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ORIGINAL PAPER

Linkage between geographic space and knowledge transfer by multinational enterprises: a structural equation approach

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Abstract This paper discusses the current links between international business, economic geography and knowledge management. Despite the recent proliferation of papers dealing with knowledge transfer by multinational enterprises (MNEs) in China, there is limited work investigating the role of geographic space on knowledge transfer. Given the growing interest in knowledge transfer by MNEs, the lack of research on geographic space in the Chinese context is a significant gap in our knowledge. In response, we have conducted what we believe to be the first study on the relationship between geographic space and knowledge transfer by the Japanese MNEs to their subsidiaries in China. The paper reviews the relevant literature from which it develops a theoretical model which is then tested empirically. We then provide empirical results on the relationship between geographic space, perceived distance and knowledge transfer. A LISREL model is employed to study the impact of the latent variables associated with geographic space on knowledge transfer. Based on the results, this study provides useful insights for economic geographers who wish to study knowledge transfer between parent companies and their subsidiaries across geographic space.

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1 Introduction

Geographers have been slow to address the issue as to how multinational enterprises (MNEs) manage their knowledge over distance (Beaverstock 2004). Yeung (2000) treats this as a surprising deficit in economic geography. However, within the business management and economic geography literature, interest in the concept of geographic distance has grown steadily in recent years. In economic geography, few questions have been studied more frequently as to what role geographic proximity plays in knowledge sharing and innovation (Broekel and Boschma 2012, p. 409). This has been particularly so over the last decade (Gertler 2004). This paper seeks to further strengthen the links between the three disciplines of international business, economic geography and knowledge management by focusing on knowledge transfer in the MNE context.

Crucial to international business success is the management of organizational knowledge (Ghoshal et al. 2000; Gupta and Govindaranjan 2000). MNEs develop knowledge in one location and then transfer bits of that knowledge in either embodied or disembodied form to their foreign subsidiaries across the globe (Keller and Yeaple 2013). The process of knowledge transfer between the business units of an MNE is an essential aspect of knowledge management (Bresman et al. 1999; Easterby-Smith et al. 2008). MNEs can enhance their sustainable competitive advantage by managing knowledge flows to and between their subsidiaries (Schulz and Jobe 2001; Chang et al. 2012b). Against this backdrop, Wood and Reynolds (2012, p. 539) observe that 'the manner in which knowledge is spatially generated, reproduced and diffused is of interest to students of economic geography and business management.'

Geographic space can be viewed as the distance between countries relying on measures such as cultural distance, institutional distance, psychic distance. In this context, psychic distance and cultural distance have received attention in international business research over several decades (Dow and Ferencikova 2010). Stopford and Wells (1972), for example, contend that cultural distance makes it difficult for MNEs to manage their foreign subsidiaries well.

A MNE is viewed as a globally dispersed organization that is involved in several business activities under different governance modes (e.g., wholly owned subsidiaries, partnerships, joint ventures, strategic alliances) to meet different market demands (Lagerström and Andersson 2003). Intensive research examines MNEs in contemporary globalization (Beaverstock 2004). MNE's locational choice has been investigated by economic geographers and international business scholars (Mariotti et al. 2010). Understanding knowledge transfer by MNEs across space is becoming a key research area.

Empirical studies on knowledge transfer by MNEs have focused on knowledge characteristics (Ambrosini and Bowman 2001; Jasimuddin et al. 2005; Jasimuddin and Zhang 2014), knowledge contributors (Lyles and Salk 1996; Szulanski 1996; Foss and Pedersen 2004; Jasimuddin et al. 2006), knowledge recipients (Szulanski 1996; Gupta and Govindaranjan 2000; Jasimuddin et al. 2012), knowledge transfer mechanism (Szulanski 1996; Simonin 2004; Bresman et al. 1999; Gupta and Govindaranjan 2000; Jasimuddin et al. 2014), knowledge acquisition (Huber 1991; Buckely et al. 2009; Park 2010; Anh et al. 2006; Jasimuddin et al. 2014), etc. Despite substan-

tial research devoted to expanding our understanding of knowledge transfer between MNEs and their subsidiaries, significant gaps still remain (Gamble 2010). A clearer understanding of the geographic space, in particular perceived distance, and its impact on knowledge transfer is necessary. To date, the relationship between geographic space and knowledge transfer within the MNE context has received little attention despite the pivotal role it plays in knowledge transfer.

Given the rising interest in knowledge transfer by MNEs in China, this lack of research on geographic space in the Chinese context seems to be a significant gap in our knowledge. In response, we have studied the relationship between geographic space and knowledge transfer. We believe this is the first study to examine the influence of geographic space in a variety of forms on knowledge transfer by Japanese MNEs to their subsidiaries in China. The emerging market economy of China provides an appropriate test bed. As part of its economic reform, China has attempted to improve its economic growth by attracting inward investment from MNEs (Li and Park 2006). The inflow of knowledge from the MNEs to their subsidiaries is seen as a valuable way to developing China's own knowledge base (Sumelius and Sarala 2008). Since China lacks 'knowledge' and technology, MNEs are a source from which it can enrich its knowledge and technology base, in particular from Western MNEs (Steensma and Lyles 2000). The question remains whether geographic space hampers Japanese MNEs in transferring knowledge to their subsidiaries based in China. Hence, this paper deals with the role of geographic, cultural and relational distance, and how they impact on knowledge transfer between Japanese MNEs and their subsidiaries in Dalian Industrial Zone in China.

This paper reviews the relevant literature from which it develops a theoretical model which is then tested empirically in order to provide the linkages between geographic space in terms of geographic distance, cultural distance and relational distance, and knowledge transfer in the context of Japanese MNEs operating in China. The remainder of this paper is organized as follows. First, the notion of knowledge transfer and the characteristics of geographic space are identified, their relationships are discussed, research hypotheses are developed, and the conceptual framework is presented linking geographic space characteristics and knowledge transfer. The research methodology is then presented, and the results of the statistical analysis are reported. Following a discussion of the results, we outline the implications and limitations of our work, and suggest directions for future research.

2 Theory and hypotheses

This section reviews the literature to propose a research model which posits that the characteristics of geographic space inhibit knowledge transfer in the context of Japanese MNEs based in China. Figure 1 depicts the conceptual model that guides the execution of the study. Overall, the study offers an empirical test for five hypotheses, which are developed in the following paragraphs.

