DETERMINANTS AND OUTCOMES OF KNOWLEDGE TRANSFER:
A STUDY OF MNCs IN CHINA

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ABSTRACT

This paper focuses on the factors that affect the transfer of knowledge from MNCs originating from a more developed economy to their subsidiaries in a transitional economy. We propose and test a two-stage model for knowledge transfer from an MNC to its subsidiary. In the first stage, our model proposes factors affecting knowledge contributed by the MNC to its foreign subsidiary. In the second stage, the model proposes factors affecting knowledge acquired by the subsidiary from its parent. Finally, knowledge acquired by the subsidiary is predicted to influence its performance.

We test this model in the context of knowledge transfer between MNCs and their subsidiaries in China, employing a sample of 297 ventures. We examine the transfer of management and technological knowledge, and distinguish between transfers to wholly owned and joint venture subsidiaries. The empirical data and geographical context address a weakness in research of intra-firm knowledge transfer, inadequate large-scale empirical study of cross-border knowledge transfer within a comprehensive framework. Results substantially support the proposed model, showing that the MNC’s knowledge base, knowledge transfer skills, benefits from knowledge transfer, and fear of appropriation of knowledge impact knowledge contributed to its subsidiary. Knowledge contributed by the MNC parent, subsidiary’s learning capacity and intent, provision of training, link between rewards and learning, and the learning objective of local partner determine knowledge acquired by the subsidiary. Importantly, we demonstrate that management knowledge acquired by a subsidiary significantly influences its performance.

Keywords: knowledge transfer, MNCs, China
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This paper focuses on the factors that affect knowledge transfer from MNCs to their foreign subsidiaries. Knowledge management (e.g., Hedlund, 1994) and related issues such as knowledge creation (e.g., Nonaka, 1994) and transfer (e.g., Inkpen, 1995; Kogut & Zander, 1993) have attracted considerable research attention. However, partly due to significant data collection challenges, relatively little empirical work (e.g., Gupta & Govindarajan, 2000; Lyles & Salk, 1996; Szulanski, 1996) has examined knowledge transfer in the context in which it is most difficult – transferring knowledge from an MNC originating from a more developed economy to its subsidiary in a transition economy.

In this paper, we propose and test a two-stage model for knowledge transfer from the MNC to its foreign subsidiary. In the first stage, our model proposes factors affecting knowledge contributed by the MNC to its subsidiary. In the second stage, the model proposes factors affecting knowledge acquired by the subsidiary from its parent. Finally, knowledge acquired by the subsidiary is predicted to influence its performance.

We test this model using data collected from a mail survey on the transfer of knowledge from foreign parents to their subsidiaries in China, using a final sample comprising 297 wholly owned venture (WOV) and Sino-foreign joint venture (JV) subsidiaries. The empirical data and geographical context provide an appropriate and unusual setting to examine knowledge transfer. They allow us to address what has been identified as a significant weakness in the intra-firm knowledge transfer literature - insufficient large-scale empirical study of cross-border knowledge transfer (e.g., Spender & Grant, 1996; Gupta & Govindarajan, 2000) within a comprehensive research framework. The results are broadly consistent with our model and show that the MNC’s knowledge base, knowledge transfer skills, benefits from knowledge transfer, and fear of appropriation of knowledge affect knowledge contributed to its subsidiary. The results also show that knowledge contributed by the MNC parent, subsidiary’s absorptive capacity and learning intent, provision of training, link between rewards and learning, and the learning objective of local partner determine knowledge acquired by the subsidiary. We also demonstrate that management knowledge acquired by the subsidiary influences its performance.

BACKGROUND

The “knowledge-based view of the firm” (Quinn, 1992; Grant, 1996; Spender, 1996) asserts that knowledge is the most strategically important resource that firms posses. The primary advantage that MNCs bring to their foreign subsidiaries is their possession of firm-specific superior knowledge underlying technology, production, marketing or other activities (Hymer, 1976; Caves, 1971). As the knowledge base of young or new subsidiaries is thin (Lyles & Salk, 1996), parent firms become important sources of knowledge that subsidiaries can use to seek above-normal rents (Steensma & Lyles, 2000). The issue of knowledge transferability within firms is therefore of critical importance (Grant, 1996).

Despite its importance, knowledge transfer does not necessarily take place efficiently or effectively (Gupta & Govindarajan, 2000; Szulanski, 1996). The “tacitness”, “complexity” or “causal ambiguity” of knowledge is one of the widely recognized barriers to its transfer (Kogut & Zander, 1992; Simonin, 1999). Firm-specific knowledge is often tacit and
embedded in organizational practices and routines, and is consequently immobile and non-tradeable (Nelson & Winter, 1982; Nonaka, 1994). While these qualities make knowledge valuable and a source of competitive advantage, it is difficult to transfer non-codifiabile, complex or ambiguous knowledge across units of an organization (Kogut & Zander, 1992).

In the technology/knowledge transfer and alliances literature, there has been general acknowledgement that the success of knowledge transfer requires that the transferor possess the (1) capacity, and (2) willingness to transfer knowledge; and the recipient possess the (3) capacity, and (4) intent to learn the knowledge contributed by the transferor (e.g., Inkpen, 1995; Hamel, 1991; Lyles & Salk, 1996; Steensma & Lyles, 2000). Capacity to transfer is a function of the technological level of the transferor, the technological gap between the transferor and the recipient (Young & Lan, 1997), and the knowledge transfer experience of the transferor (Steensma & Lyles, 2000). Willingness to transfer is affected by the incentive to exploit knowledge and skills abroad (Young & Lan, 1997), and the perceived need to control proprietary know-how (Steensma & Lyles, 2000). Capacity to learn is affected by the recipient’s absorptive capacity and provision of training (Cohen & Levinthal, 1990; Lyles & Salk, 1996). Intent to learn is influenced by the learning intent of the recipient’s employees (Argyris & Schon, 1978), and the link between rewards and learning (Pucik, 1991).

