 3.	The greater the willingness of the subsidiary, the greater the extent of Reverse Knowledge Transfer	Supported
Hypothesis 4.	The greater the extent of the subsidiary knowledge development, the greater the extent of Reverse Knowledge Transfer	Supported
Hypothesis 5.	The more embedded the subsidiary is in the host economy, the more it will be capable of developing new knowledge.	Supported
Hypothesis 6.	The more embedded is the relationship between the subsidiary and other sister subsidiaries, the more it will be capable of developing new knowledge.	Rejected
Hypothesis 7.	The more is the level of subsidiary's autonomy, the more it will be capable of developing new knowledge.	Supported
Hypothesis 8a.	The more socialisation mechanisms are employed, the more embedded the subsidiary is with its headquarters.	Supported
Hypothesis 8b.	The more socialisation mechanisms are employed, the more is the shared values between the subsidiary is with its headquarters.	Supported
Hypothesis 8c.	The more socialisation mechanisms are employed; the greater is the extent of Reverse Knowledge Transfer.	Supported
Hypothesis 9a.	The greater the shared values between a subsidiary and its parent company, the greater the extent of Reverse Knowledge Transfer.	Rejected
Hypothesis 9b.	The greater the shared values between a subsidiary and its headquarters, the greater the willingness of the subsidiary to transfer its knowledge to its parent firm.	Supported
Hypothesis 10a.	The more embedded is the relationship between the subsidiary and its headquarters, the more the subsidiary engages in the process of Reverse Knowledge Transfer.	Supported
Hypothesis 10b.	The more embedded is the relationship between the subsidiary and its headquarters, the more willing the subsidiary is to engage in Reverse Knowledge Transfer.	Rejected
Hypothesis 10c.	The more embedded is the relationship between the subsidiary and its headquarters, the more will be subsidiary knowledge development.	Supported

4.3.2.4. Mediating Impacts

In addition to testing the relationship between variables, this research is also interested in investigating whether the results would be the same in different groups or not. The subsidiaries were categorised by age and mode of entry. With regard to the age, the median was used to split the sample into two groups of old and young subsidiaries. Those subsidiaries established less than 15 years ago were categorised as young and the rest were considered as old.

4.3.2.4.1. Group Comparison on Age

Table 4.7 illustrates the result of group analysis. As can be seen, although there exists a negative relationship between tacitness and the extent of reverse knowledge transfer, these relationships are insignificant in the case of both young and old subsidiaries. Therefore, Hypothesis 1 is rejected in both categories. In contrast, as anticipated, complexity significantly and negatively influences the knowledge transfer of both young and old subsidiaries (Hypothesis 2).

As to the relationship between willingness and the extent of reverse knowledge transfer, there is a positive significant relationship between these variables in both groups of subsidiaries. Indeed, subsidiaries should be willing to allocate time and resources associated with transfer of highly tacit and complex knowledge. Thus, Hypothesis 3 is supported in both old and young subsidiaries. Moreover, results show that in order to be able to contribute to the knowledge of parent firms, subsidiaries should be capable of developing new knowledge in the first place. Consequently, Hypothesis 4 is valid in both young and old subsidiaries.

As mentioned earlier, knowledge development of KIBS companies relies heavily on accessing external sources of knowledge. The results are in line with this argument (in both old and young subsidiaries there exists a positive significant relationship between knowledge development and external embeddedness). Thus, Hypothesis 5 is supported. In contrast, for both groups of subsidiaries, there is no significant association between subsidiary-sister subsidiaries' embeddedness and

knowledge development. Therefore, Hypothesis 6 is rejected in the context of both young and old subsidiaries.

With regard to autonomy, for young subsidiaries this factor significantly and positively impacts on knowledge development. However, for old subsidiaries, although there is a positive correlation between these variables, it is not significant. Thus, Hypothesis 7 is supported for young subsidiaries but is rejected for old. In Hypothesis 8a it was assumed that use of socialisation mechanisms would result in creation of shared values. The results do illustrate a positive association between these variables. However, this relationship is significant only for the young subsidiaries. Additionally, it was hypothesized that shared values facilitate the extent of reverse knowledge transfer. Surprisingly, no support was found for Hypothesis 8b, neither for old subsidiaries nor for young ones. According to Hypothesis 8c, there is a positive association between socialisation mechanisms and the extent of reverse knowledge transfer. While this association is significant for old subsidiaries, there exists no support for Hypothesis 8c within the context of young subsidiaries.

Furthermore, according to the results, while shared values impact positively on the extent of subsidiary knowledge transfer, this relationship is not significant. Consequently, Hypothesis 9a is rejected within both groups of subsidiaries. In contrast, the existence of shared values significantly and positively increases willingness of both young and old subsidiaries (Hypothesis 9b). Hypothesis 10a is related to association between subsidiary-parent firm embeddedness and the extent of reverse knowledge transfer. The results show no support for this relationship, thus Hypothesis 10a is rejected in both age categories.

Furthermore, the results demonstrate a positive relationship between willingness and the extent of subsidiary knowledge transfer. However, this association is significant only within the context of old subsidiaries (Hypothesis 10b). Finally, while the embeddedness between a subsidiary and its parent firm significantly facilitates the knowledge development of young subsidiaries, this variable does not have any influence on knowledge development of old subsidiaries. This indicates that, while young subsidiaries are heavily dependent on resources

(mostly intangible) of their parent firms to be capable of creating knowledge, old subsidiaries become relatively less dependent.

Table 4.7 illustrates the structural parameter estimates and goodness-of-fit indices for two-group comparison on age.

Table 4.7: Structural parameter estimates and goodness-of-fit indices for two-group comparison on age

Path	**Hypothesis**	**Age**	
		Young (N= 90)	**Old (N= 84)**
Tacitness => RKT	Hypothesis 1.	-0.147	-0.109
Complexity => RKT	Hypothesis 2.	**-0.217****	**-0.277****
Willingness => RKT	Hypothesis 3.	**0.275****	**0.250****
Knowledge development => RKT	Hypothesis 4.	**0.396****	**0.441****
External embeddedness => Knowledge development	Hypothesis 5.	**0.452****	**0.576****
Sub-sub embeddedness => Knowledge development	Hypothesis 6.	0.08	0.054
Autonomy => Knowledge development	Hypothesis 7.	**0.390****	0.043
Socialisation mechanisms => Sub-HQ Embeddedness	Hypothesis 8a.	**0.415****	0.160
Socialisation mechanisms => Shared values	Hypothesis 8b.	**0.587****	**0.502****
Socialisation mechanisms => RKT	Hypothesis 8c.	0.161	**0.263****
Shared values => RKT	Hypothesis 9a.	0.094	0.84
Shared values => Willingness	Hypothesis 9b.	**0.358****	**0.317****
Sub-HQ embeddedness => RKT	Hypothesis 10a.	0.048	0.145
Sub-HQ embeddedness => Willingness	Hypothesis 10b.	0.099	**0.246***
Sub-HQ Embeddedness => Knowledge development	Hypothesis 10c.	**0.257****	**0.296****
Note: ** P < 0.05, * P < 0.10		CFI= 0.818; IFI= 0.827 $\chi 2$= 2104 (df: 1344)	

4.3.2.4.2. Group Comparison on Mode of Entry

In terms of modes of entry, subsidiaries are categorised into two groups: acquisition and greenfield. Table 4.8 shows structural parameter estimates and goodness-of-fit indices for two-group comparison on mode of entry.

According to the table, tacitness hinders the extent of subsidiary knowledge transfer. However, this association is only significant for acquired subsidiaries. Therefore Hypothesis 1 is rejected in the case of greenfield subsidiaries. In contrast, the results show that complexity impacts negatively and significantly on the extent of reverse knowledge transfer within both groups of subsidiaries. Consequently, Hypothesis 2 is supported in both categories.

As for the association between willingness and reverse knowledge transfer, results illustrate a very strong positive relationship. It can thus be concluded that within both acquired and greenfield subsidiaries, willingness plays a pivotal role in the success of reverse knowledge transfer. Therefore Hypothesis 3 is supported within the context of acquired and greenfield subsidiaries. In a similar vein, results yield a very strong support for Hypothesis 4. According to this hypothesis, ability of the subsidiary to develop new knowledge influences its contribution to the knowledge of the parent company. With regard to the facilitators of subsidiary knowledge development, results show that the extent of external embeddedness significantly and positively increases subsidiary's ability to create new knowledge (Hypothesis 5). However, this relationship is stronger for acquired subsidiaries than greenfield ones. The fact that acquired subsidiaries are more embedded than their counterparts may have impacts on the strength of this relationship.

According to the results, surprisingly, the impacts of subsidiary-sister subsidiaries' embeddedness on knowledge development differ in the two groups. While it impacts positively on the ability of greenfield subsidiaries to develop knowledge, it has negative influence on knowledge creation of acquired subsidiaries. Since these associations are not significant, neither for acquired subsidiaries nor for greenfield ones, Hypothesis 6 is rejected. Hypothesis 7 anticipated that the level of autonomy influences subsidiary's knowledge

development. According to Table 4.8, there is a positive association between these two variables in both groups. However, while this relationship is significant for acquired subsidiaries, it is insignificant in the case of greenfield subsidiaries. Hypothesis 8a concerns with the relationship between socialisation mechanisms and the extent of embeddedness between the subsidiary and its parent firms. In both cases, this relationship is significant; however; the association is stronger for the acquired subsidiaries (** $P < 0.05$).

Results illustrate that the extent of shared values is significantly linked to the use of socialisation mechanisms. As a result, Hypothesis 8b is supported across the two categories. There exists no support for Hypothesis 8c which anticipates a positive association between the extent of subsidiary knowledge transfer and the use of socialisation mechanisms. Consequently, Hypothesis 8c is rejected in both contexts. According to Hypothesis 9a, shared values facilitate reverse knowledge transfer. However, although this association is positive for both categories, it is not significant, thus Hypothesis 9a is rejected. In contrast, according to the results, the existence of shared values considerably boosts knowledge holder willingness. This correlation is significant and positive across the two groups, thus hypothesis 9b is supported.

The final set of hypotheses is related to the inter-correlation between subsidiary parent firm embeddedness on the one hand and the extent of reverse knowledge transfer, willingness and knowledge development on the other. While the subsidiary-HQ embeddedness increases both willingness and reverse knowledge transfer, this association is not significant. Therefore, Hypotheses 10a and 10b are rejected. Finally, the results demonstrate that subsidiary-parent firm embeddedness positively influences subsidiary capability to develop new knowledge. However, this relationship is significant only in the case of greenfield subsidiaries. This might be due to the fact that greenfield subsidiaries are less embedded in their local environment and as a result they are more reliant on the relationship with parent firms which can serve as source of knowledge.

Table 4.8: Structural parameter estimates and goodness-of-fit indices for two-group comparison on mode of entry

Path	Hypothesis	Mode of entry	
		Acquisition (N= 78)	Greenfield (N=99)
Tacitness => RKT	Hypothesis 1.	**-0.260****	-0.063
Complexity => RKT	Hypothesis 2.	**-0.232****	**-0.238****
Willingness => RKT	Hypothesis 3.	**0.253****	**0.301****
Knowledge development => RKT	Hypothesis 4.	**0.377****	**0.549****
External embeddedness => Knowledge development	Hypothesis 5.	**0.650****	**0.268***
Sub-sub embeddedness => Knowledge development	Hypothesis 6.	-0.10	0.068
Autonomy => Knowledge development	Hypothesis 7.	**0.200***	0.156
Socialisation mechanisms => Sub-HQ Embeddedness	Hypothesis 8a.	**0.431****	**0.194***
Socialisation mechanisms => Shared values	Hypothesis 8b.	**0.362****	**0.671****
Socialisation mechanisms => RKT	Hypothesis 8c.	0.164	0.199
Shared values => RKT	Hypothesis 9a.	0.003	0.075
Shared values => Willingness	Hypothesis 9b.	**0.349****	**0.366****
Sub-HQ embeddedness => RKT	Hypothesis 10a.	0.07	0.063
Sub-HQ embeddedness => Willingness	Hypothesis 10b.	0.148	0.169
Sub-HQ Embeddedness => Knowledge development	Hypothesis 10c.	0.183	**0.299****
Note: ** P < 0.05, * P < 0.10		CFI= 0.811; IFI= 0.820 $\chi 2$= 2104 (df: 1344)	

4.4. Conclusion

This section presented the result of data analysis. Data were analyzed by Structural Equation Modelling using LISREL 8. Two main steps were taken in data analysis: CFA and SEM. The main aim of CFA model was to identify cross loadings, check validity and reliability, and improving fit indices. After purifying the measures, structural model can be conducted. Output of SEM model indicated which hypotheses were rejected or supported.