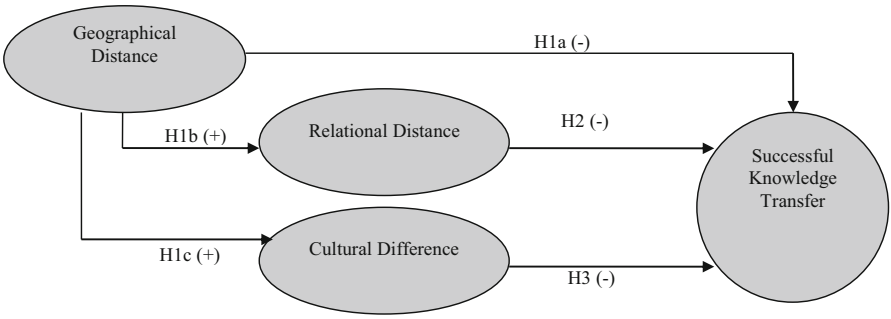

Fig. 1 A conceptual model of knowledge characteristics and knowledge transfer. *Note*: The +/− signs indicate positive or negative associations

2.1 Knowledge transfer

It is accepted that knowledge transfer and innovation are critical in developing and enhancing the competitive advantage of firms and regions (Boschma 2005). Knowledge sharing is increasingly acknowledged as an important research topic (Lu et al. 2006). Knowledge transfer is the process through which one group, department or division of an organization is affected by the experience of another (Argote and Ingram 2000). Minbaeva et al. (2003) define knowledge transfer as the level of knowledge utilization by the recipients assuming both acquisition and use of new knowledge. According to Cummings and Teng (2003), knowledge transfer is the process by which knowledge is successfully transferred to a recipient.

Knowledge transfer ranks one of the top activities in the hierarchy of organizational tasks. Li (2008), for example, contends that in a competitive environment, successful knowledge transfer within or among organizations is a strategic imperative. MNEs seek to transfer, integrate and leverage knowledge across national boundaries (Hong et al. 2009). Drawing on Qin et al. (2008), knowledge transferred by MNEs for the purpose of this study includes the transfer of 'expertise in technology, skills in the use of related tools and technologies, understanding of market and product requirements, and insights of current industry trends and developments.'

Doz and Santos (1997), for example, point out that the dispersion of space and time and different contexts can lead to difficulties in the MNEs' knowledge transfer activities. Geographic location tends to widen cultural distance and relational distance. More specifically, some elements, such as different languages and cultures, generate a perception of 'cultural distance' among knowledge receivers, which may hamper the knowledge transfer process (Rabbiosi and Santangelo 2013). The present study suggests that in order to understand the effective and efficient transfer of knowledge between MNEs and their subsidiaries, the role of the geographic space needs to be considered. As mentioned earlier, our empirical efforts focus on three geographic space characteristics: geographic distance, cultural distance and relational distance. We then develop a model to investigate the relationships between the three dimensions of geographic space and knowledge transfer using structural equation modeling.

2.2 Geographic distance

A key issue in economic geography is to determine the impact of geographic proximity on knowledge transfer and innovation (Boschma 2005). Geographic proximity expresses the physical distance that separates two units (e.g., individuals, organizations, towns) in geographic space (Torre and Rallet 2005; Tobler 1970). According to Boschma (2005, p. 63), geographic proximity is defined as spatial distance between actors, in both an absolute and relative sense. The purpose of investigating geographic proximity is to determine whether one is 'far from' or 'close to' (Boschma 2005, p. 63).

The extant literature suggests that geographic proximity between organizations can yield benefits that arise from knowledge spillovers (Audretsch and Feldman 1996). The importance of geographic proximity for knowledge sharing has been discussed extensively in recent years (Broekel and Boschma 2012). Broekel and Binder (2007) suggest that geographic proximity may also impact on the likelihood that actors will exchange knowledge. Geographic proximity refers to the spatial or physical distance between economic actors (i.e., knowledge provider and recipient) (Boschma 2005). Davenport and Prusak (1998) state that knowledge transfer can only work if the various parties are brought together in a physical sense. This view is consistent with Broekel and Boschma (2012) who argue that geographic proximity offers certain advantages to knowledge-sharing activities.

Similarly, Galbraith (1990) realizes that the transfer of technology-embedded knowledge is slower when the organizations transferring the knowledge are farther apart, as is often the case with MNEs and their subsidiaries. In this context, Allen (1977) showed that communication between R&D employees decreases significantly with the increase in physical distance. This was attributed to the time and financial resources involved in traveling to and from different locations. If the units within an MNE are not separated through distance, knowledge transfer would occur with relative ease.

Distance affecting international business has commonly been treated as a multifaceted construct, including administrative, geographic and economic dimensions (Ghemawat 2001). Geographic distance is an important issue in international business research. Due to culture differences, MNEs need to be cautious in managing its business. For example, knowledge sharing is highly sensitive to geographic distance (Broekel and Boschma 2012). Geographic distance between an MNE and its subsidiaries can have an impact on the transfer of knowledge. In other words, geographic distance between partners is a key obstacle to inter-firm knowledge transfer (Mowery et al. 1996). Parallel to this, Darr and Kurtzberg (2000) find that physical distance greatly affects knowledge-sharing success. Geographic distance is directly and negatively associated with knowledge transfer between a MNE and its subsidiaries. Overall, geographic distance makes knowledge transfer difficult. Therefore, we have formulated the following hypothesis:

Hypothesis 1a The success of knowledge transfer between an MNE and its subsidiaries decreases as geographic distance increases between them.

As mentioned earlier, the extant literature on geographic proximity suggests that firms that are proximate to each other benefit from each other's knowledge and expertise (Baptista and Swann 1998; Gnywalim et al. 2009). Geographic proximity may

play a complementary role in building and strengthening social, organizational, institutional and cognitive proximity (Boschma 2005). For instance, spatial proximity facilitates informal relationships (Audretsch and Stephan 1996). The effect of geographic distance on the knowledge transfer could also be hypothesized as to be indirect. Geographic distance affects other dimensions of geographic space such as cultural distance and relational distance, which, in turn, influence knowledge transfer.

Although the 'relational term' in economic geography opens up new understandings of how proximity impacts on knowledge transfer, little attention has been given to it in relation to MNEs (Stensheim 2012). Relational proximity may thus be as important as physical geographic proximity in enabling the generation and transfer of tacit knowledge (Gertler 2004; Amin and Cohendet 2004; Zhao and Islam 2006; Rinallo and Golfetto 2011). Geographic distance may damage the relationships between partners (Goodall and Roberts 2003). Eisenhardt and Santos (2002) argue that knowledge transfer is hampered when the knowledge contributor and user find it difficult to establish frequent interpersonal interactions because of distance. In their view, Mehmanpazir and Munier (1999) highlight that the physical distance separating knowledge-sharing actors has an impact on the ability and/or willingness of the actors to develop social relationships, as is often the case in MNEs. Resonating with this, D'Este et al. (2013) observe that geographic proximity plays a role in the establishment of relationships in research collaborations.

Moreover, geographic distances involve cultural differences. Cultural distance between an MNE and its subsidiaries may evolve if they are based in two different locations, be they in a country (e.g., India Hindi-speaking North and the Tamil-speaking South) or in two countries (e.g., France and Luxembourg). In this regard, Choi and Lee (1997) state that the greater the difference between the partners in terms of national and organizational culture, the greater the difficulty in knowledge transfer. Hence, there is a positive impact of geographic distance on relational distance and cultural distance. Based on these arguments, the following hypotheses can be proposed:

Hypothesis 1b Geographic distance positively influences relational distance.