Though the conceptual and theoretical bases of individual elements in the knowledge transfer process have been reasonably established, there has not been adequate development of an integrative theoretical framework. Furthermore, empirical research in this field has not adequately examined the impact of characteristics of key players on the outcomes of knowledge transfer. Therefore, both the development of an integrated theoretical framework and its empirical testing are required to improve the understanding of knowledge transfer from parents to foreign subsidiaries.

**MODEL AND HYPOTHESES**

Figure 1 presents our model for knowledge transfer, which also serves as the overarching framework for this study. In this paper, knowledge is defined as the explicit and implicit practical skills, insights, judgements, and values required to run an operation. Knowledge transfer is a process of systematically organized exchange of information and skills between entities. Successful transfer results in the recipient unit accumulating or assimilating new knowledge (Zander, 1991).

Our model identifies two stages in the knowledge transfer process. The first stage focuses on the parent’s contribution of knowledge, and the second on the subsidiary’s acquisition of knowledge. Factors influencing the knowledge contribution of the parent are grouped into two categories: a) parent’s capacity to transfer; and b) parent’s willingness to transfer. Factors affecting the knowledge acquisition of the subsidiary are divided into three categories: a) parent’s knowledge contribution; b) subsidiary’s capacity to learn; and c) subsidiary’s intent to learn. Importantly, this model recognizes a follow-on stage, in which the knowledge acquired by the subsidiary will impact its performance.

***Figure 1 about here***

Our model also recognizes that knowledge transfer is affected by whether the subsidiary is a WOV or a JV with a local firm. In a JV, knowledge transfer will also be impacted by inter-partner factors such as objectives of the partners to learn skills (Hamel,
1991) and the nature of their relationship (Mowery et al., 1996). To recognize the empirical impact of these factors, we evaluate WOVs and JVs separately, including in the latter group, joint venture specific factors. Knowledge transfer is also affected by the type of knowledge (i.e., management knowledge, technological knowledge) being transferred. For instance, concern over the infringement of intellectual property rights prevents parent firms from contributing latest technological knowledge (Mansfield, 1993 & 2000) but not management knowledge. We distinguish between management and technological knowledge transfer in our empirical analysis. Finally, though the flows of knowledge within a MNC occur along multiple directions (e.g., the flow of knowledge from the parent to the subsidiary, from the subsidiary to the parent, and from subsidiaries to subsidiaries), the parent continues to serve as the most active creator and diffuser of knowledge within the firm (Gupta & Govindarajan, 2000). Thus, our study focuses on the knowledge transfer from the parent to the foreign subsidiary.

We next discuss each of the major elements of the model and present hypotheses on their effects. To guide our discussion of relevant variables, Figure 2 expands on the key components of our model and identifies their impact on knowledge contributed and acquired.

***Figure 2 about here***

**Capacity to Transfer**

Capacity to transfer knowledge is defined as the possession of firm-specific knowledge, and the ability to impart the knowledge in a form that can be assimilated by the recipient. A parent’s capacity to transfer knowledge is primarily determined by (1) the quality of its knowledge base, and (2) the ability to effectively transfer knowledge to its subsidiary.

Firm-specific knowledge is not mobile, non-tradeable, imperfectly imitable, and cannot be created quickly (Dierickx & Cool, 1989; Barney, 1991). In addition, not all firms are equally adept at knowledge creation. Thus, firms are heterogeneous in the knowledge they generate and control. The capacity of the parent to transfer valuable knowledge to its subsidiary is reflected in the sophistication of its existing knowledge stock. Gupta and Govindarajan (2000), for example, argue that transfer is facilitated if the transferor possesses knowledge that is non-duplicative and relevant, and which the recipient lacks. A firm with rich knowledge base will possess more valuable knowledge, routines, and intangible resources available for transfer to its subsidiaries than a firm with poor knowledge base.

\[ H1. \text{The better the quality of the parent’s knowledge base, the greater the knowledge contributed to its foreign subsidiary.} \]

The difficulty of transferring knowledge is contingent on the tacitness of knowledge being transferred (Kogut & Zander, 1992; Simonin, 1999). As knowledge is typically embedded in organisational routines and in individual members, much of the knowledge to be transferred is tacit and difficult to specify (Nelson & Winter, 1982; Nonaka, 1994). The transfer of such knowledge often requires personal interaction between the transferor and the recipient (Teece, 1981; Zander & Kogut, 1995). Therefore, the ability of the parent to transfer its knowledge will affect the amount of knowledge contributed to its subsidiary.

\[ H2. \text{The greater the parent’s knowledge transfer skills, the greater the knowledge contributed to its foreign subsidiary.} \]
Willingness to Transfer

Willingness to transfer knowledge is defined as the predisposition to provide knowledge to the recipient. The cost of transferring knowledge is not trivial (Teece, 1977, 1981). Therefore, even when the parent firm is resource rich and able to disburse resources, it may not be willing to commit resources for this purpose. Contractor and Sagafi-nejad (1981) indicate that it is necessary that revenues resultant from knowledge transfer contribute towards the costs of generating the technology. Driscoll and Wallender (1981) also mention that the ability of the transferor firm to recoup the cost of technology transfer affects its willingness to undertake further transfers. Clearly, cost-benefits considerations significantly influence a parent firm’s contribution of knowledge to its subsidiary. The greater the potential benefits the parent firm derives from the success of the subsidiary, the more the knowledge transfer to the subsidiary it is willing to undertake.