Section 4.3 illustrated the CFA results. In Section 4.3.1 the process of purification of constructs' measurements was explained thoroughly. The details of a new model including the goodness and badness of fit were presented afterwards. In the last section, the SEM was run. The results of hypothesis testing and group analysis were presented in Section 4.4.2.

Part III

Discussion and Conclusions

CHAPTER 5

DISCUSSION OF RESULTS

5.1. Introduction

The results of empirical analysis presented in the previous chapter (Chapter 4) will be discussed further in this chapter. This chapter contains four main sections. In the first, the results (results of SEM model and group comparison) related to the relationship between knowledge characteristics and reverse knowledge transfer will be thoroughly examined. The second section interprets the results on association between sender characteristics and subsidiary knowledge transfer. Moreover, the results concerning the relationship between subsidiary knowledge development and its antecedents will also be explained in this section. The third section explores the results related to the impacts of relationship characteristics on reverse knowledge transfer. In the last section, an integrated framework of reverse knowledge transfer will be investigated comprehensively. .

5.2. Reverse Knowledge Transfer and Characteristics of Knowledge

This research focuses on tacitness and complexity as knowledge characteristics. For successful knowledge transfer, both sender and receiver should be aware of the implications of these characteristics for reverse knowledge transfer. Hypothetically, tacitness and complexity hinder the cross-border knowledge transfer through two different ways. On one hand, transfer of tacit and complex knowledge is considerably time and resource consuming, thus the subsidiary is usually reluctant to engage in knowledge sharing activities. On the other hand, tacitness and complexity decrease the ability of parent firms to fully understand and appreciate the knowledge existing in their subsidiaries. In other words, these knowledge characteristics decrease the absorptive capacity of the parent firm.

The results show that tacitness influences negatively and significantly the process of reverse knowledge transfer. The results of other studies (i.e. Szulanski, 1996, Hansen, 1999, McEvily and Chakravarthy, 2002) are also in line with these arguments. Simonin (2004), for instance, illustrated that this variable impedes the process of knowledge transfer through augmenting the level of ambiguity. Other scholars show that tacitness increases the cost associated with knowledge transfer and it usually results in misinterpretation (Buckley et al., 2009). The results of group analysis show that this association is significant only in the case of acquired subsidiaries. As for the insignificant association between tacitness and reverse knowledge transfer for greenfield, old and young subsidiaries, other contributions also found no significant correlation between these variables (e.g. Simonin, 1999a, Zander and Kogut, 1995, Minbaeva, 2007). The lack of support for the relationship between tacitness and reverse knowledge transfer in these subgroups might be for two main reasons: firstly, the importance of this variable might be outweighed by other constructs; secondly, the lack of evidence might be the result of limitations in the operationalisation of tacitness.

On the other hand, the results of group analysis indicate that complexity negatively and significantly influences reverse knowledge transfer in all cases. These results are in line with the findings of previous studies (Hansen, 1999). For instance, Reed and DeFillippi (1990) found that complexity negatively affects knowledge transfer through increasing casual ambiguity. Moreover, following McEvily and Chakravarthy (2002), the high level of complexity decreases the ability of the knowledge seeker to imitate completely a particular knowledge or skill.

The knowledge existing in the KIBS sector is categorised as application-oriented (Buckley/Pass/Prescott 1992; Johannisson 1998) and is therefore highly tacit and complex in nature. These types of knowledge usually reside in employees' skills and experiences and in contrast to the manufacturing sector they are rarely available in the form of patents and/or manuscripts. The overall results of this study point to the fundamental roles played by complexity and tacitness in the process of reverse knowledge transfer within the context of KIBS sector. Therefore, when it comes to transfer of knowledge within the context of KIBS

sectors, both subsidiary and its parent firm should consider the nature of knowledge and infrastructures needed for effective knowledge transfer. In doing so firstly, as suggested by KBV and information richness theory, both subsidiaries and their parent firms require to employ appropriate socialisation mechanisms (Kogut and Zander, 1993, Nonaka et al., 1996, Håkanson, 2005, Gorovaia and Windsperger, 2010). Socialisation mechanisms such as face-to-face interaction, joint training program, and teamwork substantially minimize the loss of knowledge and information which usually happen during the transfer of tacit and complex knowledge (Mudambi, 2002). Secondly, through creating shared values and close relationships headquarters can considerably ease the transfer of tacit and complex knowledge. The existence of shared values and embedded relations increases the absorptive capacity of parent firm (through increasing the awareness of parent firm about competences existing in the subsidiary) and promote sender-receiver commitment.

Table 5.1 presents the key findings with regards to association between knowledge characteristics and reverse knowledge transfer.

Table 5.1. Key findings on impact of knowledge characteristics on reverse knowledge transfer

Key concept	Knowledge characteristic influence the extent of reverse knowledge transfer
Key studies	DeFillippi (1990); Hansen (1999); McEvily and Chakravarthy (2002); Zander and Kogut (1995); Szulanski (1996); Simonin (1999b)
Key findings	Tacitness and complexity significantly significantly hinder knowledge transfer from the subsidiary to its parent firm

5.3. Reverse Knowledge Transfer and Characteristics of Sender

5.3.1. Willingness

According to Hypothesis 3, the higher level of willingness would increase the extent of subsidiary knowledge transfer. The results yield a strong support for this hypothesis. Current contributions also have highlighted the important role of willingness on knowledge transfer (Minbaeva, 2007, Gupta and Govindarajan, 2000, Inkpen, 2000). Instead of willingness, Minbaeva (2007) used the term 'motivation of the sender' and illustrated that this variable significantly influences the process of traditional knowledge transfer. Furthermore, Simonin (2004) looked at the implications of sender protectiveness (opposite side of spectrum) for cross-border knowledge transfer. He found that sender protectiveness negatively and significantly impacts on this process. Foss et al. (2009) show that the extent of knowledge sharing is significantly associated with motivation.

When it comes to subsidiary knowledge transfer within the context of KIBS firms, the importance of willingness becomes more noticeable. Firstly, contrary to the manufacturing sector, there are not many legal ways of protecting new ideas and knowledge developed by KIBS sectors. For instance, while patenting is one of the most popular means of protecting innovation within manufacturing industry, it is not appropriate within the service sector (except software companies) (Grosse, 1996). Therefore, due to fear of losing competencies, the KIBS subsidiaries might be reluctant to engage in the process of reverse knowledge transfer.

Secondly, as mentioned previously, knowledge existing in KIBS companies is highly tacit and complex. Transfer of tacit and complex knowledge requires the devotion of both sender and receiver. However, one of the hindrances of knowledge transfer identified by recent studies is the associated cost (Ba et al., 2001). In other words, the subsidiary might be reluctant to contribute to the knowledge of its parent firm due to the time and resources required for knowledge transfer.

The results of group analysis on both age and mode of entry also indicate that for all of the subgroups (old vs. young subsidiaries and greenfield vs. acquired subsidiaries) willingness is one of the fundamental predictors of reverse knowledge transfer. To sum up, for successful reverse knowledge transfer, parent companies need to use appropriate incentive mechanisms to increase the willingness of their subsidiaries to transfer their knowledge.

5.3.2. Knowledge Development

Hypothesis 4 predicts that the ability of a subsidiary to develop new knowledge influences positively the extent of reverse knowledge transfer. The results are indeed in accord with this hypothesis. Other studies on subsidiary knowledge transfer also emphasise the link between knowledge development and reverse knowledge transfer. Håkanson and Nobel (2001), for instance, show that innovativeness of the subsidiary significantly influences its ability to contribute to the knowledge of its parent firm. Instead of knowledge development, Gupta and Govindarajan (2000) focused on stock of knowledge. They found that the subsidiary's stock of knowledge is one of the main facilitators of subsidiary knowledge outflow.

The results of group comparison are also in line with the aforementioned contributions. Irrespective of age or mode of entry, the subsidiary should be able to develop new knowledge to be capable of contributing to the knowledge base of its headquarters.

Table 5.2 illustrates the key findings with regards to association between subsidiary characteristics and reverse knowledge transfer.

Table 5.2. Key findings on impact of subsidiary characteristics on reverse knowledge transfer

Key concept	Subsidiary (sender) characteristic influence the extent of reverse knowledge transfer
Key studies	Inkpen (2000); Minbaeva (2007); Simonin (2004); Foss et al. (2009); Håkanson and Nobel (2001); Gupta and Govindarajan (2000)
Key findings	Willingness and knowledge development are one of the main facilitators of reverse knowledge transfer.

5.3.3. Determinants of Knowledge Development

5.3.3.1. External Embeddedness

Hypothesis 5 is looking at the relationship between external embeddedness and the extent of reverse knowledge transfer. The output of the SEM model is in line with this hypothesis. Embedded relations serve as knowledge gathering devices that boost the ability of the firm to develop knowledge. Previous contributions also support this finding (i.e. Birkinshaw, 1996, Håkanson and Nobel, 2001, Almeida and Anupama, 2004). Andersson el al. (2005) and Håkanson and Nobel (2001) show that the extent of embeddedness with local actors indeed impacts positively on the innovativeness of the subsidiary. Birkinshaw (1996) found that local actors are one of the main sources of competitive advantages for focal subsidiaries. Fritsch et al. (2010) demonstrate that the existence of close ties increases knowledge development through increasing the accessibility of knowledge.

Similarly, the results of group comparison on age show that within both old and young subsidiaries, external embeddedness plays a very important role in knowledge development. However, the group analysis on mode of entry shows that this association is significant in both groups but is stronger for acquired

subsidiaries. According to Saliola and Zanfei (2009), building embedded relations is a very time consuming process. It has been broadly accepted that compared to the greenfield subsidiaries, acquired subsidiaries are more embedded in their local environment (Håkanson and Nobel, 2001). This means that acquired subsidiaries have more access to the local resources of knowledge since these embedded relations result in the creation of trust. Consequently, the importance of having embedded relations with local actors is more evident for acquired subsidiaries compared to their counterparts, greenfield subsidiaries.

Within the KIBS sector, knowledge creation is crucial for the success and even survival of KIBS companies. In fact, KIBS companies are defined as firms that are highly involved in creation and exchange of knowledge (Miles et al., 1995). In doing so, KIBS firms should have access to 'specialised knowledge' (Koch and Strotmann, 2008). According to the literature on the service industry and in particular the KIBS sector, local actors are the main source of specialised knowledge. Customers of KIBS firms are even termed co-producer or co-creator of knowledge (den Hertog, 2000). Following Bettencourt et al. (2002), the success of KIBS firms depends solely on the effectiveness of interactions with their customers. Therefore it can be concluded that KIBS subsidiaries are required to be fully integrated in their local environment to be capable of developing new knowledge.