Hypothesis 1c Geographic distance positively influences cultural distance.

2.3 Relational distance

Relational distance implies the lack of intimate and enduring relationships between the parties. Boschma (2005, p. 63) uses the term 'organizational proximity,' referring to the degree of the closeness of actors in organizational terms. Organizational proximity is not geographic in a physical sense but relational (Torre and Rallet 2005). Similarly, Gertler (2004) argues that 'organizational distance' is associated with the closeness in organizational ties and the possibility for branch plants to benefit from a larger resource pool within the whole company. Organizational proximity covers the extent to which actors share the same space of relations (i.e., the way interaction and coordination between actors is organized). Relational proximity may thus be as important as geographic or physical proximity in enabling the generation and transfer of tacit knowledge (Rinallo and Golfetto 2011; Gertler 2004; Amin and Cohendet 2004).

Relational factors include inter-firm trust, relational duration and performance in knowledge transfer between the knowledge contributor–recipient (MNC–subsidiary) relationship (Hohberger (2014)). Relational strength refers to the frequency, reciprocity and the emotional attachment and trust that partners develop with each other (Gnywalim et al. 2009). Several scholars (e.g., Rowley et al. 2000; Granovetter 1973) argue that a strong tie is characterized by frequent and repeated interactions between partners, emotional attachment to the relationship and a high level of trust among the partners. An MNE that has developed long-term and trusting relationships with its subsidiaries is more likely to be willing to exchange knowledge. In this connection, Schrader (1991) examines close relations between both parties involved in an alliance that improve knowledge sharing. A close relationship refers to the confidence that partners are reliable, which in turn promotes trust and the willingness to share knowledge. Parallel to this, Inkpen (1998) contends that the strength of a relationship serves as a conduit for knowledge sharing.

Relational distance between partners also affects inter-firm knowledge transfer. Several studies (e.g., Gooderham et al. 2010; Bresman et al. 1999; Gupta and Govindaranjan 2000; Lyles and Salk 1996; Cummings 2001; Evangelista and Hua 2009; Simonin 1999) have focused on intra-MNE knowledge transfer, suggesting that knowledge transfer between units is possible only when close relationships exist between knowledge providers and recipients. Cummings (2001), for example, states that relationship-related factors can affect knowledge-sharing success. This view is also shared by Evangelista and Hua (2009) who confirm that relationship capital plays an important role in inter-organizational knowledge transfer. Contrarily, the lack of close relations between a MNE and its subsidiaries acts as a barrier to knowledge transfer between them. Hence, relationship distance is found to be negatively associated with knowledge exchange. The above discussion leads to the following hypothesis:

Hypothesis 2 The success of knowledge transfer between an MNE and its subsidiaries decreases as relational distance increases between them.

2.4 Cultural distance

Culture is generally considered to be a critical dimension in international business (Adler 1983; Hofstede 2001; Roseenzweig and Singh 1991). The role of cultural distance has attracted growing interests in economic geography and management studies (Giannetti and Yafeh 2012; Guiso et al. 2006). In this regard, Qin et al. (2008) argue that a major challenge faced by MNEs is how to manage knowledge transfer between headquarters and subsidiaries located in dissimilar cultural contexts. Schneider (1988) suggests that MNEs need to take into account the differences in the host country's culture and values. In the context of knowledge transfer within MNEs, a key issue arises when headquarters and subsidiaries are located in culturally distant environments (Bhagat et al. 2002; Holden 2001). Yamin and Golesorkhi (2010) define cultural distance as the difference between the national cultural characteristics of the home and of the host countries. Gertler (2004, cited in Stensheim 2012) points to a 'cultural distance' referring to the way culture, language, institutions, dominant work practices and the legacy of past industrial practice vary from one place to another and between

one company and another. This view is reflected by Yamin and Golesorkhi (2010) who further elaborate that cultural distance as a construct captures the differences in the cultural traits and value systems of different groups and countries.

According to Chang et al. (2012a), 'cultural distance in international business research generally refers to the fundamental differences in norms and values between the home country of MNEs and the host country of their foreign operations.' That is, cultural differences encompass the politics, economics, enterprise systems, ideologies and legal systems of the countries where enterprises are located. Almeida (1996) shows that differences in national systems affect the behavior of companies in different ways, and so impact on knowledge transfer. This is particularly so in the case of MNEs operating across cultures. This view is also shared by Kostova (1999) who comments that the 'cultural differences between countries' is an important factor that influences MNEs' investment and knowledge transfer behavior. The sharing of knowledge may be inhibited by such cultural boundaries (Simonin 1999).

Evangelista and Hua (2009) suggest that since cultural distance raises barriers to understanding partners, such distance matters with regard to knowledge sharing. As manifested by Mowery et al. (1996), empirical findings indicate that international alliances result in lower levels of knowledge transfer than domestic alliances due to the cultural distance between partners. This view is consistent with Child and Rodrigues (1996) who point out that knowledge transfer is facilitated when the parties in international joint ventures hold similar social identities. The extant literature (e.g., Evangelista and Hua 2009; Doz and Santos 1997; Stopford and Wells 1972) indicates that cultural distance has a robust influence on knowledge transfer. Johanson and Vahlne (2009, as cited in Evangelista and Hua 2009) view cultural distance as the resulting vector of culture-based factors (i.e., languages, values, norms, meanings) that can impede knowledge flow between partners.

Transferring knowledge from one cultural background to another is difficult to implement. Dianne and Yolande (2003) confirm this, arguing that cultural differences can affect the extent of knowledge sharing and the direction of knowledge flow between companies. Numerous empirical studies (e.g., Doz and Santos 1997; Mowery et al. 1996; Fabry and Zeghni 2003; Lyles and Salk 1996; Dow and Ferencikova 2010; Park 2011) on intra-MNE knowledge transfer have confirmed that knowledge transfer across units becomes difficult as a result of cultural distance. In the broader view, Doz and Santos (1997) state that the wider the difference in culture, the greater the difficulties in knowledge transfer. Likewise, Mowery et al. (1996) identify cultural differences between a parent and its subsidiaries as key to minimizing inter-firm knowledge transfer. Differences in culture disturb the flow of knowledge (Dow and Ferencikova 2010). This view is consistent with Lyles and Salk (1996), who find that cultural conflicts can reduce the smooth flow of knowledge and hamper successful knowledge transfer.

Furthermore, several scholars (Park 2011; Mowery et al. 1996) argue that cultural distance can lead to misunderstanding and conflict between partners and impede knowledge transfer. Cultural differences between partners create extra problems because they make it difficult for managers to work together effectively and develop common values (Park 2011). Therefore, the following hypothesis is formulated:

Hypothesis 3 The success of knowledge transfer between an MNE and its subsidiaries decreases as cultural distance increases between them.