\[ H3. \text{ The greater the benefits to the parent of knowledge transfer, the greater the knowledge contributed to its foreign subsidiary.} \]

Fear of appropriation of knowledge. Given that knowledge is the source of competitive advantage (Spender & Grant, 1996), firms are naturally concerned over the misappropriation of their proprietary knowledge. When knowledge is transferred across borders, the distance and unfamiliarity with host country conditions pose greater challenges to the monitoring and controlling of the knowledge flow. The fear of appropriation of knowledge is likely to adversely affect the amount of knowledge contributed to its subsidiary.

\[ H4. \text{ The greater the parent’s fear of appropriation of knowledge, the less the knowledge contributed to its foreign subsidiary.} \]

Knowledge Contributed and Knowledge Acquired

Foreign parents are important sources of advanced technological and managerial know-how for subsidiaries in transitional economies (Child & Markoczy, 1993; Markoczy, 1993; Lyles & Salk, 1996). In general, the greater the knowledge contributed by the parent, the greater the knowledge acquired by the subsidiary (Lyles & Salk, 1996; Steensma & Lyle, 2000).

\[ H5: \text{The greater the knowledge contributed by the parent, the greater the knowledge acquired by its foreign subsidiary.} \]

Capacity to Learn

The second stage of the knowledge transfer process focuses on subsidiary factors. The subsidiary’s capacity and intent to learn mirrors the impact and importance of the parent’s capacity and willingness to transfer knowledge. The subsidiary’s capacity to learn is affected by its absorptive capacity and provision of training.

Contractor (1980), Driscoll and Wallender (1981), Aharoni (1991) and Gupta and Govindarajan (2000) consider the absorptive capacity of the recipient to be the major influence on knowledge transfer. Research on alliance learning (Hamel, 1991; Mowery et al., 1996; Pucik, 1991) also underscores the importance for the knowledge-acquiring firm to
possess learning capacity for the effective transfer of knowledge from its partner. Consistent with this research, we posit that the recipient’s absorptive capacity plays a role in effective knowledge transfer. Cohen and Levinthal (1990: 128) defined absorptive capacity as “…the ability to recognize the value of new information, assimilate it and apply it to commercial ends…” Clearly, for knowledge contributed by the parent firm to be effectively learned, the subsidiary’s level of absorptive capacity is important because it affects how well the subsidiary assimilates the knowledge.

**H6:** The greater the absorptive capacity of the subsidiary, the greater the knowledge acquired from its parent.

The training of employees can be seen as a vehicle for imparting both explicit and tacit knowledge (Nonaka, 1994). New employees are rarely equipped with adequate necessary knowledge for their job because firms’ routines and activities are idiosyncratic and firm specific. Since prior related knowledge is necessary for the effective assimilation of new knowledge (Cohen & Levinthal, 1990), there is a need to provide adequate training to equip the subsidiary employees with the essential knowledge for their jobs. This will enhance individual absorptive capacities and cumulatively, improves the learning capacity of the subsidiary. Provision of training is not limited to new employees only; firms frequently use training to improve the managerial and technical skills of all employees. Lyles and Salk (1996), and Chi and Roehl (1997) have found training of employees to be an important factor facilitating technology/knowledge transfer.

**H7:** The greater the provision of training in the foreign subsidiary, the greater the knowledge acquired from its parent.

**Intent to Learn**

Organizations that have a conscious plan or intent to learn have been found to acquire knowledge more effectively from their foreign alliance partners (Hamel, 1991; Inkpen & Crossan, 1995). Gupta and Govindarajan (2000) and Szulanski (1996) found that more effective knowledge transfer takes place when knowledge recipients have the motivational disposition to accept knowledge. Zander (1998) found that the reluctance of units to accept technology developed in other parts of the firm hindered the diffusion of technological capabilities within firms. For organizational learning to take place, it is imperative that a strong intent and plan to learn, in contrast to mere willingness, be present. Organizations with strong learning intent are likely to translate this intent into systematic and supported approaches to knowledge transfer and accumulation.

**H8:** The greater the learning intent of the subsidiary, the greater the knowledge acquired from its parent.

Employees require incentives to learn. With little or no reward given for contributions to the accumulation of skills and knowledge, employees might treat learning as secondary for the job. Learning is a long-term activity. Thus, short-term reward measures used to evaluate staff performance will reduce their willingness to learn knowledge because of pressure to achieve immediate results (Pucik, 1991).

**H9:** The greater the link between employees’ rewards and their learning, the greater the knowledge acquired from the parent.
Learning from partners is often one of the prime motivations for forming JVs (Hamel et al., 1989). The presence of a clear learning intent on the part of one partner has been found to facilitate learning from its allies (Hamel, 1991). A local partner with strong learning intent will actively seek to acquire knowledge via the JV experience. It is expected that the subsidiary will inherit the learning intent and will thus be motivated to acquire more knowledge from its foreign parent.

H10: The greater the emphasis on knowledge acquisition by the local partner, the greater the knowledge acquired by the subsidiary from its foreign parent.

Knowledge Acquired and Subsidiary Performance

A fundamental precept of the resource-based view of firm is that firms possessing greater resources have greater potential to outperform their competitors (Barney, 1991). Knowledge, which is a critical resource, helps firms more effectively exploit other forms of resources or compensate for resource inadequacies, leading to improved firm performance. Lyles and Salk (1996) found knowledge acquisition from foreign parents to positively correlate with IJVs’ performance. In contrast, due to many intervening factors and measurement problems, Dixon (1999) and others (e.g., Huber 1991; Inkpen & Crossan, 1995) caution against drawing direct links between organisational performance and learning. However, in the absence of consistent and widespread managerial mistakes in knowledge acquisition and management, it is likely that greater knowledge acquisition by subsidiaries will lead to improved subsidiary performance or improved reliability of performance (March, 1991). This relationship is particularly likely in transitional economies, where knowledge from MNCs is a key means for firms to improve their resource bases and competitiveness.