5.3.3.2. Subsidiary-Subsidiary Embeddedness

With regard to the relationship between subsidiary-sister subsidiary embeddedness and knowledge development, neither the main results nor the result of group comparison (on age and mode of entry) supported Hypothesis 6. Hypothetically, ties and relationships are considered as information gathering mechanisms (Rogers and Larsen, 1984). This is mainly due to the fact that close relationships create trust between knowledge holder and knowledge receiver. This means that the possibility that the knowledge holder intentionally restricts knowledge sharing activities becomes less. Consequently, one can assume that accessing market know-how is not the only source of competitive advantage. It could be coupled with the knowledge residing in other subsidiaries of the same corporation. Sister subsidiaries are in diverse locations and therefore they have

access to different sources of knowledge. It has been broadly accepted that MNCs could survive only through integrating and assimilating knowledge existing in different parts of a corporation (Teece, 2000, Kostova, 1999, Lane et al., 2001, Hymer, 1976).

However, against all of these arguments, results indicate that although there is a positive relationship between subsidiary-sister subsidiary embeddedness and knowledge development, this relationship is not significant. This might be for several reasons. Firstly, as mentioned earlier, in order to be successful KIBS sectors should be fully integrated into their local environment. However, the high level of external embeddedness is usually associated with a higher level of context-specificity of the relations (Andersson et al., 2002). This means that the subsidiary will assign more resources including time to those relation-specific activities, which could prevent them from contributing to the knowledge base of other parts of the MNC, including sister subsidiaries.

Secondly, the knowledge of KIBS subsidiaries is usually embedded in the employees' activities and skills and is thus highly tacit in nature. These types of knowledge could be effectively transferred only through rich transmission mechanisms (i.e. face to face interactions). This means that both sender and receiver should be willing to allocate time and resources for knowledge transfer activities. Nevertheless, on one hand, for fear of losing monopoly power and absence of reliable protection mechanisms (such as patents), in the KIBS sector sister subsidiaries might not be willing to share their knowledge with the focal subsidiary. On the other hand, the focal subsidiary might ignore the competencies residing in other sister subsidiaries due to the 'not invented here' syndrome or just because it is very hard to understand and recognise the value and potentials of tacit knowledge. Finally, this insignificant relationship might be due to the timing of the study. The data were collected during the recession when all the companies were struggling to survive. Such a business environment might reduce the ability of a focal subsidiary to contribute to the knowledge base of other sister subsidiaries.

5.3.3.3. Autonomy

According to Hypothesis 7, autonomy has a positive impact on knowledge development. The results yield a strong support for this hypothesis. The extant literature on knowledge development also highlights the importance of autonomy (i.e. Gupta and Govindarajan, 1991, Frost et al., 2002, Cantwell et al., 2010). Miller at al. (1988), for instance, argue that autonomy impacts negatively on knowledge development through decreasing the openness of the firm towards new ideas. Cantwell and Piscitello (1999) also found that a low level of autonomy prevents a subsidiary from making decisions independently and thus it impedes knowledge creation. Within the KIBS sector, firms should develop and maintain embedded relationships with their local actors (suppliers, customers, etc.) to be capable of developing new knowledge. However, a high level of control prevents these firms from building close and strong ties with the local environment and therefore it hinders their learning patterns (Damanpour, 1991, Miller et al., 1988).

However, the results of multiple group analysis are inconsistent. As for group comparison on age, aligned with prior studies, this association is positive and significant. However, while within the old subsidiaries this relationship is positive, it is not significant. The parent company usually limits the level of its subsidiaries autonomy to make sure that aims and activities of its subsidiaries are in accord with the whole corporation agendas. However, the older the subsidiary becomes the closer and stronger would be its relationships with the parent firm. These embedded relations create trust, which in turn decreases the need for low level of autonomy. Furthermore, sometimes the HQ prefers to restrict the level of its subsidiaries' autonomy indirectly through socialisation mechanisms (Harzing and Noorderhaven, 2006). Consequently, it might be very hard for subsidiaries to specify accurately the extent to which their HQ controls them.

With regard to group comparison on mode of entry, although in both cases the relationship between autonomy and knowledge development is positive, it is only significant in the context of acquired subsidiaries. This might be due to the differences between these types of subsidiaries. Greenfield subsidiaries are established from scratch by the parent firm itself and their structure is to a large extent in line with the structure of parent firm (Håkanson and Nobel, 2001). They

are considerably dependent on the knowledge of their parent firm rather than market knowledge. On the other hand, given that the acquired subsidiaries had existed beforehand, they might be more interested in pursuing their own aims. Compared to the greenfield subsidiaries, they are less integrated into the MNC and cultural differences are prevalent. In some cases, employees of the acquisition might be reluctant to even have direct interactions with their HQ (Håkanson and Nobel, 2001). Therefore the parent company might place more control on its acquired subsidiaries due to the uncertainties about subsidiaries' initiatives. This high level of control then hinders knowledge development of these subsidiaries through stopping them from developing and sustaining embedded relationships with local actors (the main source of knowledge).

Table 5.3 presents the key findings on determinants of subsidiary knowledge development.

Table 5.3. Key findings on determinants of knowledge development

Key concept	There exists close association between subsidiary's organizational structure and its ability to develop knowledge
Key studies	Almeida et al. (2004); Birkinshaw (1996); Håkanson and Nobel (2001); Andersson el al. (2005); Rogers and Larsen (1984); Kostova (1999); Cantwell et al. (2010); Frost et al. (2002); Damanpour (1991); Miller et al. (1988)
Key findings	Subsidiary-parent firm embeddedness, external embeddedness, and autonomy are the main facilitators of know development. Subsidiary-sister subsidiaries embeddedness are not influential

5.4. Reverse Knowledge Transfer and Characteristics of Relationship between Sender and Receiver

5.4.1. Socialisation Mechanism and Subsidiary-Parent Firm Embeddedness

Results indicate that socialisation mechanisms are strongly and positively linked to the subsidiary-HQ embeddedness. In a similar vein, previous studies found that use of socialisation mechanisms could improve the relationship between the subsidiary and its parent firm (i.e. Schreiner et al., 2009, Bresman et al., 2010). For instance, Bresman et al. (2010) found that a *social community* emerges as a result of employment of socialisation mechanisms. Furthermore, Schreiner et al. (2009) show that through diminishing uncertainties the socialisation mechanism could facilitate the creation of strong bonds.

The results of group comparison on mode of entry also indicate that socialisation mechanisms increase embeddedness between the subsidiary and its parent firm. However, this relationship is more significant in the case of acquired subsidiaries (significant at 0.05). Greenfield subsidiaries rely heavily on knowledge of their parent firm. Håkanson and Nobel (2001) found that this reliance results in a high level of integration between a subsidiary and its HQ. This means that the fact that greenfield subsidiaries depend on their parents firm knowledge resources has itself resulted in more embedded relationship which in turn could outshine the impact of socialisation mechanisms.

As to group analysis on age, the link between socialisation mechanisms and subsidiary-HQ embeddedness is only significant for young subsidiaries. The lack of evidence on this association could be explained by the impact of age on relationships. The older subsidiaries have already developed embedded relations with their parent. Therefore the existence of socialisation mechanisms could cause no considerable difference in the extent of embeddedness between old subsidiaries and their parent firms.

5.4.2. Socialisation Mechanism and Shared Values

Previous studies found a positive correlation between the socialisation mechanism and the extent of shared values (i.e. Dyer and Nobeoka, 2000). The results of the SEM model are in line with the findings of the prior studies. The more the socialisation mechanisms are employed, the more would be the frequency of interaction between parent firm and its subsidiary. These interactions then will form common values and language (Håkanson and Nobel, 2001) and joint visions and norms (Mudambi et al., 2007) between the two units. Likewise, Dyer and Nobeoka (2000) found that shared values emerged between the subsidiary and its parent company in the process of socialisation.

The results of multiple group analysis also strongly support the hypothesis 8b. Regardless of age or mode of entry the association between socialisation mechanisms and shared values is positive and significance in all subgroups. Lack of shared values could result in creation of conflicts between units. Therefore, within the context of KIBS sector where all units are located in diverse geographical locations socialisation mechanisms play pivotal role in forming a uniform organisational culture and language, or in other words creating shared values.

5.4.3. Socialisation Mechanism and Reverse Knowledge Transfer

The important role of socialisation mechanisms on cross-border knowledge transfer has been consistently highlighted by the extant literature (i.e. Björkman et al., 2004, Bresman et al., 2010, Schulz, 2003). For instance, Noorderhaven and Harzing found that socialisation mechanisms facilitate subsidiary knowledge outflow. They also illustrate that those mechanisms mediate the impact on the relationship between subsidiary knowledge outflow and its antecedents. Gupta and Govindarajan (2000) show that socialisation mechanisms significantly ease subsidiary knowledge inflow and outflow. Consistent with these findings, the results show that indeed there exists a positive significant relationship between these two variables.

Knowledge residing in KIBS firms is highly tacit in nature (Doloreux et al., 2008). Beaverstock (2004) found that inter-personal interactions and socialisation mechanisms are the main method for transferring and/or exchanging tacit knowledge across professional service firms. Lowendahl (2001) claimed that different mechanisms should be used for transferring tacit and explicit knowledge. He asserts that "*when knowledge is tacit, it can be transferred as tacit, through interpersonal mechanisms such as socialisation and training . . . explicit knowledge can be transferred as explicit, or converted to new knowledge through the combination of different categories of explicit knowledge*" (Lowendahl et al., 2001, P. 920). However, according to the results of group comparison, the relationship between socialisation mechanisms and reverse knowledge transfer is significant only in the case of old subsidiaries. This might be due to the fact that the knowledge residing in the old subsidiaries might have become too localized or in other words highly tacit in nature. As a result, the existence of socialization mechanisms can substantially ease the transfer of such knowledge. The importance of socialisation mechanisms could be outshone by other more important factors such as knowledge characteristics or knowledge development.

Overall, it is expected that the existence of socialisation mechanisms plays a fundamental role in the KIBS sector. On one hand, subsidiaries of the KIBS sector need to have close and frequent relations with their external environment to be capable of developing knowledge. On the other, the more the external embeddedness, the higher the possibility that a subsidiary's managers prefer to align their activities with their local environment rather than with the whole corporation (Andersson and Forsgren, 1996). Use of socialisation mechanisms decreases the conflicts resulting from these distractions and thus not only increases the integration (Lindsay et al., 2003) but also creates shared values between the subsidiary and its parent firms. The results also indicate that through use of appropriate socialisation mechanisms HQ could facilitate the process of reverse knowledge transfer.

5.4.4. Shared Values, Reverse Knowledge Transfer and Willingness

The findings of previous contributions (Bhagat et al., 2002, Tenkasi, 2000, Kogut and Zander, 1992) on international knowledge transfer show that the existence of shared values facilitates knowledge sharing activities through creating trust and shared understanding. In contrast to these findings, neither the results of the SEM model nor the result of group comparison support this association (Hypothesis 9a). In the extant literature on subsidiary knowledge transfer, there are some studies (Zhou and Frost, 2003, Ambos et al., 2006) that also could not find any connection between shared values and reverse knowledge transfer.

The lack of support on direct impact of shared values on reverse knowledge transfer might hide other paths through which shared values are significant. Therefore, it was checked whether willingness mediates the impact of shared values on reverse knowledge transfer. The results yield strong support for Hypothesis 9b. Similarly, the results of group comparison show that the association between shared values and willingness is significant in all subgroups. Knowledge existing in KIBS firms is highly context-specific. Transfer of such knowledge entails lots of effort and takes time.

The existence of shared values increases willingness in two different ways. Firstly, shared values boost absorptive capacity of parent firms (Lane and Lubatkin, 1998). It means that the subsidiary needs to allocate less resources and time on knowledge transfer activities. Therefore, shared values increase subsidiaries' willingness by decreasing the cost related to knowledge transfer activities. Secondly, shared values create trust. Trust is an essential factor of knowledge transfer in KIBS companies (Empson, 2001, Beaverstock, 2004) since it assures the transferor that there will be appropriate award if he/she shares her/his knowledge with other parts of corporations (Empson, 2001, Nahapiet and Ghoshal, 1998). Consequently, shared values raise subsidiary's willingness through creating trust.