3 Research setting, data and methods

Structural equation modeling (SEM) is applied to test the research hypotheses. This allowed us to perform path-analytic modeling with latent variables (Cho et al. 2010). The SEM approach combines a dual focus on prediction concerning the structural relationships among constructs with the measurement of latent, observed indicators (Venaik et al. 2005). SEM is capable of handling simultaneity, where the conceptual network of relationships provides meaning to embedded measures. Since SEM helps to examine complex research models collectively (Gefen et al. 2000), the approach is used in this study to test the relationships between the constructs (e.g., knowledge transfer, geographic distance, relational distance and cultural distance) and determine the predictive power of the model. LISREL 8.5 is used to analyze and interpret the data following a two-stage process, as prescribed by Anderson and Gerbing (1998). The units of analysis in this study were China-based subsidiaries where knowledge was transferred from their Japanese headquarters.

3.1 Background and research setting

This study involved a postal survey methodology which was sent to Japanese MNEs' subsidiaries operating in Dalian Industrial Zone in China. Dalian is geographically close to the second-largest economy in the world, Japan (Luo et al. 2008). Three reasons lie behind undertaking research in such a setting. First, China continues to remain a leading foreign investment recipient. Second, Japanese firms have become one of the most important sources of FDI in China, ranking as its second largest foreign investor. Third, the companies in this study were either manufacturing or service sector establishments that had in place strategies to promote learning and the sharing of knowledge. In transition economies like China, MNEs are often viewed as vital sources of managerial, marketing, technical know-how for local firms (Danis and Shipilov 2012; Child and Markoczym 2005; Steensma and Lyles 2000). Dalian is a highly developed industrial and commercial region, one of the most popular destinations for inward FDI in China, and geographically close to Japan.

The data were gathered as indicated above via a postal survey, using Dillman's (2000) guidelines. A multi-industry sampling design was used to broaden the generalizability of the findings (Katsikea et al. 2011) and included manufacturing (e.g., chemical, machinery, electrical, and electronic products) and service (e.g., information technology, retailing and trading) sectors. A group of 169 Japanese MNEs were randomly selected. The minimum number of employees working in the subsidiaries participating in this study was 200, while their registered capital was at least 1 million RMB.

3.2 Sample

Following Huber and Power's (1985) procedures with respect to data collection, senior executives were contacted as the key informants. They were asked to distribute the

questionnaire to an employee who had the relevant knowledge to complete the form. A cover letter explaining the purpose of the study and a postage-paid return envelope were included in the package. The data collection process resulted in 125 completed and useable questionnaires, with a response rate of 73.97 %.

It is important to test potential non-response bias which was assessed by using Armstrong and Overton's (1977) procedure. Since late responders are argued to be representative of non-responders (Churchill 1979), the *t*-tests is performed in terms of industry, registered capital, sales revenue and the number of employees. There were no significant differences ($p < 0.05$) in terms of any item, which suggest that non-response bias was not a problem in this study, and our sample is representative of the population satisfying our criteria.

The questionnaire used in this study was developed on the basis of the literature review. Initially, the questionnaire was piloted using 20 respondents in order to increase the clarity of the questions and to avoid interpretation errors. Moreover, it was translated and back-translated to ensure that the Chinese translation accurately reflected the meaning of the English version and to reduce comprehension problems (Sperber et al. 1994). The final version of the questionnaire consisted of 28 questions, most of which used a seven-point Likert-type scale to measure responses.

All respondents had similar backgrounds and were likely to participate in knowledge-sharing activities in their firms. Most respondents were university educated (69.1 %), male (74.4 %) and in the 40+ age group (79.2 %). The study particularly targeted middle management personnel. Of the respondents 89.6 % were departmental heads or technical supervisors, while the remaining 10.4 % were senior executives (e.g., general managers or above).

In total, 85 (68.0 %) of the companies were in the manufacturing sector and 40 (32.0 %) in the service (tertiary) sector. Of the respondent companies the majority were found in the range of 200–500 employees (68.8 %), while the remainder was located in the over 500 employee range (31.2 %). Their registered capital ranged from <10 million RMB to 50 million RMB. Table 1 illustrates the firms' demographic information in more detail.

3.3 Measurement

Measurement of the research constructs involved the employment of multi-item reflective scales (Bollen and Lennox 1991). The use of multi-item measures enhances confidence so that the measurement of the research construct will be consistent (Churchill 1979). A rigorous review of the existing literature was undertaken to develop multiple indicators (observed items) of all constructs (latent variables) of interest so as to assess the relationship between geographic space and knowledge transfer. There are certain scales which are repeatedly used in most empirical investigations. Most of the constructs used are derived from previous studies on knowledge management and international business. All measures were assessed via a seven-point interval scale ranging from '1 = strongly disagree' to '7 = strongly agree.' This format was used for all the scales described below. The questionnaire contained 17 items on geographic

Table 1 Demographic information

Measure	Items	Frequency	Percent (%)
Gender	Male	93	74.4
	Female	32	25.6
Age	50 years and above	57	45.6
	40–49 years old	42	33.6
	30–39 years old	21	16.8
	Under 30 years old	5	4.0
Position	General manager	13	10.4
	Department manager	68	54.4
	Senior technical supervisor	44	35.2
Nature of the jobs (functional areas)	Production	15	12.0
	Marketing (including sales service)	37	29.6
	Technology (R&D)	20	16.0
	Management	46	36.8
	Others	7	5.6
Organization size	200 employees	18	14.4
	201–500 employees	68	54.4
	>500 employees	39	31.2
Industry	Manufacturing	85	68.0
	Servicing	40	32.0

space characteristics and knowledge transfer, plus 11 items at the beginning of the questionnaire to gather background information.

The notion of geographic space was captured by geographic distance, relational distance and cultural distance dimensions. Each dimension was made up of several items in order to measure a scale. Geographic distance was measured on a scale that was developed using the related literature (e.g., Davenport and Prusak 1998; Darr and Kurtzberg 2000; Mowery et al. 1996). The scale (composite reliability = 0.83) consisted of three items (i.e., long distance, face-to-face interaction and working place distance).

Relational distance was assessed using a four-item scale, drawn from the relevant literature (e.g., Schrader 1991; Inkpen 1998; Cummings 2001; Evangelista and Hua 2009). Items such as frequent business visits, lasting business cooperation, communication on various issues and similarity in business strategy are used in our model (composite reliability = 0.84). Furthermore, there are different instruments to measure cultural distance. We used a three-item scale to measure cultural distance, which was adapted from others' work (e.g., Yamin and Golesorkhi 2010; Almeida 1996; Kostova 1999; Doz and Santos 1997). Items included national cultural differences, language differences and differences in organizational culture (composite reliability = 0.79).