H11: The greater the knowledge acquired by a subsidiary from its parent, the better its performance.

DATA AND METHODS

Research Context: Knowledge Transfer in China

We conduct our study in China, evaluating the hypotheses in the context of knowledge transfer between foreign MNCs and their local subsidiaries. Since China established its “Open Door Policy” in 1979, it has attracted huge volumes of foreign direct investments, and has become one of the largest hosts of MNCs in the world (Ji, 1999; Liu, 1999; Martinsons & Tseng, 1999). More than 350,000 foreign invested enterprises (FIEs) are estimated to have been established from 1979 to 2000 in China (Almanac of China’s Foreign Economic Relations and Trade, 1979/1983 – 2000/2001). One of the key objectives of China’s new policy to attract FDI was to expedite its economic development through the transfer of advanced technological and management experiences from foreign investors (Selected Works of Deng Xiaoping, 1984). China is therefore a highly suitable context in which to study the factors that influence the transfer of knowledge across international boundaries.

Despite the emphasis on learning advanced technology, the Chinese authorities and firms have paid relatively little attention to factors affecting the learning capacity and intent of local firms. The low technological and organizational capabilities of Chinese firms (Bruijn
& Jia, 1993), a shortage of skilled Chinese workers (Wong & Law, 1999) and competent managers (Park & Luo, 2001), and inefficient practices inculcated by a command economy have often hindered Chinese subsidiaries from effectively absorbing the knowledge contributed by their foreign parents. Foreign firms have often avoided transferring the most advanced technologies that China has sought (Wang, 1997) because of concerns over competition, IPR protection and the capabilities of their subsidiaries. Though Western MNCs have introduced more advanced management systems and technological skills into China in recent years, few have established leading-edge facilities (Jiang, 1999).

Chinese employees are generally more interested and effective in acquiring foreign technological skills than management skills. This can be partially explained by the tacitness of knowledge and ideology barriers. In general, technological knowledge is more explicit (hard), while management knowledge is more implicit (soft). Hard knowledge is less subject to the influence of cultural and environmental variations and can be applied immediately with little or no adaptation; soft knowledge is more culture-bound and context-specific (Fan, 1998). Learning of soft knowledge such as managerial skills for managers in transitional economies requires an attitudinal, cognitive and behavioural change (Child, 1994).

Despite China’s transition to a market-based economy, the legacy of Marxist ideology has left a significant imprint on the values maintained by Chinese managers. Under the Marxist model, technological expertise is believed to be the primary stimulus for economic, institutional, and cultural change (Gomulka, 1986). State-owned and large enterprises in China have traditionally emphasized the criticality of production know-how over management know-how (Young & Lan, 1997) and modern management is commonly perceived as a body of quantitative techniques, not as a way of thinking and acting (Borganjan & Vanhonacker, 1992). As most Chinese managers come from a technical or engineering background, which China has traditionally emphasised, they display a preference for technological skills learning, while being indifferent to or even resisting learning of managerial skills (Fan, 1998). Consequently, Chinese employees and firms are generally more interested and effective in acquiring foreign technological skills than management skills (Lan, 1996; Shenkar & Li, 1999). However, more than two decades of economic reforms and development have led to growing interest in learning management know-how from the West and a keen interest in experimenting with the new management approach (Fan, 1998).

JVs allow for prolonged cohabitation of managerial and technical personnel and thus facilitate the learning of organizational practices and routines (Kogut, 1988). Approximately 65% of the US$350 billion invested in China between 1979 and 2000 was through JVs (Almanac of China’s Foreign Economic Relations and Trade, 1979/83 – 2000/2001). Shenkar and Li (1999) found that JVs represent the structure of choice for Chinese firms seeking acquisition of tacit management skills from perspective foreign partners.

Kogut and Zander (1993) showed that the more complex, non-codifiable, and non-teachable the technology, the more likely technology transfer is conducted through wholly owned subsidiaries. Due to its flexibility and independence in operation management and more adequate protection of technology and trade secrets, wholly owned subsidiaries has been winning increasing favor from foreign investor in recent years (China Hand, 1999). Since 1997, the number of wholly foreign owned ventures approved has exceeded that of equity JVs approved (Almanac of China’s Foreign Economic Relations and Trade, 1979/83 – 2000/2001).
The data for this study was obtained from a mailed survey of MNCs in China. The questionnaire was originally developed in English, and was independently translated into Chinese (Mandarin) by two of the native Chinese authors of this study. These versions were compared, rationalised, and back translated into English to check for errors and inconsistencies. Three rounds of pre-testing were conducted. The Chinese version of the questionnaire was first administered to 40 Chinese executives in China. The questionnaire was amended and the revised English version was administered to 10 managers. Minor revisions were made and final tests were conducted with 22 managers for the English version and 57 managers for the Chinese version. The questionnaire items are described in the “Measures” section below. The full questionnaire is available on request.

A total of 3500 questionnaires were mailed to managers of foreign firms in China in April 2000. The sample was drawn from 15 directories such as American Chamber of Commerce in Shanghai 1997/98; 1998/99, and Directory of Taiwanese Investors in China, 2000. The English questionnaire was sent to 1467 expatriate managers, while the Chinese questionnaire was sent to 1568 Chinese managers. Japanese managers (457) received both versions of the questionnaire. Each questionnaire contained a personalized cover letter to explain the purpose of the study, and a stamped self-addressed return envelope. The only incentive promised was a summary report of results. A personalized email, when available, was sent to respondents subsequently as a reminder.