5.4.5. Subsidiary-Parent Firm Embeddedness, Reverse Knowledge Transfer and Willingness

As for the interrelationship between subsidiary–parent firm embeddedness and reverse knowledge transfer, the results show no significant association between these two variables. Contrary to these results, the extant literature on cross-border knowledge transfer consistently highlights the important role of embeddedness in knowledge transfer (Szulanski, 1996, Kogut and Zander, 1993, Nahapiet and Ghoshal, 1998). For instance, Håkanson and Nobel (2001) found that integration between the subsidiary and its parent firm is positively associated with reverse knowledge transfer. Szulanski (1996) demonstrates that an *odorous relation* impacts negatively and significantly on knowledge transfer.

Given the lack of evidence on the association between embeddedness and subsidiary knowledge transfer (Hypothesis 10a) similar to shared values, it was checked whether willingness mediates the relationship between these two variables. The results show that the closeness and strength of the relationship positively influence subsidiary's willingness in the context of the KIBS sector. The existence of close bonds helps the parent firm to both identify and understand the competencies existing in its subsidiary. Therefore, in such circumstances, the subsidiary requires to allocate less time and resource on such transfer, which in turn could increase the willingness.

Overall, the results of Hypotheses 9b and 10b highlight the fundamental role of willingness in the success of reverse knowledge transfer within the KIBS sector. Without willingness, the probability of successful reverse knowledge transfer is very low, thus it is very important for parent firms to employ appropriate incentive mechanisms.

5.4.6. Subsidiary-Parent Firm Embeddedness and Knowledge Development

The results show that embeddedness between the subsidiary and its parent firm significantly influences the former's ability to develop new knowledge. According

to previous contributions on knowledge development, accessing the various sources of knowledge could facilitate ability of the firm to develop knowledge (Turner and Fauconnier, 1997, Frost, 2001). Mudambi and Navarra (2004), for instance, illustrate that there is a close relationship between the level of subsidiary knowledge inflow and outflow. Therefore, in addition to the other subsidiaries and local actors, the parent firm can serve as one of the main sources of knowledge for the subsidiary. Embedded relations can serve as knowledge gathering devices (Rogers and Larsen, 1984) and they ease the exchange of knowledge between sender and receiver through creating trust. Thus, through embedded relationships, a subsidiary could benefit more from the competencies existing in its parent company. These then increase the ability of the subsidiary to develop knowledge.

The results of group comparison show that irrespective of subsidiary age, knowledge of parents firm is indeed one of the main predictors of subsidiary knowledge development. As for the group comparison on mode of entry, results are not consistent across the two subgroups. While the association between subsidiary-parent firm embeddedness and knowledge development is positive across both greenfield and acquisition, it is significant only in the case of greenfield. This result reflects the earlier finding of this research wherein external embeddedness impacts significantly on the knowledge development of acquisitions (Hypothesis 5). This demonstrates that while the main source of knowledge development for the acquired subsidiary is its local environment, that of competitive advantages for the greenfield subsidiary is its parent firm. In other words, the influence of embeddedness (between a subsidiary and its parent firm) on knowledge development is considerably more for greenfield subsidiaries.

Table 5.4 shows the key findings on association between sender-reciever characteristics and reverse knowledge transfer and knowledge development.

Table 5.4. Key findings on impact of characteristics of sender-receiver relationship on reverse knowledge transfer and knowledge development

Key concept	The relationship between the subsidiary and its parent firm is one of the main determinants of reverse knowledge transfer
Key studies	Bresman et al. (2010); Håkanson and Nobel (2001); Dyer and Nobeoka (, 2000); Björkman et al. (2004); Schulz (2003); Gupta and Govindarajan (2000); Andersson and Forsgren (1996); (Lane and Lubatkin (1998); Noorderhaven and Harzing (2009); Szulanski (1996)
Key findings	• Socialisation mechanisms not only positively influence reverse knowledge transfer but also augment the extent of shared value and subsidiary-parent firm embeddedness • Shared values and subsidiary-parent firm embeddedness have no direct impact on reverse knowledge transfer. However, through willingness these factors positively influence reverse knowledge transfer • Subsidiary-parent firm embeddedness increase the ability of the subsidiary to develop knowledge

5.5. Integrated View of Reverse Knowledge Transfer

Building on KBV and network perspective and combining key contributions on both knowledge transfer and reverse knowledge transfer, three main determinants of reverse knowledge transfer were identified: characteristics of subsidiary (knowledge development and willingness), characteristics of relationship (subsidiary-parent company embeddedness, shared values, and socialisation mechanisms), and characteristics of knowledge (tacitness and complexity). The main aim of this research is to investigate the joint impact of these factors on subsidiary knowledge transfer. In other word this study tries to specify the relative importance of each group of determinants.

Overall, the results indicate that characteristics of sender, knowledge, and relationships directly impact reverse knowledge transfer. However, relationship characteristics emerge as the most important factors due to their indirect and direct implications.

According to the results, the characteristics of subsidiary-HQ relationships play a pivotal role in subsidiary knowledge transfer. Within the three determinants, only the association between socialisation mechanisms and reverse knowledge transfer is statistically significant. However, the impacts of shared values and subsidiary-parent firm embeddedness on subsidiary knowledge transfer are two-folds. On one hand, these determinants ease intra-firm knowledge transfer through increasing willingness. On the other, embedded relationship influence reverse knowledge transfer through knowledge development. The results indicate that those subsidiaries nurturing close relations with both their internal and external environment are more capable of developing knowledge. In similar vein, Szulanski (1996) found that arduous relationship is one of the main hindrances of intra-firm knowledge transfer.

The results of analysis indicate that the characteristics of subsidiary were amongst one of the most influential factors of reverse knowledge transfer. In other words, for reverse knowledge transfer to happen the subsidiary should develop knowledge and be willing to share its knowledge. This finding is in line with Minbaeva (2007) contribution wherein she found that sender characteristics are one of the main predictors of knowledge transfer. In their comprehensive study of subsidiary knowledge outflow, Gupta and Govindarajan (2000) illustrate that sender's motivation and stock of knowledge significantly influence knowledge flow.

Finally, while relationship and subsidiary characteristics emerge as the key facilitators, knowledge characteristics were recognized as the main hindrances of subsidiary knowledge transfer. This is in-line with Simonin (1999b, 2004) contribution where he demonstrated that knowledge characteristics deter knowledge transfer through increasing ambiguity. Figure 5.1 illustrates the associations between reverse knowledge transfer and its antecedences.

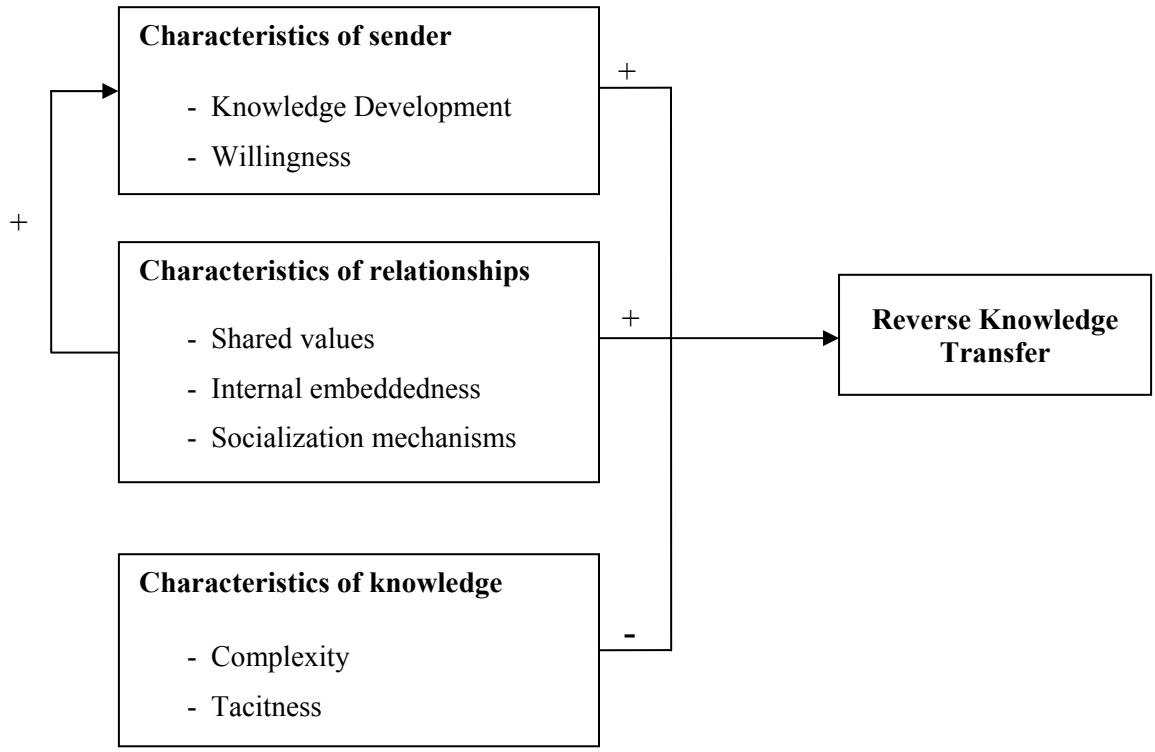


Figure 5.1: Determinants of Reverse Knowledge Transfer

CHAPTER 6

CONCLUSION AND LIMITATIONS

6.1. Introduction

This thesis has investigated the facilitators and impediments of knowledge transfer from the subsidiary to its parent firm within the KIBS sector.

In the extant literature on international business there are many contributions exploring knowledge transfer (Minbaeva, 2007, Simonin, 1999b, Szulanski, 1996). However, while these studies provide invaluable insight, they are limited at least from two perspectives. Firstly the majority of these studies are based on KBV and thus they underestimate the impacts of internal and external relations on subsidiary knowledge transfer (Mu et al., 2007). Secondly, few of these studies have been conducted within service sector (Grosse, 1996, Moore and Birkinshaw, 1998, Yamin, 1999) and therefore it is not clear whether findings of prior studies on manufacturing sector are generalisable across services and in particular KIBS sector. Through focusing on reverse knowledge transfer within the KIBS sector this study extends our understanding of this phenomenon. This research not only identifies the key facilitators and impediments of reverse knowledge transfer but also key out the main determinants of subsidiary knowledge development.

The main aim of this concluding chapter is to highlight the key findings, implications, and limitations of this research. It begins with addressing the questions introduced in the first chapter (introduction). Moreover, it demonstrates how the findings of this research could benefit parent firms as well as subsidiaries. The contributions of the research will be illustrated in Section 6.4. Finally, this chapter presents the limitations of the present research and the directions for future studies.

6.2. Summing up

This research aims to contribute to the extant literature by addressing the following questions:

1. What are the conditions under which subsidiaries develop knowledge?

2. Do subsidiaries engage in knowledge transfer?

    2.1. If they do, What Kind of knowledge is transferred?

    2.2. If they do, what factors influence knowledge transfer from a subsidiary to its parent company?

        2.2.1. To what extent do the characteristics of the subsidiary impact on the Reverse Knowledge Transfer?

        2.2.2. To what extent do the characteristics of knowledge impact on the Reverse Knowledge Transfer?

        2.2.3. To what extent do the characteristics of the relationship between subsidiary and parent company impact on the Reverse Knowledge Transfer?

Drawing on an empirical sample of 187 subsidiaries within the KIBS sector, this research finds empirical evidence on the positive relationship between knowledge development and subsidiary-parent firm embeddedness. Similar to findings of prior studies (Cantwell and Mudambi, 2005, Miller et al., 1988), the results of this research confirm that autonomous subsidiaries are more capable of developing knowledge. Furthermore, according to the literature on KIBS sector, the linkages with local environment (customers, suppliers, competitors, universities, and research institutes) are the main determinants of subsidiary knowledge development. The results are indeed in line with prior findings and they indicate that while external embeddedness has the highest impact, autonomy has the lowest influence on subsidiary knowledge development.