Finally, knowledge transfer was measured (composite reliability = 0.82) using a seven-item scale. Drawing on a variety of studies (e.g., Gooderham et al. 2010; Nonaka and Takeuchi 1995; Bresman et al. 1999; Cummings 2002; Kostova 1999; Zahra

and George 2002), the dependent variable was evaluated, focusing on the acquisition of new knowledge, enhancement of absorptive capability, improvement of performance, employee's quality improvement, ownership of new knowledge, a favorable knowledge-sharing culture and more involvement in knowledge transfer activities (active participation).

4 Data analysis and results

Despite China's importance in global foreign direct investment, diffusing Japanese MNEs' knowledge into the country is also crucial. Japanese MNEs are known for their superior expertise that helps improve the technical level of their subsidiaries. Japanese MNEs possess a rich knowledge base which is then transferred to their subsidiaries around the world. Chinese employees are short of experience and knowledge (Wang et al. 2004). The knowledge base of subsidiaries established by Japanese MNEs in China is weak. Without successful knowledge transfer from Japanese MNEs, it will be difficult for these subsidiaries to build up a knowledge base and improve their capabilities so as to generate revenue for their parents (i.e., Japanese MNEs). However, it is to be noted that the impact of cross-regional collaborations is not limited to the enterprises that are directly involved in the collaborations. Such long distance linkages also expand the horizon for all neighboring enterprises through localized knowledge spillover (Zhao and Islam 2006). Since enterprises are likely to search for and apply knowledge around their own technological positions (Cohen and Levinthal 1990), colocation of similar enterprises can promote cross learning in the local Chinese business community.

The analysis was designed as a LISREL model using survey data on 169 MNEs and 28 questions covering information on various measures on parent-subsidiary distance and knowledge transfers. Following Anderson and Gerbing's (1998) procedure, the reliability and validity of the measurement model was evaluated first. Confirmatory factor analysis (CFA) was used to test the reliability and validity issues based on Campbell and Fisk's (1959) criteria. The testing of the research hypotheses with structural equation modeling (SEM) technique then followed to determine the significance of the paths among the constructs. This sequence of the two-step procedure ensures that the construct measures are valid and reliable before drawing any conclusion on the relationships among them (Kiessling et al. 2009).

4.1 The measurement model

After the questionnaires were returned, CFA was used to assess the adequacy of the measurement model (Joreskog and Dag 1989). That is, CFA was performed to assess the psychometric properties of scaled items for constructs derived from the survey instrument. Reliability and validity tests were conducted for each of the constructs with multivariate measures. The internal reliability of the measurement model was tested using Cronbach's alpha (Nunnally 1978; Fornell and Larcker 1981). The smallest Cronbach's alpha (α) in this study was 0.79. Since the Cronbach α of each construct was >0.7 (Nunnally 1978; Cuieford 1965), it implies a 'strong' reliability for the

Table 2 Survey structure and description of statistics for dimensions

Dimensions	Number of items	Mean	SD	Cronbach's alpha
Geographic distance (GD)	3	5.01	1.04	0.83
Relational distance (RD)	4	4.47	1.57	0.84
Cultural differences (CD)	3	3.88	1.14	0.79
Knowledge transfer (KT)	4	4.51	1.21	0.85

questionnaire content. Table 2 summarizes the variables used in this study and displays the means, standard deviations and the Cronbach's α.

Content validity and construct validity were assessed to validate the measurement model. Straub (1989) suggests that an instrument can be claimed to be valid on the grounds of the content of the measurement items. Content validity was established by ensuring consistency between the measurement items and the extant literature (Kang et al. 2010). In this regard, Bock and Kim (2002) state that content validity is related to how representative and comprehensive are the items that are used to create a scale. As noted earlier, most of the items were adopted from existing scales, which were revised through a pilot survey (pretesting) before the final version of the questionnaire was distributed.

Again construct validity was assessed to validate the measurement model through the evaluation of convergent validity and discriminant validity (Straub 1989; Chatzoglou and Vraimaki 2009). Specifically, convergent validity was examined by considering the average variance extracted, the composite reliability and the item loadings (Fornell and Larcker 1981). Several scholars (e.g., Chin 1998; Bock et al. 2005) suggest that composite reliability values should be >0.7. In this study, all composite reliability values exceeded the recommended threshold value, ranging from 0.79 (cultural distance) to 0.84 (relational distance) as shown in Table 3.

The average variance extracted (AVE) values should be >0.5 to validate convergent validity in order to indicate that the majority of the variance is accounted for by the construct (Hair et al. 1998; Fornell and Larcker 1981; Chin 1998). In this study, all AVE values exceeded the suggested threshold value of 0.5, ranging from 0.60 (knowledge transfer) to 0.72 (relational distance). Convergent validity was also verified by finding whether each of the measurement items was significantly loaded on its latent construct (Gefen et al. 2000). The values for the loadings of the measurement items should be >0.5 to imply convergent validity (Straub 1989). In this study, the factor loadings ranged from 0.70 (similarity in business strategy) to 0.93 (working place distance). Thus, all exceeded the recommended threshold value. Table 3 presents a complete list of measurement items, confirmatory factor results and reliabilities.

Furthermore, scholars (e.g., Hair et al. 1998; Ryu et al. 2003; Chatzoglou and Vraimaki 2009) recommend 0.35 as an acceptable threshold for the t-values for the loadings of measurement items. These were well above the cutoff value (8.27–13.14), demonstrating adequate convergent validity.

Table 3 Factoring loading, critical ratio, composite reliability (CR) and average variance extracted (AVE) by confirmatory factor analysis (CFA)

Construct	Indicator (items)	Standardized factor loading	Critical ratio (t value)
Geographic distance	Long distance	0.81	10.09
AVE = 0.692	Face-to-face interaction	0.88	11.98
CR = 0.83	Working place distance	0.93	13.14
Relational distance	Frequent business visits	0.89	12.19
AVE = 0.723	Lasting business cooperation	0.80	9.71
CR = 0.84	Communication on various issues	0.81	9.93
	Similarity in business strategy	0.70	8.49
Cultural differences	National cultural differences	0.81	10.05
AVE = 0.613	Language differences	0.85	11.13
CR = 0.79	Differences in organizational culture	0.86	11.27
Final response variable			
Knowledge transfer	Acquisition of new knowledge	0.88	11.92
AVE = 0.603	Enhancement of absorptive capability	0.79	9.46
CR = 0.82	Improvement of performance	0.70	8.27
	Employee's quality improvement	0.75	8.98
	Ownership of new knowledge	0.75	8.96
	Favorable knowledge-sharing culture	0.86	11.29
	Involvement in knowledge transfer activities (active participation)	0.72	8.52

All significance level at $p < 0.001$

Finally, discriminant validity was assessed using the square root of the average variance extracted (AVE). For adequate discriminant validity, the square root of every AVE value should be greater than the off-diagonal elements in the corresponding row and column of the correlation table (Fornell and Larcker 1981). Table 4 shows the correlation between the latent variables, providing the correlation coefficients in the off-diagonal elements of the matrix and the square root of AVE values for each construct along the diagonal. The comparison using the values in the table confirms the items' discriminant validity and shows adequate discriminant validity.