Of the 3500 questionnaires, 550 were returned as undeliverable. A total of 297 usable responses were received, representing a response rate of 10%. This response rate is comparable to research targeted at senior executives, which typically achieve rates of between 10% and 12% in mail surveys (Hambrick, Geletkanycz & Fredrickson, 1993). This response rate is also reasonable in light of the difficulty of conducting cross-nation surveys and the particular difficulty of conducting surveys in China (Peng & Luo, 2000).

The majority of respondents held positions such as general manager (46.1%), deputy general manager (12.1%), Chairman of the Board (6.7%), department manager (6.4%), and managing director (5.1%). The foreign parents of the China subsidiaries were from Taiwan (28.0%), Europe (18.2%), US (17.2%), Japan (14.9%), Singapore (11.5%), Hong Kong/Macao (5.7%), and others (4.5%). The respondents were equally divided between WOVs (51.2%) and JVs (48.8%). The vast majority (91.9%) were in the manufacturing sector. The majority of the respondents (57.4%) invested less than US$10 million in the ventures. Parents of 51.2% of the respondents had sales greater than US$50 million in 1998, 35.7% had sales of less than US$50 million, while the rest did not provide an answer. The majority (56.7%) had investment values of below US$10 million in China and employed fewer than 200 people (56.2%). About half (48.1%) had been in China for fewer than 5 years.

To obtain additional information, a total of 85 managers from 64 firms were interviewed. Interviews with 12 companies were conducted in the Singapore HQs of the China ventures, while the other 52 interviews were conducted in eight cities in China. Senior managers of these companies were interviewed in English or Mandarin, by one or more of the authors. Most interviews lasted for between 1.5 and 2.5 hours, though some lasted longer. Interviewees were mostly senior managers matching the profiles of respondents. They were
mainly from manufacturing firms from US (15), Europe (12), Japan (9), Hong Kong (3),
Taiwan (10), South Korea (3), and Singapore (12).

**Measures**

Table 1 summarizes the variables used in this study. Most of variables were measured with multiple items, with the average scores of these items being used as the final values. The key dependent variables for the first and second stages of our model are knowledge contributed and knowledge acquired. We used the measures adopted by Lyles and Salk’s (1996) as the starting point to develop our measures of knowledge contributed and acquired but modified them to address concerns about the need to adapt measures to China because of cultural and contextual differences (Adler, Campbell & Laurent, 1989). Both technological knowledge contributed by parents and acquired by subsidiaries were measured with identical two-item constructs. Similarly, both management knowledge contributed by parents and acquired by subsidiaries were also measured by identical five-item constructs. The empirical analysis employs both management and technological knowledge as dependent variables.

*** Table 1 about here***

The third key dependent variable is firm performance. We adopted several measures of performance, including growth, profitability, overall performance, improved capabilities and localisation of management. These variables enable us to measure different dimensions of performance and provide a more comprehensive view of the impact of knowledge transfers on firm outcomes (Dess & Robinson, 1984). Though the last measure is not typically associated with performance in domestic settings, it is an important measure of subsidiary performance in the context of MNCs’ knowledge transfer to their foreign subsidiaries (Putti, Singh & Stoever, 1992).

Four explanatory variables were predicted to impact on knowledge contributed. The level of technological and management skills was used to measure the first variable, quality of knowledge base. The literature on expatriates has underscored the important role of expatriates as mentors to transfer skills and knowledge from the parent to the host country affiliates (Dowling & Welch, 1990; Downes & Thomas, 2000). Expatriates are also considered as a basic mechanism to transfer tacit knowledge (Bonache & Brewster, 2001). Thus, expatriate competencies was used to measure the second variable, firm’s knowledge transfer skill.

The third variable, benefits from knowledge transfer, was assessed from two aspects: 1) importance of the foreign subsidiary; and 2) time orientation of the investment. Firms are likely to gain more benefits by transferring more knowledge to foreign subsidiaries deemed to be strategically important and with longer time orientation.

The last variable, fear of appropriation of knowledge, was examined from four aspects: 1) parent’s control over the subsidiary; 2) intellectual property rights (IPRs) infringement; 3) competitive intensity; and 4) inter-partner relationship. Exercising a greater degree of control over subsidiaries, a parent can better prevent opportunistic misappropriation of its knowledge by partners or potential competitors. Thus, a parent’s fear of appropriation of knowledge will be alleviated. IPRs considerations have been found to have a substantial effect on a firm’s willingness to transfer advanced technologies (Mansfield, 1993, 2000) and to affect the
structuring of inter-organizational relationships (Teece, 1977, 1981). The more serious the IPRs infringement, the less the knowledge contributed by the parent. Fear of appropriation of knowledge, however, will be tempered by the competitiveness of the subsidiary’s business environment: greater competition increases the need for knowledge transfer to improve the competitiveness of the subsidiary (World Investment Report 1999). For JVs, inter-partner relationship is an important factor impacting the parent’s willingness to transfer knowledge. Poor relationships between partners undermine inter-partner trust and understanding (Gulati, 1995), increase the possibility of opportunistic behaviour, and discourage information sharing (Child & Faulkner, 1998).

Six explanatory variables were predicted to influence knowledge acquired by the subsidiary. Technological and management knowledge contributed were measured by two-item and five-item constructs respectively. The absorptive capacity of the firm is dependent on the absorptive capacities of its individual members (Cohen & Levinthal, 1990). Thus, quality of employees was used as a measure of the absorptive capacity at the firm level. Learning takes place at the individual level, employees’ learning intent is necessary for organizational learning (Argyris & Schon, 1978). Therefore, the learning intent of employees can be considered as a proxy of learning intent of the subsidiary. The measurements of the other three variables: provision of training, link between rewards and learning, and objective of JV partner to learn skills, are listed in Table 1.