Looking at research question 2, the results show that subsidiaries of KIBS sector indeed transfer their knowledge to HQ. Amongst various types of knowledge, sale and marketing know-how was mainly transferred followed by management systems and practices know-how, distribution know-how, and strategy know-how. As for the characteristics of the subsidiary/sender, this research focuses on two sets of characteristics: willingness and knowledge development. In line with findings of prior contributions (Gupta and Govindarajan, 2000, Szulanski, 1996, Minbaeva, 2007, Empson, 2001), the results show that willingness impacts significantly on subsidiary knowledge transfer. With regard to knowledge development, the results indicate that this variable is the strongest predictors of reverse knowledge transfer. This is in accord with Håkanson and Nobel (2001) contribution wherein they find a significant link between subsidiary innovativeness and reverse knowledge transfer. Overall, according to the results, sender characteristics influence subsidiary knowledge transfer positively and significantly.

The second sub-question focuses on the relationship between knowledge characteristics and reverse knowledge transfer. Within various types of knowledge characteristics, this research investigates how tacitness and complexity influence subsidiary knowledge transfer. Similar to Reed and DeFillippi (1990), McEvily and Chakravarthy (2002), and Simonin (1999a) contributions, the results show that both tacitness and complexity significantly hinder this process. Moreover, the output of the SEM model indicates that compared to tacitness, complexity has stronger contributions to explain the extent of reverse knowledge transfer.

The third sub-question explores the association between characteristics of the subsidiary-parent firm relationship and the extent of reverse knowledge transfer. This research considers subsidiary-parent company embeddedness, socialisation mechanisms and shared values as relationship characteristics. The results support only the link between socialisation mechanisms and reverse knowledge transfer. The important role of socialisation mechanisms on subsidiary knowledge transfer was also emphasized by many scholars (i.e. Gupta and Govindarajan, 2000, Noorderhaven and Harzing, 2009). The results indicate that shared values and subsidiary-parent firm embeddedness influence reverse knowledge transfer

through increasing willingness. Furthermore, according to the output of SEM model, socialisation mechanisms not only significantly increase the extent of shared values but also strengthen the closeness of relationship between the subsidiary and its parent firm.

Overall, according to the results willingness, socialisation mechanisms and knowledge development (as facilitators) and tacitness and complexity (as hindrances) are the main predictors of reverse knowledge transfer. Amongst these factors, knowledge development has the strongest and socialisation mechanism has the lowest contributions to explain the extent of subsidiary knowledge transfer.

6.3. Implications of Results

This study sheds light on several factors impacting on firstly the extent of reverse knowledge transfer and secondly knowledge development within the KIBS sector. The following sections highlight the implications of these findings both for parent firm and subsidiaries. They also provide some suggestions and policies on optimizing subsidiaries' ability to develop and transfer knowledge.

6.3.1. For Parent Firms

One of the most important findings of this research is the key role of relationship between the subsidiary and its parent firm. Subsidiary-parent firm relationships are not only a vital element of subsidiary knowledge development but also proved to increase willingness of the subsidiary to transfer its knowledge. The output of the SEM model suggests that the extent of subsidiary knowledge transfer depends on knowledge development, socialisation mechanisms, willingness, tacitness and complexity. These results have several implications for headquarters:

Through providing the necessary infrastructure the parent firm can maximises the ability of the subsidiary to develop knowledge. In this regard, according to the results, subsidiary-parent firm embeddedness increases significantly and positively the knowledge development of the focal subsidiary. This is due to the

fact that close relations serve as the only effective means of transferring knowledge and indeed it is through these relations that the parent firm (a) recognises what its subsidiary's requirements are and (b) is motivated to transfer such knowledge to its subsidiary. This indicate that rather than focusing only on motivation mechanisms, parents firms should maintain close relations with their subsidiaries.

Moreover, results show that the local environment is one of the main indicators of knowledge development in the KIBS sector. Through close relations and frequent interactions, KIBS firms along with their local actors co-create or co-produce new knowledge. However, subsidiaries that have low level of autonomy are not able to be fully integrated into their local environment. Low level of embeddedness decreases the ability of the subsidiary to develop new knowledge. Thus, parent firms should be aware of the negative implications of low level of autonomy.

As suggested by results, through use of socialisation mechanisms, parent firms could benefit more from the knowledge residing in their subsidiaries. Furthermore, parent firms can create shared values and establish and maintain close relations with focal subsidiaries via socialisation mechanisms. The existence of shared values avoids unwanted conflicts and thus, improves the quality of the relationship. Also, as mentioned earlier, a low level of autonomy is proved to have a negative influence on subsidiary knowledge development. However, to make sure that the goals and actions of their subunits are in line with the missions and visions of the whole corporation, parent firms need to control their subsidiaries to some extent. In such circumstances, following Gupta and Govindarajan (1991), HQ could control their subsidiaries by more subtle means such as socialisation mechanisms.

Finally, the results suggest that willingness is one of the main indicators of subsidiary knowledge transfer. Knowledge residing in KIBS companies is highly tacit in nature and the subsidiary should be willing to allocate time and resources associated with knowledge sharing activities. Therefore, for successful knowledge transfer, parent firms should use proper incentive mechanisms. In addition, as suggested by the results, headquarters can increase the willingness of their

subsidiaries through creating shared values and strengthening of their relations with the subsidiary.

6.3.2. For Subsidiaries

The results pointed out that the subsidiary's competitive advantage depends heavily on its ability to develop and maintain business relationships. It is through these relations that the subsidiary could benefit from diverse sources of knowledge existing in its internal and external network. These results entail following implications for subsidiaries:

As expected, local environment is one of the main sources of competitive advantage for KIBS firms. Given that KIBS companies are involved in activities that are highly customised and complicated, having close relations with local actors is essential for the success of this sector. In fact, through close relations, the subsidiary co-creates or co-produces knowledge with its local actors. Therefore focal subsidiaries should maintain and improve their relations with customers, suppliers, universities, and competitors to be capable of developing new knowledge[1].

In addition to local environment, the findings of this research show that the quality of the relationship between the subsidiary and its parent firm significantly increases knowledge development. This indicates that the success or even survival of KIBS subsidiaries still depends heavily on receiving intangible resources from their HQ. In fact, these relationships serve as the knowledge gathering devices which could create trust and avoid conflict. Moreover, in order to establish and maintain embedded relationships with their parent firms, subsidiaries need to use an appropriate socialisation mechanism.

Although local environment and parent company are the main sources of knowledge for KIBS subsidiaries, they should not underestimate knowledge

[1] It should be acknowledged that while the existence of embedded relations with local actors positively impacts the ability of the subsidiary to develop knowledge, they might negatively influence knowledge transfer from the focal subsidiary to either its parent firm or sister subsidiaries. This is mainly due to the fact that the transfer of knowledge being developed as a result of embedded relations is considerably resource consuming. Consequently, it is not surprising if the focal subsidiary refuses to transfer its knowledge to other parts of the MNC.

resources of their sister subsidiaries. Developing knowledge that already exists in other parts is the waste of time and energy. The embedded relations increase the openness and willingness of other subsidiaries. Thus, subsidiaries can increase their ability to develop knowledge through developing and maintaining embedded relations with other sister subsidiaries.

6.4. Contributions of This Research

The contributions of this research are three-fold.

Firstly, the research contributes to the extant literature by investigating the process of reverse knowledge transfer exclusively within the KIBS sector. The majority of the contributions on reverse knowledge transfer have been made within the manufacturing sector or at best across both manufacturing and service industry. The findings of this study provide a better understanding on the factors which facilitate or hinder subsidiary knowledge transfer within the KIBS sector. The results of this study indicate that relations are the main facilitators of the subsidiary's ability to develop knowledge. However, unlike manufacturing companies, to develop knowledge, subsidiaries of the KIBS sector rely more on their local actors than their parent firms. Moreover, according to the studies on manufacturing sector, shared values and subsidiary-headquarter embeddedness are the main facilitators of intra-firm knowledge transfer. However, within the KIBS sector, these factors have no significant impact on subsidiary knowledge transfer.

Secondly, since the focus of the KBV is on internal resources of knowledge, most of the current studies grounded on this perspective overlook the importance of external sources of knowledge on cross-border knowledge transfer. Unlike prior studies, this research is grounded on both the knowledge-based view and network view of the firm. The combination of these two perspectives provides this opportunity to examine the effects of internal and external factors on reverse knowledge transfer. The findings indicate that external embeddedness along with internal embeddedness significantly influence knowledge development.

Finally, this study investigates knowledge transfer from the subsidiary to parents firm. The extant literature focuses mainly on knowledge transfer from parent

company to its subsidiary and therefore the process of reverse knowledge transfer and its determinants remain relatively unexplored. While the extant literature on traditional knowledge transfer has consistently highlighted the importance of some factors such as willingness and tacitness, there are few studies investigating the association between these factors and reverse knowledge transfer. In this regard, the contributions of this research is fourfold since it explores (a) the implications of subsidiary-parent firm relationship for subsidiary knowledge development and transfer, (b) the impacts of willingness, tacitness and complexity on reverse knowledge transfer, (c) the mediating impacts of willingness and (d) the joint impacts of knowledge characteristics, relationship characteristics and subsidiary/sender characteristics on reverse knowledge transfer. This comprehensive taxonomy of reverse knowledge transfer facilitators and barriers provides this opportunity to determine the most influential determinants of reverse knowledge transfer).

6.5. Theoretical Contribution

Overall, the findings of this research strongly emphasize the importance of relationship for reverse knowledge transfer. This is in accord with network view of the firm which consider relationships as the only effective way for knowledge transfer (Uzzi, 1997, Granovetter, 1982). Embedded relations (both internal and external) serve as information gathering devices that considerably facilitate subsidiary's knowledge development.

Results indicate that socialisation mechanisms are more than just communication devices. These mechanisms not only facilitate knowledge transfer but also increase shared values and closeness of subsidiary-parent firm relations. Furthermore, the results pinpoint the significant association between shared values and subsidiary-parent firm embeddedness on one hand and willingness on the other. This is aligned with embeddedness theory which asserts that behaviour of an individual is affected by his/her environment (Granovetter, 1982).

Furthermore, findings show that the characteristics of knowledge significantly hinder reverse knowledge transfer. This is in line with KBV which claims that

knowledge is the most strategically important resource of the firm. The competitive advantage of the firm lies in its ability to acquire and develop knowledge (Kogut and Zander, 1992). According to this perspective, knowledge characteristics influence easiness and cost associated with knowledge transfer (Gorovaia and Windsperger, 2010). Thus, as indicated by results, the more the knowledge is tacit and/or explicit the less is the extent of subsidiary knowledge transfer.

Finally, findings indicate that subsidiaries' knowledge development is related to the existence of internal and external relationships. This finding confirms the resource-based perspective. According to this perspective, there exists a close association between firm's ability to create and sustain competitive advantages and its strategic resources (Barney, 1991, Grant, 1991). RBV consider relations as firms' strategic resources which can result in creation of competitive advantages. The results show that the more the subsidiary is embedded in its internal and external network, the more it is capable of developing new knowledge.

6.6. Limitations and Future Research Directions

This main aim of this research is to further understanding on knowledge transfer from the subsidiary to its parent firm. Using the sample of 187 UK subsidiaries active in the KIBS sector, willingness, socialisation mechanism, knowledge development, tacitness and complexity are recognised as the main determinants of subsidiary knowledge transfer. However, although this study contributes to the extant literature in various ways, similar to every contribution, it suffers from some limitations which should be taking into account when interpreting the results.

Firstly, as pinpointed by prior studies (i.e. Minbaeva, 2007, Szulanski, 1996), characteristics of receiver is one of the main predictors of cross-border knowledge transfer. However, this research focuses only on the association between knowledge characteristics, relationship characteristics and sender characteristics on one hand and reverse knowledge transfer on the other. Consequently, future

studies could contribute to the extant literature by including the characteristics of the receiver.