The adequacy of the measurement model is evaluated based on the criteria of convergent and discriminant validity of the constructs and their reliability (see Fig. 2). However, since both independent and dependent measures were self-reported and obtained from the same source, the common method variance problem might be present. Following Podsakoff and Organ (1986), the Harman's one-factor test was

Table 4 Correlation matrix between constructs (latent variables)

Dimensions	1	2	3	4
1. Geographic distance (GD)	0.83			
2. Relational distance (RD)	0.46	**0.85**		
3. Cultural differences (CD)	0.49	0.35	**0.78**	
4. Knowledge transfer (KT)	−0.47	−0.46	−0.35	**0.78**

The bold numbers in the diagonal row are the square root of the average variance extracted. Other entries represent inter-correlations of the constructs

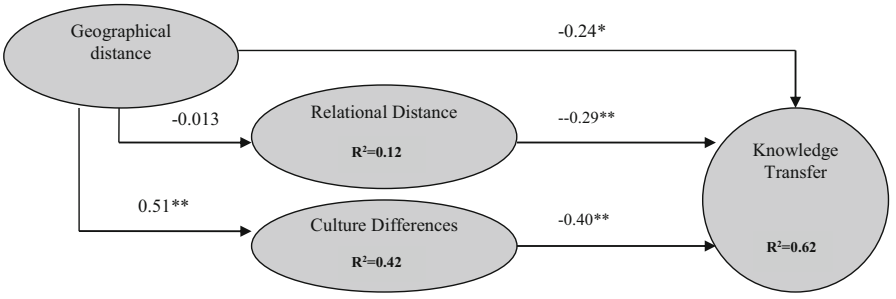

Fig. 2 Standardized path coefficients and t values for the structural model. *Note*: $^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

conducted on the items in the conceptual model so as to measure the extent of common method bias in the data set. According to Harman (1960), the threat of common method bias is high if a single factor accounts for more than 50 % of the variance. Having entered all constructs into an unrotated principal component factor analysis, no single predominant factor emerged. Therefore, common method variance did not appear to be present. Additionally, an effort was made to check for multicollinearity. There were no high correlations among the constructs (latent variables). The variance inflation factor (VIF) values for all of the variables were <1.41, which showed that multicollinearity was not a serious issue in this study (Kang et al. 2010).

4.2 Structural model and hypothesis testing

After the structure of the measurement model was established, the structural model was subsequently tested (Lu et al. 2006; Jiang and Li 2008). In the proposed model (see Fig. 1), knowledge transfer is considered the dependent variable, and the three components of geographic space (i.e., geographic distance, relational distance and cultural distance) are treated as independent variables. However, relational distance serves as both a dependent variable (to geographic distance) and again an independent (mediating) variable (to knowledge transfer). Similarly, cultural distance serves as both a dependent variable (to geographic distance) and again an independent (mediating) variable (to knowledge transfer). Figure 2 illustrates the structural model, along with

factor loadings, significant path coefficients, t-values and explained variances (R^2) as produced by LISREL 8.5.

Scholars (e.g., Hair et al. 1998; Ryu et al. 2003) recommend the three perspectives (i.e., absolute fit, incremental fit and parsimonious fit) for the validation of overall model fit. The overall model fit was assessed using six measures from the three perspectives. In more detail, the absolute fit measures used in the evaluation of structural model are X^2/df, root mean square error of approximation (RMSEA) and goodness of fit index (GFI). The comparative fit index (CFI), adjusted goodness of fit index (AGFI), normed fit index (NFI) and non-normed fit index (NNFI) were all used to measure incremental fit, while the parsimonious goodness of fit index (PGFI) was used to measure parsimonious fit.

The overall Chi-squared (χ^2) value was 173.28, with a degree of freedom equal to 159. The χ^2 statistic divided by the degrees of freedom also indicates a 'reasonable' fit at 1.09. Given the medium size of sample (Cudek and Henly 1991, as cited in Dhanaraj et al. 2004), multiple fit indices were assessed to check the overall model fit. We have looked at these indices to identify the model. Fit indices (e.g., GFI = 0.91, AGFI = 0.92, CFI = 0.98, NFI = 0.91, NNFI = 0.98, RMSEA = 0.027) also pointed to a good fit. Browne and Cudeck (1993) suggest that RMSEA < 0.05 is deemed to be a good fit. Similarly, Hu and Bentler (1999) suggest that CFI > 0.95 can be considered a close fit. The parsimonious goodness of fit index (PGFI) at 0.66 was above the cutoff point of 0.5.

Table 5 summarizes the overall model fit indices of the structural model, with all fit indices above the commonly accepted levels. It can be argued that the higher the model fit, the higher the model's usability (Shih et al. 2010). The validation values show a good fit, supporting the structured model we proposed. This also means that the

Table 5 Overall model fit of path analysis

Fit indicators	Criteria value	Validation	Results
Absolute fit measures			
χ^2/df	$1 < \chi^2/df < 2$	1.19	Complaint
P	>0.05	0.208	Complaint
Goodness of fit index (GFI)	>0.9	0.91	Complaint
Root mean square error of approximation (RMSEA)	>0.05	0.027	Complaint
Incremental fit measures			
Adjusted goodness of fit index (AGFI)	>0.9	0.92	Complaint
Comparative fit index (CFI)	>0.9	0.98	Complaint
Normed fit index (NFI)	>0.9	0.91	Complaint
Non-normed fit index (NNFI)	>0.9	0.98	Complaint
Parsimonious fit measures			
Parsimonious goodness of fit index (PGFI)	>0.5	0.66	Complaint

Table 6 Hypotheses testing results

Hypotheses	Hypothesized path	Expected sign	Standardized coefficient	t value	Assessment	
H1a	GD⟶SKT	−	−0.24	−1.98	−	S*
H1b	GD⟶RD	+	−0.013	−0.059	−	NS
H1c	GD⟶CD	+	0.51	4.05	+	S**
H2	RD⟶SKT	−	−0.29	−2.72	−	S**
H3	CD⟶SKT	−	−0.40	−2.48	−	S*

+ indicates a positive relationship; − indicates a negative relationship;
** $p < 0.01$; * $p < 0.05$; S indicates hypothesis supported; NS indicates a nonsignificant relationship

parameter estimates can be expected to be more meaningful, which will be elaborated later.

The final step in the structural model estimation was to examine the significance of each hypothesized path (Cho et al. 2010). Since a structural model is estimated to test the research hypotheses (Katsikea et al. 2011), Table 6 presents the results of the model estimation.