A number of control variables were included in the regression models. For the analysis of knowledge contributed, controls were included for parent’s country of origin (for differences in knowledge sharing approaches associated with country of origin (Appleyard, 1996)), age of subsidiary (for varying needs for knowledge transfer and performance differences), number of expatriate managers (for impact on knowledge transfer), and technology intensity (for impact on technological knowledge contributed). For the knowledge acquired analyses, control variables were subsidiary age (for impact on knowledge absorption and overall performance), percentage of employees formerly from state owned enterprises (for impact on subsidiary’s learning culture), employee turnover (for impact on loss of knowledge base), and a joint venture location dummy (for impact on attitude toward foreign sources of knowledge). For the analysis of firm performance, additional controls included percentage of products sold domestically (for degree of internationalisation and performance impact), competitive intensity (for performance impact), and demand/supply conditions (for performance impact). Firm size is a potentially important control variable. Unfortunately, size was not consistently reported by respondents, and was excluded from the analysis. However, we tested our results using available size information. Results were substantially unchanged from those reported below.

All analyses employed standard OLS regression. For all analyses, we conducted standard testing of statistical assumptions. We were able to rule out multicollinearity and other problems. Tables 2 to 4 provide descriptive statistics for all variables employed for the three analyses.

*** Tables 2 to 4 about here ***

RESULTS

Three sets of relationships are tested in this study. The first evaluates the factors that affect parents’ knowledge contribution to foreign subsidiaries, while the second evaluates the
factors affecting subsidiaries’ knowledge acquisition. The third test investigates the impact of knowledge acquired on subsidiary performance.

Knowledge Contributed by Parent

Table 5 presents the results of the tests of H1, H2, H3, and H4. Columns 1 and 2 present the results of the tests on WOVs for management and technological knowledge contributed, with following columns presenting equivalent results for JVs.

*** Table 5 about here***

H1 argues for a positive relationship between the parent’s knowledge base and knowledge contributed. The knowledge base of a firm as measured by firm skills is significantly and positively related to management knowledge contributed (r=.421, p<.001) in WOVs and technological knowledge contributed (r=.271, p<.05) in JVs. Although not significant at .1 level, the beta coefficients between firm skills and a) technological knowledge contributed in WOVs; and b) management knowledge contributed in JVs are in the right direction. Thus, H1 is supported.

H2 predicts a positive relationship between the parent’s transfer skills and knowledge contributed. Except for technological knowledge contributed for WOVs, the parent’s transfer skills as embedded in expatriate competencies, are significantly and positively related to a) management knowledge contributed for WOVs (r=.385, p<.001) and JVs (r=.484, p<.001); and technological knowledge contributed in JVs (r=.183, p<.1). Thus, H2 is supported.

H3, which links benefits from knowledge transfer with knowledge contributed, receives less support. For WOVs, the importance of subsidiary was a positive influence on management knowledge contributed (r=.173, p<.05) but not on technological knowledge contributed, whereas the opposite effects were detected for JVs (r=.147, p<.1). The time orientation of the investment in the subsidiary had no impact on the parent’s knowledge contributed, with the exception of technological knowledge contributed to WOVs (r=.192, p<.05). Thus, H3 is partially supported.

Results provide partial support for H4, which predicts a negative relationship between fear of appropriation of knowledge and knowledge contributed. Control over the subsidiary was significantly and positively related to management knowledge contributed (as measured by the degree of control over the subsidiary, r=.234, p<.01) but not on technological knowledge contributed (as measured by percentage of equity, r=.163, p<.1) for JVs. Contrary to the hypothesis, IPRs infringement, competitive intensity, and inter-partner relationship did not affect knowledge contributed. Thus, H4 receives only partial support.

The control variables were not consistently significant. Technological knowledge contributed was significantly and positively related to technology intensity in WOVs (r=.258, p<.05) and JVs (r=.195, p<.05). MNCs of overseas Chinese origin (primarily from Taiwan) contributed more management knowledge than Japanese (r=.124, p<.1) and American (r=.131, p<.1) MNCs in WOVs. MNCs of overseas Chinese origin also contributed more technological knowledge than European MNCs (r=.141, p<.1) in WOVs.

All models are significant, and provide significant explanation for knowledge contributed. In summary, our results support the view that knowledge contributed is
positively influenced by the parent’s knowledge base and transfer skills. However, we find only partial support for our prediction that knowledge contributed is affected by benefits from knowledge transfer and risks of transferring knowledge.

Knowledge Acquired by Subsidiary

Table 6 presents the results of the tests of H5 to H10. We undertook the analyses for management and technological knowledge for both WOVs and JVs.

*** Table 6 about here***

Results provide support for H5, which links the parent’s knowledge contributed to the subsidiary’s knowledge acquired. Management knowledge and technological knowledge contributed significantly and positively influenced the respective categories of knowledge acquired in both WOVs and JVs. Clearly, the knowledge contributed by a parent is a major determinant of the knowledge acquired by its China subsidiary.

Results provide partial support for H6, which predicts a positive relationship between subsidiary’s absorptive capacity and knowledge acquired. Employee absorptive capacity was positively associated with management (r=.162, p<.05) and technological (r=.163, p<.05) knowledge acquired in JVs but not WOVs.

H7 predicts a positive relationship between provision of training and knowledge acquired. Training was positively related to management (r=.124, p<.1) and technological (r=.253, p<.01) knowledge acquired in WOVs but not JVs, lending partial support to H7.

H8 posits a positive relationship between learning intent and knowledge acquired. Subsidiary’s learning intent was only positively related to management knowledge acquired (r=.144, p<.05) in WOVs, lending partial support to H8.