Secondly, Gupta and Govindarajan (2000) suggest that conducting research at dyadic level could increase our understanding on international knowledge transfer. However, this research investigates the process of reverse knowledge transfer at nodal level (the simplest level). Investigating the process of reverse knowledge transfer from a dyadic perspective is highly important since on one hand it provides the opportunity to investigate how *bilateral homophily* impacts on the process of reverse knowledge transfer (Gupta and Govindarajan, 2000, Lazarsfeld and Merton, 1964). On the other hand, it enables the further exploration of the 'reciprocity' implications for the process of reverse knowledge transfer (i.e. whether willingness of the sender impacts on the learning intent of the receiver) (Gupta and Govindarajan, 2000). Therefore, investigating reverse knowledge transfer at dyadic level is a promising topic for future studies.

Thirdly, some of the measures of the structural model were perceptual (e.g. level of autonomy, extent of subsidiary-parent firm embeddedness). One of the drawbacks of using perceptual measures is that they might not be accurate, given that other issues might impact on the manager's perceptions. Despite this limitation, the use of such measures provides this opportunity to investigate the process of reverse knowledge transfer from different perspectives. Perhaps future studies could address this limitation by either developing new scales or conducting research at dyadic level.

Furthermore, the conceptual framework is tested only within the KIBS sector. Although this research produces invaluable implications for that sector, it is not clear whether these findings are generalisable across other industries. Therefore collecting data from other sectors will provide this opportunity to compare subsidiary knowledge transfer across different sectors.

Finally, this research was conducted during the recession period wherein many companies struggled to survive. Such situations may influence the knowledge sharing activities of firms or even the perception of managers about such activities. For instance, results surprisingly show no support for the association

between subsidiary-subsidiary embeddedness and knowledge development. This might be due either to the fact that these subsidiaries prefer to allocate all of their resources to survive rather than to transfer their knowledge to other parts of the corporation, or this situation might have negative impact on the perception of managers about the importance of resources residing in other sister subsidiaries. Therefore, it could be concluded that the timing of the research might explain why the relationships between some of the variables were not significant as expected. It might be worthwhile to test the research model again in a more stable economical environment.

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Appendix A- Questionnaire

Welcome and thank you for accepting to participate in our project.

The project investigates how subsidiaries can better contribute to the knowledge base of multinational corporations and enhance their strategic power by transferring their knowledge to headquarters and sister subsidiaries. 1000 top service companies based in the United Kingdom are targeted and you are selected because of your knowledge on the company's current activities and relationships. The effective knowledge transfer can amplify the bargaining power of a subsidiary; therefore by employing the results of our research you will be able to improve your company's strategic position.

We fully understand the demands on your time and we are very thankful for the 15 minutes you spend on filling in the questionnaire. In return we will be pleased to send you the executive summary of the results. Please note that there are no right and wrong answers and it is your personal opinion that is important for us.

If you have any questions or comments about this project, please do not hesitate to contact me on ... or you can write to me at the following address: Zhaleh.NajafiTavani@postgrad.mbs.ac.uk

Thank you very much for your help and consideration.

Sincerely yours,

Zhaleh Tavani

* You can save your answers and exit the survey at any time just by clicking on "Exit this survey" and then re-enter the survey at any time to update your responses.

I. KNOWLEDGE TRANSFER

We would like to understand the extent to which Knowledge is transferred from or into your company and the commitments made by your company and its headquarters to either transfer or obtain knowledge.

To what extent during the last three years did <u>your company</u> <u>develop</u> the following knowledge which is superior to that of headquarters, sister companies or competitors?								
	Not at all			To some extent			Great extent	NA
Sale and marketing know-how	☐	☐	☐	☐	☐	☐	☐	☐
Distribution know-how	☐	☐	☐	☐	☐	☐	☐	☐
Service production strategy know-how	☐	☐	☐	☐	☐	☐	☐	☐
Strategy know-how (knowledge about customers, suppliers and competitors)	☐	☐	☐	☐	☐	☐	☐	☐
Management systems and practices know-how	☐	☐	☐	☐	☐	☐	☐	☐

In thinking of the knowledge transferred into or out of your company, please answer the following questions.

To what extent, during the last three years, did <u>your company</u> <u>transfer</u> the following knowledge to its headquarters?								
	Not at all			To some extent			Great extent	NA
Sale and marketing know-how	☐	☐	☐	☐	☐	☐	☐	☐
Distribution know-how	☐	☐	☐	☐	☐	☐	☐	☐
Service production strategy know-how	☐	☐	☐	☐	☐	☐	☐	☐
Strategy know-how (knowledge about customers, suppliers and competitors)	☐	☐	☐	☐	☐	☐	☐	☐
Management systems and practices know-how	☐	☐	☐	☐	☐	☐	☐	☐

To what extent has <u>your headquarters</u> <u>used</u> the following knowledge transferred by your company?								
	Not at all			To some extent			Great extent	NA
Sale and marketing know-how	☐	☐	☐	☐	☐	☐	☐	☐
Distribution know-how	☐	☐	☐	☐	☐	☐	☐	☐
Service production strategy know-how	☐	☐	☐	☐	☐	☐	☐	☐
Strategy know-how (knowledge about customers, suppliers and competitors)	☐	☐	☐	☐	☐	☐	☐	☐
Management systems and practices know-how	☐	☐	☐	☐	☐	☐	☐	☐

In thinking of the knowledge transferred into or out of your company, during the last three years, please indicate the extent to which you agree or disagree with the following statements.								
	Not at all			Neither			Fully agree	NA
<u>Our headquarters</u> frequently <u>transferred</u> knowledge <u></u>to our company.	☐	☐	☐	☐	☐	☐	☐	☐
<u>Other subsidiaries</u> frequently <u>transferred</u> knowledge to our company.	☐	☐	☐	☐	☐	☐	☐	☐
<u>Our company</u> frequently <u>transferred</u> knowledge to other subsidiaries.	☐	☐	☐	☐	☐	☐	☐	☐
Our company saw benefits in sharing its knowledge with <u>headquarters</u>.	☐	☐	☐	☐	☐	☐	☐	☐
Our company saw benefits in sharing its knowledge with <u>sister subsidiaries.</u>	☐	☐	☐	☐	☐	☐	☐	☐
<u>Our headquarters</u> encouraged us (financially and emotionally) to transfer our knowledge.	☐	☐	☐	☐	☐	☐	☐	☐
<u>Other subsidiaries</u> encouraged us to transfer our knowledge.	☐	☐	☐	☐	☐	☐	☐	☐

In thinking of different resources (personnel, physical, financial, organisational and logistical needed to transfer or obtain knowledge, please indicate the extent to which you agree or disagree with the following statements.								
	Fully disagree			Neither			Fully agree	NA
Our headquarters has committed resources to obtain our company's knowledge.	☐	☐	☐	☐	☐	☐	☐	☐
Our company has committed resources to transfer its knowledge to headquarters.	☐	☐	☐	☐	☐	☐	☐	☐
Our company has committed resources to transfer its knowledge to sister subsidiaries.	☐	☐	☐	☐	☐	☐	☐	☐

II. KNOWLEDGE CHARACTERISTICS

In thinking of your company's knowledge, please indicate the extent to which you agree or disagree with the following statements.

Our sales and marketing know-how...	Fully disagree			Neither			Fully agree	NA
• Can be easily documented in manuals and reports.	☐	☐	☐	☐	☐	☐	☐	☐
• Can be easily learnt.	☐	☐	☐	☐	☐	☐	☐	☐
• Is more explicit than tacit (=hard to document, imitate, learn).	☐	☐	☐	☐	☐	☐	☐	☐
• Is the product of many interdependent routines, individuals and resources.	☐	☐	☐	☐	☐	☐	☐	☐
• Includes many novel skills or competencies.	☐	☐	☐	☐	☐	☐	☐	☐

<u>Our distribution</u> know-how...	Fully disagree			Neither			Fully agree	NA
• Can be easily documented in manuals and reports.	☐	☐	☐	☐	☐	☐	☐	☐
• Can be easily learnt.	☐	☐	☐	☐	☐	☐	☐	☐
• Is more explicit than tacit (=hard to document, imitate, learn).	☐	☐	☐	☐	☐	☐	☐	☐
• Is the product of many interdependent routines, individuals and resources.	☐	☐	☐	☐	☐	☐	☐	☐
• Includes many novel skills or competencies.	☐	☐	☐	☐	☐	☐	☐	☐

<u>Our strategy know-how</u> (knowledge about customers, suppliers and competitors)...	Fully disagree			Neither			Fully agree	NA
• Can be easily documented in manuals and reports.	☐	☐	☐	☐	☐	☐	☐	☐
• Can be easily learnt.	☐	☐	☐	☐	☐	☐	☐	☐
• Is more explicit than tacit (=hard to document, imitate, learn).	☐	☐	☐	☐	☐	☐	☐	☐
• Is the product of many interdependent routines, individuals and resources.	☐	☐	☐	☐	☐	☐	☐	☐
• Includes many novel skills or competencies.	☐	☐	☐	☐	☐	☐	☐	☐

Our <u>management systems and practices</u> know-how...	Fully disagree			Neither			Fully agree	NA
• Can be easily documented in manuals and reports.	☐	☐	☐	☐	☐	☐	☐	☐
• Can be easily learnt.	☐	☐	☐	☐	☐	☐	☐	☐
• Is more explicit than tacit (=hard to document, imitate, learn).	☐	☐	☐	☐	☐	☐	☐	☐
• Is the product of many interdependent routines, individuals and resources.	☐	☐	☐	☐	☐	☐	☐	☐
• Includes many novel skills or competencies.	☐	☐	☐	☐	☐	☐	☐	☐

Our <u>service production strategy</u> know-how ..	Fully disagree			Neither			Fully agree	NA
• Can be easily documented in manuals and reports.	☐	☐	☐	☐	☐	☐	☐	☐
• Can be easily learnt.	☐	☐	☐	☐	☐	☐	☐	☐
• Is more explicit than tacit (=hard to document, imitate, learn).	☐	☐	☐	☐	☐	☐	☐	☐
• Is the product of many interdependent routines, individuals and resources.	☐	☐	☐	☐	☐	☐	☐	☐
• Includes many novel skills or competencies.	☐	☐	☐	☐	☐	☐	☐	☐

III. External and internal embeddedness

In thinking of your most important external business relationships (customers, suppliers and universities/research centres), please indicate the extent to which they have caused adaptations concerning:								
	Not at all			Neither			To a very great extent	NA
Sales and marketing practices	☐	☐	☐	☐	☐	☐	☐	☐
Distribution practices	☐	☐	☐	☐	☐	☐	☐	☐
Management systems and practices	☐	☐	☐	☐	☐	☐	☐	☐

In thinking of your relationships with your headquarters, please indicate the extent to which they have caused adaptations concerning:								
	Not at all			Neither			To a very great extent	NA
Sales and marketing practices	☐	☐	☐	☐	☐	☐	☐	☐
Distribution practices	☐	☐	☐	☐	☐	☐	☐	☐
Management systems and practices	☐	☐	☐	☐	☐	☐	☐	☐

In thinking of your relationships with your sister subsidiaries, please indicate the extent to which they have caused adaptations concerning:								
	Not at all			Neither			To a very great extent	NA
Sales and marketing practices	☐	☐	☐	☐	☐	☐	☐	☐
Distribution practices	☐	☐	☐	☐	☐	☐	☐	☐
Management systems and practices	☐	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent to which you agree or disagree with the following statements.								
	Fully disagree			Neither			Fully agree	NA
My company discusses common problems with its parent/s company frequently.	☐	☐	☐	☐	☐	☐	☐	☐
Our parent company supports us in introducing changes.	☐	☐	☐	☐	☐	☐	☐	☐
The peer subsidiaries support us in introducing changes.	☐	☐	☐	☐	☐	☐	☐	☐