Geographic distance is the physical distance between the two countries. Hypothesis 1a suggests that the greater the geographic distance between an MNE and its subsidiaries, the lower the chance of knowledge transfer taking place between them. In other words, geographic distance will have a negative effect on knowledge transfer. The standardized coefficients of geographic distance and knowledge transfer are −0.24, and t-value is −1.98, $p < 0.05$, reaching statistical significance. These results suggest that geographic distance and knowledge transfer are, albeit weak, related negatively. Thus, Hypothesis 1a is supported. This result provides a picture, indicating that geographic distance between Japanese MNEs and their subsidiaries based in China has a negative influence on knowledge transfer. This implies that geographic distance between Japanese MNEs and their subsidiaries based in China does hamper knowledge transfer.

Hypothesis 1b suggests that geographic distance will have a strong direct effect on relational distance. That is, geographic distance is supposed to be positively associated with relational distance. In this connection, scholars (e.g., Mehmanpazir and Munier 1999; D'Este et al. 2013) argue that the physical distance separating knowledge-sharing actors can have an impact on the ability and/or the willingness of the actors to develop social relationships, as is often the case in MNEs. However, the standardized coefficient of geographic distance and relational distance is −0.013, and the t value is 0.059, and is not statistically significant. The results actually provide a different picture, indicating that geographic distance has a negative influence on relational distance. Thus, Hypothesis 1b is not supported. This implies that geographic distance does not hamper the social and business relationship between Japanese MNEs and their subsidiaries based in the Dalian Industrial Zone in China. Dalian is geographically close to Japan. As the Dalian respondents indicated, given their historical relationship and contact with Japanese people and ease of communication, geographic distance is not positively associated with relational distance.

Hypothesis 1c suggests that the more the location distance between an MNE and its subsidiaries, the more likely they have cultural distance between them. The hypothesis predicts that there is a positive relationship between geographic distance and cultural distance. The standardized coefficient of geographic distance and cultural distance is 0.51, with a t-value of 4.05, $p < 0.01$, which is statistically significant. These numbers suggest that geographic distance and cultural distance are strongly and positively related. Thus, Hypothesis 1c is fully supported. This implies that cultural distance, which is the difference in religious beliefs, race, social norms and language between the host country (i.e., China) and the recipient country (i.e., Japan) of the MNCs, is strongly and positively related to the geographic distance between these countries.

Hypothesis 2 predicts that relational distance is negatively related to knowledge transfer. The standardized coefficients of relational distance and knowledge transfer are -0.29, and the t-value is -2.72, $p < 0.01$, indicating statistical significance. These values suggest that hypothesis 2 is fully supported. When it comes to exploring the association between relational distance and knowledge transfer, this study found that relational distance is negatively related to knowledge transfer between Japanese MNEs and their subsidiaries.

Hypothesis 3 predicts that cultural distance is negatively related to knowledge transfer. Cultural boundaries often lessen the opportunities for knowledge sharing (Park and Ghauri 2011). The standardized coefficient of cultural distance and knowledge transfer is -0.40, and the t-value is -2.48, with $p < 0.05$, suggesting statistical significance. These results suggest that cultural distance and knowledge transfer have a strong negative relationship. Thus, Hypothesis 3 is supported. That is, differences in culture between the host country and the recipient country of the MNCs are a major hindrance to knowledge transfer, as they create various problems particularly in organizations requiring cooperation between Japanese MNCs and their subsidiaries in China. The result of the LISREL analysis is shown in Fig. 2.

5 Discussion and implications

Distance, proximity and geography matter for knowledge transfer in the MNE environment (Howells 2002; Stensheim 2012). Given its importance as a key component of knowledge management, knowledge transfer between a MNE and its subsidiaries seems to become harder due to geographic space. This study provides empirical evidence regarding the relationship between various characteristics or measures of geographic space (i.e., geographic distance, cultural distance and relational distance) and their role in knowledge transfer. We proposed and tested an integrated framework in which geographic distance, cultural distance and relational distance are treated as the key features of geographic space that influence knowledge transfer.

Although previous research (e.g., Evangelista and Hua 2009; Doz and Santos 1997; Mowery et al. 1996; Simonin 1999; Park 2011; Cummings 2001) provides consistent evidence that geographic distance, relational distance and cultural distance in isolation affect knowledge transfer, little work exists that examines the relationship between these characteristics of geographic space, and their relationship's influence on knowledge transfer, particularly in the Chinese context. This paper brings them together

to measure their links to knowledge transfer. In other words, this study extends the work on geographic distance and knowledge transfer, by adding relational distance and cultural distance that mediate the linkage.

Traditionally, geographic distance is expected to limit knowledge transfer (Ambos and Ambos 2009). Tacit knowledge, in particular, is difficult to transfer over long distances (Von Hipple 1994), requiring geographic proximity if it is to be generated and disseminated (Rinallo and Golfetto 2011). The fact that geographic distance influences the other types of distance but also decreases the likelihood of two actors engaging in knowledge exchanges more directly. Geographic proximity also provides opportunities for more informal and frequent interactions, which are critical to subsidiaries in building trust and pursuing knowledge, transfer (Gnywalim et al. 2009).

This research supports this view and also sheds some light on the role of geographic distance on relational distance and cultural distance. Subsidiaries having a strong tie will engage in ongoing, sustained and repeated interactions and discussions, which help create and transfer tacit knowledge (Gnywalim et al. 2009).

Recent studies on knowledge transfer in the international setting clearly indicate the importance of cultural similarity, which is more likely to exist with institutional and geographic proximity (Gnywalim et al. 2009). Hong et al. (2009) find that differences are major impediments to learning and knowledge transfer. A meta-analytic study by Van Wijk et al. (2008) shows that cultural distance inhibits knowledge transfer and the problem is greater in intra-organizational settings than in inter-organizational settings. As the findings show, geographic distance has a direct influence on knowledge transfer ($\beta = -0.24, t = -1.98$), relational distance ($\beta = -0.013, t = -0.059$) and cultural distance ($\beta = 0.51, t = 4.05$).

When it comes to exploring the relationship between geographic distance and relational distance, the results provide a different picture, indicating that geographic distance has a surprisingly negative influence on relational distance. This implies that geographic distance does not hamper the social and business relationships between Japanese MNEs and their subsidiaries based in Dalian. As mentioned earlier, the data were collected from Dalian Industrial Zone situated in coastal China which is geographically close to Japan. Historically, there were very frequent interactions between the people of these two areas. Japan's 40-year occupation of Dalian and its colonial presence may have helped lay the groundwork for the thriving trade ties we see today. Many people from Dalian speak Japanese and have Japanese friends (Huang 2013). Dalian residents, particularly our respondents, indicated that for a variety of reasons (the historical relationship, their contact with Japanese people and easier communication), reported that geographic distance does not hamper social and business relationship with their Japanese counterparts.