H9 argues for a positive relationship between link between learning and rewards and knowledge acquired. Link between learning and rewards were significantly and positively related to management knowledge acquired in WOVs (r=.171, p<.01) and JVs (r=.132, p<.1) but not technological knowledge contributed. Thus, H9 was partially supported.

H10 posits a positive relationship between the joint venture objectives of local partner and knowledge acquired for JVs. The intent of the Chinese partners to learn management (r=.172, p<.05) and technological knowledge (r=.203, p<.05) had a positive impact on the knowledge acquired by the China subsidiaries in the respective categories, lending support to H10.

Among control variables, the percentage of former state owned enterprises (SOEs) employees was significantly and positively related to management (r=.123, p<.05) and technological (r=.107, p<.1) knowledge acquired for JVs, but not for WOVs. Employee turnover was found to contribute to increased management knowledge acquired (r=.125, p<.05) in JVs.

All models are significant, and provide explanation for knowledge acquired. To summarize, our results provide partial support for the view that employees’ absorptive capacity, training, employees’ learning intent, and link between rewards and learning
influence knowledge acquired by the subsidiary. Our results also provide full support for the prediction that the objectives of JV partner positively affect knowledge acquired by the subsidiary. However, the most significant influence on knowledge acquired is the knowledge contributed by the parent.

Subsidiary Performance

Table 7 presents the results of the test of H10, which holds that knowledge acquisition by a subsidiary will improve its performance. We conducted separate analyses for management and technological knowledge acquired. Models 9 to 13 present results for performance as measured by subsidiary growth, profitability, overall performance, improved capability, and management localisation respectively.

*** Table 7 about here***

Management knowledge impacted subsidiary's performance for all the measures. However, technological knowledge only had an impact on improved capabilities. Thus, H10 receives partial support.

Our results enable a broader understanding of the factors affecting knowledge transfer. Firms that have better knowledge base and transfer skills transfer more knowledge, particularly to subsidiaries they view as more important, exercise more control over and which are older. Control over the subsidiary, particularly for JVs, is the key influence on how willing parents are to transfer knowledge. The key influence on knowledge acquired by a subsidiary is the knowledge contributed by its parent, though provision of training (for WOVs) and subsidiary’s absorptive capacity (for JVs) also influence knowledge acquired. WOVs with higher learning intent and that linked rewards with learning acquired more knowledge. Younger JVs with Chinese parents that focused on learning, and which had higher employee turnover, and more employees from former SOEs acquired more knowledge. Firms that acquire more management knowledge perform better.

DISCUSSION AND CONCLUSIONS

Our results are broadly consistent with our model and hypotheses. The results show that the knowledge base and transfer skills of MNCs are important predictors of knowledge contributed. Benefits from knowledge transfer and fear of appropriation of knowledge only partially explained knowledge contributed. Weaker support is provided for the view that subsidiary’s absorptive capacity and learning intent, provision of training, and link between rewards and learning impact knowledge acquired. The objective of JV partner to learn skills facilitates knowledge acquired by the subsidiary. Our results also support the position that knowledge contributed by a parent is a key determinant of knowledge acquired by its subsidiary. Support is also provided for the view that knowledge (especially management knowledge) acquired, in turn, enhances the subsidiary’s performance. These relationships hold for both WOVs and JVs. Therefore, these results provide general support for our model and its two-stage representation of knowledge transfer, as comprising knowledge contribution and knowledge acquisition.

Our results are also broadly consistent with, and supportive of the central ideas of FDI and resources- and knowledge-based theories. The results show, for example, that knowledge contributed by the MNC parent significantly influences what the subsidiary
learns. More importantly, knowledge acquired by the subsidiary significantly drives its performance. This is consistent with the notion that the MNC’s primary advantage lies in its ability to transfer superior knowledge to its foreign subsidiaries (Caves, 1971; Hymer, 1976; Kogut & Zander, 1993). At the same time, the results show that knowledge is a critical resource that contributes significantly to various aspects of performance, in line with the resource-based view of the firm (Barney, 1991). These findings are also consistent with the knowledge-based perspective of the firm, which stresses the importance of knowledge, and the benefits of its transfer within an organization (Kogut & Zander, 1992; Steensma & Lyles, 2000).

Our findings also offer specific implications for factors affecting the capacity and willingness of parents to transfer knowledge. Consistent with the survey finding that parents with better knowledge bases tend to transfer more knowledge to their subsidiaries, the finding of our field interviews also revealed that leading firms such as Motorola, Intel, and Philips are quite successful in transferring firm-specific advanced management systems and technological skills to their subsidiaries in China.

Our results regarding the transfer skills of a firm also adhere to the received wisdom that expatriates act as important knowledge conduits from one firm to related units or to another firm (Huber, 1991; Hedlund, 1994; Makino & Delios, 1996). The role of expatriates in transferring knowledge, although articulated in the literature (e.g., Torbiorn, 1994), has not been well tested in empirical works. Our survey findings provide empirical support for the use of competent expatriates as an effective mechanism for transferring knowledge. In addition, our findings also support the view of Tsang (1994) and Bonache and Brewster (2001) that the transfer of tacit knowledge (primarily management knowledge) requires close interaction and exchange of personnel of the parties involved.