Please indicate the frequency of communication between your company and the following actors or units.								
	Never			Sometimes			Very frequently	NA
Parent company	☐	☐	☐	☐	☐	☐	☐	☐
Other subsidiaries of the corporation	☐	☐	☐	☐	☐	☐	☐	☐
Main customers	☐	☐	☐	☐	☐	☐	☐	☐
Main suppliers	☐	☐	☐	☐	☐	☐	☐	☐
Local universities/research centres	☐	☐	☐	☐	☐	☐	☐	☐

Please estimate the relative overall influence of the subsidiary and its parent company in deciding upon the following issues for the subsidiary:								
	decided by headquarter			decided by both			decided by subsidiary	NA
Introduction of new services	☐	☐	☐	☐	☐	☐	☐	☐
Restructuring of the subsidiary organisation involving creation or elimination of departments	☐	☐	☐	☐	☐	☐	☐	☐
Changes in services	☐	☐	☐	☐	☐	☐	☐	☐
Hiring and firing of the subsidiary's top managers	☐	☐	☐	☐	☐	☐	☐	☐

V. SHARED VALUES

In thinking of existing similarities between your company and its headquarters, please indicate extent to which you agree or disagree with the following statements.								
	Fully disagree			Neither			Fully agree	NA
Generally, business practices are very similar across the two companies.	☐	☐	☐	☐	☐	☐	☐	☐
The two companies provide the same range of services.	☐	☐	☐	☐	☐	☐	☐	☐
The two companies have coherent and similar organisational culture.	☐	☐	☐	☐	☐	☐	☐	☐
Our company shares the same goals with parent company.	☐	☐	☐	☐	☐	☐	☐	☐
The two companies have a shared understanding of doing business.	☐	☐	☐	☐	☐	☐	☐	☐

VI. TRANSMISSION CHANNELS

In thinking of different socialisation mechanisms, please indicate the extent to which the following activities were prevalent during the last three years in both your company and your parent company.								
	Not at all			To some extent			Great extent	NA
Participation in joint training programmes.	☐	☐	☐	☐	☐	☐	☐	☐
Constituting project groups to work on headquarters problems.	☐	☐	☐	☐	☐	☐	☐	☐
Movement of employees between both firms (for at least one month).	☐	☐	☐	☐	☐	☐	☐	☐
Visits to your company by your headquarters' top managers.	☐	☐	☐	☐	☐	☐	☐	☐
Visits to parent company by your company's top managers.	☐	☐	☐	☐	☐	☐	☐	☐
Participation in corporate inter-unit committees/ teams/ task forces	☐	☐	☐	☐	☐	☐	☐	☐

VII. GENERAL INFORMATION ABOUT YOUR COMPANY

A. How many employees are there in your company? Number of employees: _____

B. How many years has your subsidiary been in the MNC? Years: _____

C. Please indicate which of these statements about your company is correct.

☐Your subsidiary became a part of the corporation as a result of an acquisition/ merger.

☐Your company was created as a Greenfield operation.

D. What percentage of your company is owned by a foreign company?

Share of foreign ownership: _____**%.**

E. Where are your firm's global headquarters located? Country: _____

F. What is your subsidiary's main function? _____

G. How many foreign employees are in your top management team? _____

H. Percentage of the subsidiary's sales sold within the corporation: approximately _____%

I. Percentage of the subsidiary's purchases bought within the corporation: approximately _____ %

Thank you very much for your participation
Good luck in the prize draw!

We will be pleased to send you

- An executive summary of all responses across the top 1000 service companies in UK.

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If you would like to receive an executive summary, please complete the following or attach your business card.

Name of contact person:	Postal address:
E-mail contact to be used:	Company:

Appendix B- Key contributions

Key papers on traditional knowledge transfer			
Author/s	**Objective/questions**	**Data/Sector**	**Key findings**
Simonin (2004)	Develop and test integrated model of knowledge transfer.	147 MNCs, Manufacturing and service sectors.	Learning intent and knowledge ambiguity - main factors of knowledge transfer. Impacts of learning capacity and protectiveness on knowledge transfer mediated by organisational culture, size and structure.
Watson and Hewett (2006)	Developing multi-theoretical model that helps firms improve international knowledge transfer effectiveness.	430 MNCs, Service sector.	Accessibility and reuse of knowledge along with willingness of knowledge holder to transfer its knowledge are main factors of knowledge transfer.
Bresman et al. (1999, 2010)	1. Identifying factors affecting knowledge transfer within the context international acquisition. 2. Identifying patterns of cross-border knowledge	110 MNCs, Manufacturing and service sectors.	Communications significantly influence knowledge transfer. Transfer of tacit knowledge and explicit knowledge facilitated by different sets of factors. Patterns, quality, and type of transfer changed over

	transfer.		time.
Hansen (2002)	Impacts of weak ties on sharing of complex knowledge.	120 MNCs, Electronic companies.	Weak inter-unit ties help project team to identify useful knowledge; however, impede transfer of complex knowledge. Weak ties increase speed of transfer when knowledge not complex, but decreases speed r when knowledge complex.
Dhanaraj et al. (2004)	1. Investigating impacts of embeddedness on knowledge transfer. 2. Exploring association between knowledge transfer and IJV performance.	140 IJVs, Chemicals, electronics, construction, machinery and components, auto components, food processing, and textiles.	Tie strength, trust and shared values and systems - main predictors of knowledge transfer.
Minbaeva (2007)	Analysing joint impact of knowledge characteristics, sender characteristics, receiver characteristics and relationship characteristics on knowledge transfer.	92 MNCs, Manufacturing and service sector.	Absorptive capacity, disseminative capacity and characteristics of relationship between sender and receiver - main indicators of knowledge transfer.
Minbaeva et al. (2003)	Investigating relationship between Human Resource Management practices, absorptive capacity and	169 subsidiaries, Manufacturing and service	Ability and motivation jointly influence knowledge transfer. Performance appraisal and training considerably

	international knowledge transfer.	sector.	increase employees' ability. Internal communication and performance-based compensation increase motivation of employees.
Björkman et al. (2004)	Examining how organisational mechanisms influences intra-firm knowledge transfer.	134 subsidiaries, Manufacturing and service sector.	Determining objectives of subsidiary and use of socialisation mechanisms significantly ease cross-border knowledge transfer.
Cho and Lee (2004)	Investigating relationship between organisational characteristics and intra-firm knowledge transfer.	86 MNCs, Manufacturing industry.	Stock of knowledge, degree of parent's ownership, product and process similarity and cultural similarity - main determinants of knowledge transfer.
Lord and Ranft (Lord and Ranft, 2000)	Studying cross-border transfer of market know-how.	133 MNCs, Manufacturing and service sector.	Degree of tacitness negatively influences subsidiary knowledge transfer Close association between organisational structure and knowledge transfer.
Szulanski (1996)	Investigating internal sickness of knowledge transfer.	122 best-practice transfers in eight companies,	Lack of absorptive capacity, arduous relationship and causal ambiguity - main hindrances of knowledge transfer.
Szulanski and Jensen (2006)	Exploring relationship between presumptive adaptation and effectiveness	Case study.	Presumptive adaptation hinders network growth.

	of knowledge transfer.		
Zander and Kogut (1995)	Exploring relationship between knowledge characteristics and speed of knowledge transfer.	35 innovations, Manufacturing sector.	Codifiability, teachability and danger of market pre-emption are the main factors of knowledge transfer.
Kotabe et al. (2007)	Identifying determinants of international knowledge transfer.	53 MNCs, Pharmaceutical industry.	Extent of international knowledge transfer and international knowledge dispersion positively influence innovative performance. Level of R&D resources and past experience facilitate knowledge transfer, but absolute quality of international knowledge hinders this process.

Key papers on reverse knowledge transfer			
Author/s	**Objective/questions**	**Data/Sector**	**Key findings**
Ambos et al. (2006)	Develop understanding on reverse knowledge transfer.	294 parent firms, manufacturing, finance and insurance, consultancies, trade, transport and warehousing.	Sender location, subsidiaries' strategic role and absorptive capacity significantly associated with extent to which parent firm benefits from RKT.
Björkman et al. (2004)	Further investigation of strategies employed by parent firms to control knowledge transfer from their subsidiary.	134 MNCs, manufacturing and services.	Positive link between knowledge transfer and (a) socialisation mechanisms, (b) perceived importance of knowledge transfer.
Gupta and Govindarajan (2000)	Further knowledge flow into and out of subsidiaries.	374 subsidiaries,	Sender stock of knowledge, existence and richness of transmission channels, learning intent of receiver and absorptive capacity are the main determinants of subsidiary knowledge inflow and outflow.
Foss and Pedersen (2002)	Identifying determinants of subsidiary knowledge transfer.	2107 subsidiaries, Manufacturing and service sectors.	Internal, networks, cluster sources of knowledge facilitate subsidiary knowledge transfer. Higher degree of interdependency influences positively knowledge transfer. The level of autonomy positively affects the

			transfer of local cluster knowledge.
Noorderhaven and Harzing (2009)	Investigating impacts of socialisation mechanisms on knowledge sharing based on sender-receiver and social learning perspectives.	169 MNE subsidiaries, Motor vehicles and parts, chemicals, food and beverages, and electronics.	The impact on of interactions on subsidiary knowledge inflow and outflow based on social learning model was fully confirmed. The relationship between social interaction and subsidiary knowledge inflow and outflow was partially supported.
Håkanson and Nobel (2001)	Investigating impacts of internal and external ties on reverse knowledge transfer.	110 MNCs, Manufacturing sector.	Age and mode of entry impact on subsidiary's extent of external and internal embeddedness. Local embeddedness significantly facilitates innovativeness of subsidiary. Integration between subsidiary and its parent firm considerably increases reverse knowledge transfer.
Schulz (2001)	How organisational knowledge influences subsidiary knowledge outflow	97 subsidiaries, Manufacturing and service sectors.	Collecting new knowledge positively associated with vertical flows. Close link between codifying knowledge and horizontal and vertical flows. Combining old knowledge facilitates horizontal flows
Mudambi and Navarra (2004)	Exploring relationship between intra-MNC knowledge flows and	275 subsidiaries,	Level of research intensity and of knowledge inflow into subsidiary impact positively on

	subsidiary bargaining power	High-technology companies	subsidiary knowledge outflow. Total knowledge output of subsidiary, age, level of process control and extent of subsidiary knowledge output increase bargaining power. However, level of spillovers and subsidiary's local dependence negatively linked to bargaining power.