In addition, the paper goes beyond the conventional findings and provides insights on relational distance or cultural distance. Some studies in this area focus on relational distance and cultural distance in isolation acting as mediating factors and impact on knowledge transfer. This study fills this gap in the literature and serves as a platform for further research. The results also indicate that relational distance and cultural distance are directly and negatively associated with knowledge transfer. Relational factors include inter-firm trust, relation duration and performance on knowledge transfer within the knowledge contributor–recipient (MNC–subsidiary) relationship

(Hohberger 2014). It is easier to transfer knowledge to cross-border subsidiaries where employees are trusted in the sense that the relationships with them are good (Hohberger 2014). While there is a negative relationship between relational distance and knowledge transfer ($\beta = -0.29, t = -2.72$), the relationship between cultural distance and knowledge transfer is also significantly negative ($\beta = -0.40, t = -2.48$).

R^2 indicates the fraction of total variance in the endogenous construct accounted for by those exogenous constructs (Chin 1998; Mathieson et al. 2001). Thus, the bigger the R^2, the greater the model's predictive power (Weinfurt 1995). Overall, a substantial amount of variance is explained by the endogenous variables: cultural distance ($R^2 = 0.42$) and knowledge transfer ($R^2 = 0.62$), with the exception of relational distance ($R^2 = 0.12$). The R^2 values of 0.42 and 0.62 indicate that a substantial proportion of the variance of cultural distance and knowledge transfer, respectively, was indeed predicted by the variables.

This paper confirms and advances our understanding in the field of knowledge management, economic geography and international business by making several contributions to the literature. Prior work has typically studied the effect of geographic proximities on knowledge transfer, which this study confirms. As mentioned earlier, the research extends that relationship by incorporating the mediating effects of relational distance and cultural distance. Therefore, the results demonstrate that geographic distance has both a direct and indirect effect on knowledge transfer. Relational distance serves as both a dependent variable (to geographic distance) and again an independent (mediating) variable (to knowledge transfer). Similarly, cultural distance serves as both a dependent variable (to geographic distance) and again an independent (mediating) variable (to knowledge transfer).

Currently, managers of MNEs and other organizations have little knowledge that the effect of geographic space has on knowledge transfer. This study examines whether geographic space hampers Japanese MNEs transferring knowledge to their subsidiaries based in China. The article provides some managerial implications for MNEs which intend to expand business in new foreign markets. The conceptual model developed in this paper provides useful information for managers and geographers to enhance knowledge transfer through the careful understanding of the relationship between geographic space, perceived distance and knowledge transfer. Based on the results, managers will be able to transfer knowledge to their subsidiaries, recognizing the impact geographic space has on this. Moreover, this study provides useful insights for economic geographers who wish to study knowledge transfer between parent companies and their subsidiaries across geographic space.

Structural equation modeling is not only a response to the need to understand what causes the variation in knowledge transfer from a geographic space perspective, but also a response to practitioners who need to understand the linkage between various dimensions of geographic space and their ability to transfer knowledge. Our findings suggest that geographic space in its various forms is a key issue in transferring knowledge between MNEs and their subsidiaries.

6 Limitations and future research avenues

This study elaborates the relationship between various dimensions of geographic space and knowledge transfer. However, several factors limit this empirical work and need consideration when evaluating the findings and conclusions. Firstly, this investigation did not address all the potential factors that can influence knowledge transfer. It focused only on geographic distance, relational distance and cultural distance. For example, the absorptive capacity and motivation of the receiving unit (i.e., subsidiary) are significant determinants of knowledge transfer in MNEs (Buckely et al. 2009; Gupta and Govindaranjan 2000). Future research may consider knowledge characteristics (e.g., tacitness, articulability and embeddedness) and recipients' characteristics (motivation and absorptive capacity) as moderators to understand the notion of effective knowledge transfer in combination with geographic factors.

Secondly, understanding the influence of transfer mechanisms (e.g., personalization and codification) on knowledge transfer is important in reducing barriers to knowledge transfer that arise as a result of geographic space. By limiting our discussion only to geographic space and knowledge transfer, we fail to address adequately the importance of the selection of an appropriate transfer mechanism that also influences knowledge transfer. In this regard, technology plays a great role. Technological changes and their possible impacts on cultural and relational distances deserve further discussion. Hence, future research should be undertaken to address this question. That is, future research should expand this study's conceptual model by investigating various people and technology-related transfer mechanisms that may minimize the negative effects of geographic space on knowledge transfer.

Thirdly, the cross-sectional nature of this study inhibits the testing of causality between the constructs included in the research model. Thus, longitudinal studies using causal research designs would be useful. They would also allow us to test for reverse causality where knowledge transfers may in the longer term have an effect on firms' absorptive capacity and also reduce a MNE's perceived distance to its subsidiaries.

Fourthly, the study findings contradict one of the hypotheses H1b (i.e., the positive linkage between geographic distance and relational distance). The relationship between geographic distance and relational distance is surprisingly negative ($\beta = -0.031, t = -0.059$). Although, as explained earlier, people from Dalian have an historic relationship and close contact with Japanese people, this may be a fruitful area for future research to explore the actual reasons for this contradiction.

Fifthly, it could be argued that our analysis suffers from an endogeneity problem in that the variables used interact with one another. We have attempted with some effort to deal with this in using questionnaires and gathering and analyzing the responses. We acknowledge that we may not have removed the issue completely, but within the limitations of current theoretical thinking and quantitative techniques we have done our best to minimize this impact. Future researchers using this work as a starting point may be able to unravel this issue by developing more precise theories and techniques.

Sixthly, only the views of subsidiary executives were considered in the subjective instruments used to discuss the implications of geographic space on knowledge transfer. This may lead to biased results since the views of MNEs' headquarter may be different. To ensure robust results, these views should be considered in a future study.

Seventhly, the research model and hypotheses were tested, using data drawn only from MNEs originating in a single country, and the results are therefore limited to Japanese MNEs in a particular part of China. The study's findings may not therefore be generalized to other settings. To overcome this limitation, utilizing the constructs used in this study in other emerging economies would be an interesting topic for future research. Finally, future research could triangulate in-depth qualitative case studies and quantitative research so as to provide more robust results.

7 Conclusion

This paper focuses on the current links between international business, economic geography and knowledge management. The study discusses and analyzes the geographic space characteristics that impact on knowledge transfer. Previous research focused on identifying the nature of geographic proximity that promote knowledge transfers in general without adding the role that relational distance or cultural distance plays in that process. It was essential to understand the effect of geographic distance on knowledge transfer using relational distance and cultural distance as mediators. Our model tested the often assumed direct and positive relationship between geographic proximity and knowledge transfer while also attempting to understand the effect of geography on knowledge transfer using other geographic space characteristics as mediators. By testing five hypotheses, this study finds that geographic distance has a statistically significant effect on relational distance, cultural distance and knowledge transfer. It also shows that relational distance and cultural distance are the mediating factors between geographic distance and knowledge transfer. Although the paper does not identify a new theory, it hopefully motivates scholars in economic geography and practitioners in international business to engage with this issue in a different way to that adopted in the past.

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