Key papers on knowledge development			
Author/s	**Objective/questions**	**Data/Sector**	**Key findings**
Almeida and Anupama (2004)	Understanding the impacts of accessing internal and external knowledge on subsidiary innovation.	374 MNCs, Semiconductor industry.	Subsidiary's knowledge linkages to host country firms, technological richness of MNC and technological diversity within host country are significantly associated with subsidiary's innovativeness.
Tsai (2001)	Investigating impacts of network characteristics on innovativeness of firm.	60 MNCs Petrochemical company and manufacturing company.	Absorptive capacity and network position influence positively innovativeness of the firm.
Gupta and Govindarajan (1994)	Investigating relationship between subsidiary's strategic role and systems and processes linking subsidiary to rest of corporation.	359 MNCs Both manufacturing and services.	Systems and process differ based on subsidiary strategic role. Autonomy significantly affects innovativeness of the subsidiaries.
Cantwell and Mudambi (2005)	"How the Marchian distinction between exploration and exploitation in organisational learning affects the level of R&D in	244 MNCs, Manufacturing.	Location, MNE group-level and subsidiary-level characteristics influence level of subsidiary R&D.

	each type of subsidiary".		
Harzing and Noorderhaven (2006)	Testing Gupta and Govindarajan (1994) typology of subsidiary strategic role.	169 subsidiaries, Manufacturing industry.	different subsidiary roles are linked to different control mechanisms, kevel of knowledge flows, and capabilities.
Subramaniam and Venkatraman (2001)	Investigating relationship between acquiring and employing tacit knowledge and new product development.	90 transactional product introductions, Manufacturing industry.	Transferring and employing tacit knowledge of overseas market significantly influence abilities of the firm to develop new products.
Birkinshaw et al.(1998)	Investigating ways by which subsidiaries could contribute to corporations' specific resources of MNCs.	229 subsidiaries, Manufacturing industry.	-Subsidiary resources and initiative have a strong positive impact on the subsidiary's contributory role. -There is a close relationship between the subsidiary initiative and its leadership and entrepreneurial culture. - Autonomy and a low level of local competition significantly influence subsidiary contributory role.
Birkinshaw (1997)	Investigating impacts of initiative on corporate entrepreneurship	39 separate initiative	Positive relationship between entrepreneurship and local responsiveness, worldwide learning and global integration. Employment of contextual mechanism to create

			specific subsidiary mandate not efficient.
Grevesen and Damanpour (2007)	Investigating: 1. How external knowledge sourcing via R&D internationalisation influences innovative performance. 2- How intra-firm knowledge sharing and structure of firm affect e innovative performance.	79 MNCs, Pharmaceutical, Chemical, and Technology sector.	Lateral and hieratical knowledge flows improve innovative performance. Control and bureaucratic coordination influence negatively innovative performance.
Mudambi et al. (2007)	Identifying determinants of knowledge generation of subsidiary.	275 subsidiaries, Manufacturing sector.	Positive relationship between self-determination, teamwork and cooperation and knowledge output of subsidiary.
Nobel and Birkinshaw (1998)	To develop subsidiaries' mandates.	110 MNCs, Industries that undertake R&D activities.	Three mandates identified completely different in patterns of communication and control.
Ghoshal and Bartlett (1988)	Identifying factors that facilitate creation, adaptation and dissemination of	141 MNCs, Manufacturing sector.	Organisational integration and communication affect positively innovation of subsidiary Impacts of autonomy and local sources of knowledge significantly mediated by

	innovations.		organisational integration and communication.
Frost et al. (2002)	Investigating under what circumstances centre of excellence emerges.	99 MNCs, Manufacturing sector.	Parent firm investment, internal and external actors considerably influence the subsidiary capabilities.
Ambos and Schlegelmilch (2007)	Investigating how parent firms control their overseas R&D units.	134 R&D units	Positive relationship between interdependence and all modes of control.
Andersson et al.(2005)	Examining impact of headquarters on external embeddedness of their subsidiaries.	140 subsidiaries, Manufacturing and service sector.	External embeddedness closely associated with subsidiary knowledge development. Knowledge development as performance evaluation criteria significantly increases external embeddedness. Expatriates influence negatively subsidiary external embeddedness.
Andersson et al. (2001)	Exploring impact of embeddedness on subsidiary's role in MNC.	97 subsidiaries, Gas applications, hard material tools, industrial equipment, management training, petrochemicals, etc.	- External embeddedness increases the ability of the subsidiary to serve as a provider of competency. - External embeddedness improve subsidiary's market performance.

Lagerström and Andersson (2003)	What factors influence ability of firm to develop new knowledge.	Case study.	- Socialisation of the team is the main factor of knowledge creation.

Appendix C- Survey Development Procedures

The questionnaire was drafted five times. In the following sections it will be explained in detail how the survey was developed.

1. First Draft

The first draft contained 42 questions and 8 sections; namely: external embeddedness, internal embeddedness, shared value, tastiness, complexity, reverse knowledge transfer, socialisation mechanisms and general information. The problems regarding external embeddedness were as follow. Firstly, questions did not differentiate between suppliers, customers and local universities. Secondly, some of the questions were vague: for instance one of the questions was about whether a subsidiary held ongoing projects with its headquarters, but it was not specified what was meant by 'ongoing projects'. Finally, some of the questions were too general, for example the respondents were asked to indicate whether the 'standard operation procedures' of his/her subsidiary is affected by its external environment, but it was not specified what these procedures could be.

For Internal embeddedness, one of the problems was that the questions were too general and it was impossible to separate the subsidiary from its parent firm. In some questions some academic terminology were used such as 'tie' which was hard for non-academics to understand. The questions related to shared value needed to be revised as they did not grasp the concept of shared values. Furthermore, some of the questions were suitable for manufacturing industries.

For tacitness, again there were some questions suitable for manufacturing sectors, so needed to be removed. Moreover, as some of the questions contain more than one part, they needed to be broken down into two or more questions. While some items needed to be added (e.g. delivery), some items like 'Your company knowledge is more explicit than tacit' seemed to be in academic jargon and therefore hard to understand. Similar to tacitness, the main problem regarding the

complexity questions was that some seemed to be complex and hard to understand.

Moreover, as the central variable of the research is reverse knowledge transfer and there was the possibility that respondents would get bored and give up the survey, this section should be moved towards the front. In addition, following Gupta and Govindarajan (1991, 1994), the following seven types of knowledge were included in the first draft: marketing know-how, distribution know-how, packaging design technology, product designs/process designs, purchasing know-how and management systems. However, as the focus of the research is on the KIBS sector; some of these categories seemed irrelevant. Some of the questions of this section needed to be revised.

Finally, there were some problems regarding the operationalisation of socialisation mechanisms. Some of the questions were too general, for instance it was not determined whether a question was about the managers or the employees. Like previous sections, some academic terminology such as 'temporary task forces' was used which was hard to understand. Furthermore, there was a need to harmonise the choice of answers and, finally, the questions did not allow to identify whether the relationship were developed as a result of employing formal or informal transmission channels. Besides the mentioned limitations, the first draft did not have a covering letter.

2. Second Draft

The second draft contained 30 main questions, five Likert scale were used and the survey contained seven parts, namely general information about the company, knowledge transfer, knowledge characteristics, external and internal embeddedness, shared value and socialisation mechanisms. The main difference between this version and the previous one was that in this one the most important part of the questionnaire, reverse knowledge transfer, was moved to the first page of the questionnaire.

Furthermore, since some of the knowledge categories included in the first draft of the questionnaire seemed irrelevant to the focus of the research, the number of

knowledge categories in this draft was reduced to five, namely sales and marketing know-how, distribution know-how, service production methodology know-how, strategy know-how (knowledge about customers, suppliers, competitors, and universities) and management systems and practices know-how. A covering letter was also added to the survey but it was too short and not standard. For the questionnaire itself, some questions were repeated across some parts and some of the questions were too general.

General information contained four questions regarding the number of employees, age, entry mode and the percentage of ownership. Moreover, some questions were added to general information such as the percentage of ownership and the other two questions were rephrased. The second part, knowledge characteristics, contained five questions, each of which contained five sub-questions. Similar to the first draft, the main problem for this part was that the questions were very similar and therefore poorly structured.

In the third section, internal embeddedness, some of the questions were modified based on the feedback from the first draft; the questions were divided into two main groups, one devoted to the subsidiary and the other to the parent firm. There were some overlaps between the questions of the internal embeddedness and knowledge transfer sections. Moreover, in some cases, the scales' labels needed to be changed.

In order to address some limitations of the first draft, firstly the company's external actors were placed into four separate categories: customers, suppliers, universities and the main competitors. However, the number of questions was increased too much and in some cases the questions were too detailed, for example there were some questions on the extent to which customers, suppliers, universities and the main competitors contribute to the five categories of knowledge (sales and marketing know-how, distribution know-how, service production methodology know-how, strategy know-how, and management systems and practices know-how). These sub-categories of knowledge added unnecessary questions which might negatively affect the respondents' motivation to continue the survey.

The shared value section was improved by adding some questions such as the extent to which the subsidiary is similar to its headquarters in organisational culture, ambitions and ways of doing business; however, some of these questions needed to be revised as they were too broad, such as ambitions. Finally, for socialisation mechanisms, questions about managers were separated from those about employees. Moreover, some questions were added, using the contribution of Noorderhaven and Harzing (2009), namely participation in training programme, constituting the group of employees/managers to work on headquarters' problems and the frequency of the visit between the two companies.

There were also some problems related to grammatical errors and using the right phrase. For instance, one of the questions was related to employing rotation programmes which is an academic terminology and therefore is hard for non-academics to understand. Additionally, some questions on subsidiary strategic role, subsidiary protectiveness and headquarters' learning intention needed to be included.

3. Third Draft

The third draft contained 56 questions and had 6 parts (the internal and external sections were merged): general information about the company, knowledge transfer, knowledge characteristics, external and internal embeddedness, shared values and socialisation mechanisms. The covering letter was improved based on Dillman's tailored design method. There were several problems regarding each part:

Similar to the second draft, general information contained only four questions, including number of employees, age, entry mode and the percentage of ownership. There were also other general questions still needing to be included. Some questions were added to the second part; these related to the subsidiary's motivations to transfer its knowledge to its headquarters, as well as the questions relating to the intention of the parent company to learn from its subsidiary.

Moreover, due to the similarities between some questions on internal embeddedness and knowledge transfer, some of those on internal embeddedness

were moved to this part. However, there were some limitations relating to the second part, namely that using academic terminology made this part very hard for non-academics to understand. Moreover, the questions of this part only captured knowledge transfer from subsidiary to parent company, while it was necessary to include some questions on knowledge transfer from subsidiary to other sister subsidiaries. The logical order of the questions was one of the other limitations. For instance, while this section started with the questions of knowledge transfer from subsidiary to parent company, the last question was related to the subsidiary's ability to develop new knowledge. There were also some concerns about how respondents interpret the question related to subsidiary ability to develop new knowledge and in particular there was a concern about the term 'superior' that seemed to be too general.

The questions relating to the knowledge characteristics were rephrased. Instead of having separate questions which contained separate categories, all the questions were merged and separate questions for each sub-category were developed. As a result; questions became too long and there was a great possibility that the respondents would get bored and thus abandon the questionnaire.

Analogous to the previous drafts, some of the questions were hard to understand as they were too general. For instance, one of the questions was about "whether the company's most important decisions are affected by its headquarters", but it was not clear what the most important decisions were. Similarly, for shared values, some of the questions were vague, for example one of the questions was related to the similarity between the ambitions of the subsidiary and the headquarters but it was not determined in terms of what. Moreover, some questions were asked about the cultural background, but it was not made clear what it was (organisational or regional culture). Finally, the labels for the scales of socialisation mechanisms needed to be modified.

Overall, the main problems regarding this draft were: (a) some of the questions were too general, (b) some of the questions were hard for non-academics to understand and (c) the covering letter still needed to be improved as it was not completely standardised.

4. Fourth Draft

The fourth draft contained 37 questions and seven parts. The questions of the general information section remained the same. Some questions were added to the knowledge transfer section, related to knowledge transfer from subsidiary to other peer subsidiaries which was not covered in the previous drafts. Moreover, the order of the questions was changed: the question on the ability of a subsidiary to create knowledge was moved forward and it was followed by some questions on transfer of knowledge from subsidiary to its headquarters, the extent to which this knowledge was used by headquarters, knowledge transfer from subsidiary to other peer subsidiaries, the intention of headquarters to receive a subsidiary's knowledge and, finally, questions relating to the willingness of the subsidiary to transfer its knowledge.

Following the limitations of the first question, the subsidiary's ability to develop superior knowledge, the key authors (Andersson et al., 2001) of an article (based on which this question was developed) were contacted. They confirmed that their respondents did not have any problem in understanding this question; therefore, it was not changed. The second section was modified by developing five separate questions, each of which were related to the five types of knowledge (sales and marketing know-how, distribution know-how, strategy know-how, management systems and practices know-how and service production strategy know-how); then for each of these knowledge categories the sub-questions relating to tacitness and complexity were included.

The external and internal embeddedness section was modified by categorising questions into two main groups: the first with questions on the frequency of the relationship between a subsidiary and its internal and external environment; the second with questions on the extent to which subsidiary activities are affected by its internal and external environment. There were some minor grammatical problems in the shared values section and "cultural background" was replaced by "organisational culture". Finally, some of the questions on socialisation mechanisms needed to be modified, for instance "exchanging" was replaced by "movements" of employees.