The survey finding on the positive relationship between the importance of the foreign subsidiary and the parent's knowledge contribution supported our observations from field interviews. China subsidiaries important to their foreign parents receive enormous managerial and technical supports from the latter. For instance, Motorola's China operations is critical to the firm as more than 10% of its worldwide sale came from the China market. To maintain the competitiveness of its subsidiaries in China’s telecommunication industry, Motorola has deployed a large number of competent expatriate managers to impart managerial and technological knowledge to their Chinese employees, implemented comprehensive and systematic training programs, and expedited management localization. In view of the importance of China market to the global position of firms, an increasing number of leading MNCs (e.g., Microsoft, Lucent Technology, Motorola, and IBM) have set up R&D labs to demonstrate to the Chinese authorities their commitment to the country. Our findings support the view of Glaister and Wang (1994) as they suggest that the extent to which a foreign investor contributes resources to an overseas project depends on the degree of importance attached to that project.

The finding that the parent's control over the subsidiary encourages its contribution of management knowledge but not technological knowledge in JVs could illuminate the point that management knowledge is more tacit (than technological knowledge) and embedded in people (Nonaka, 1994). Thus, when the parent exercises strong control over its JV subsidiary and places expatriate managers to run the operations, the increase interaction between expatriates and subsidiary employees will facilitate the transfer of management skills from the former to the latter.
The finding that IPRs infringement has no impact on MNCs’ willingness to transfer knowledge contradicts popular belief. There are four plausible explanations for our finding. First, in the event of the government’s failure to provide sufficient protection, firms may rely on internal mechanisms to protect proprietary knowledge. To safeguard their IPRs, more firms may establish wholly owned subsidiaries for operations that involve technology they wish to protect. Second, notwithstanding weak IPRs regimes (Clark, 2000; 2001 White Paper), MNCs still have to transfer new technologies quickly to maintain the competitiveness of their subsidiaries in competitive markets. Third, the speed of technological change and diffusion may encourage firms to transfer the knowledge quickly, rather than lose the opportunity to exploit this knowledge. These firms may gain more from continuous innovation and the introduction of new technologies and products to stay ahead of their local competitors. Last, many MNCs (particularly in China) are involved in labor-intensive industries. Thus, IPRs infringement is not a critical issue to these investors. Despite these possible explanations, our interview findings and media reports reveal that some software developers and small- and medium-sized chemical companies with proprietary technologies and products are concerned about the potential leakage of their technological know-how.

Our study also provides several important implications for subsidiaries seeking to acquire knowledge. Provision of training (but not employee quality) was an important predictor of knowledge acquisition for WOVs, while the opposite effects were observed in JVs. One interpretation is that full ownership gives foreign parents a free hand to select Chinese employees whom they believed suitable. Our interview findings revealed that many WOVs prefer to recruit fresh graduates with good learning potential but without the working attitude and mentality of traditional state owned enterprises (SOEs) workers. Having hired young employees with limited experience, training is necessary to equip employees with firm-specific knowledge. On the other hand, JVs are often used by firms, particularly SOEs in China, to train or dump sub-standard workers. A thorny issue in Chinese JV negotiations is often the employment of workers formerly working for the SOE partners. More successful JVs usually undertake rigorous screening criteria and procedures before accepting employees from their SOE partners (China Hand, 2000). Thus, employee quality becomes a more important factor as it affects the learning capacity of the subsidiary. In addition, some Chinese partners are reluctant to invest in employee training due to short-term concerns. Consequently, insufficient attention is given to training in JVs. This may partly explain the preference that many MNCs have for retaining full ownership over their China subsidiaries. The combination of these results suggest that JVs between MNCs and local partners may well impose restrictions on MNCs that hinder knowledge transfer, defeating what maybe a major motive among host countries for attracting FDI. This is particularly so in China, where MNCs are, in many cases, restricted to undertaking investments only through establishing JVs with local partners. This restriction, which is designed to facilitate knowledge transfer to local firms, may actually be counter-productive, and may slow the transfer because local partners do not have qualities or intentions that facilitate knowledge transfer.

Our study shows that the degree to which management knowledge can be transferred is to a large extent affected by the employees’ learning intent. But this does not hold for technological knowledge. There are two plausible explanations for this finding. First, the greater emphasis on acquiring technological skills as apposed to managerial skills (Young & Lan, 1997; Schlevogt, 2000) may lead China subsidiaries to emphasise technological knowledge ahead of management knowledge. Second, management know-how tends to be organizationally embedded and thus implicit, making its transfer difficult. Managerial
knowledge also tends to be more deeply embedded in cultural and social practises and norms
and in organizational processes and routines, further hindering its transfer. Therefore, one
needs to possess a strong intent to learn the knowledge in order to learn successfully.

Our findings have implications for business in China. For the PRC government, our
results emphasise that MNCs are important sources of knowledge that improve the
capabilities and performances of Chinese subsidiaries. This is consistent with the findings
of several previous studies in the IJV literature in other countries. (e.g., Lyles & Salk, 1996;
Lyles, Sulaiman, Barden, & Awang Kechik, 1999). Interestingly, our results point to the
greater importance of management knowledge than technological knowledge, at least for the
more direct impact on subsidiary performance. This finding, which is consistent with Lyles
and Salk (1996), has far-reaching implications, suggesting that the transfer of management
knowledge be given a priority over the transfer of technological knowledge. Though
appearing to contradict what seem to be the priorities and preference of China subsidiaries
(Young & Lan, 1997) and Chinese authorities, this proposition is well grounded in strategy
and management research. Some Chinese scholars and managers have also gradually
recognized the benefits of acquiring managerial skills. For instance, Yang (2001) suggests
that the positive spill over effects of FDI in China may not come from the direct spread of
“hard” technologies, but rather than from the spread of “soft” technologies.

Clearly, follow-up research that expands on the present study is required. This can
focus on deepening our model by introducing additional measures of its main components.
In particular, it is important in future research to evaluate the knowledge transferred, to see
how knowledge characteristics beyond the management and technological dimensions
studied here, affect transfer. The related and concurrent process, parent learning from
subsidiary and subsidiaries learning from each other, is also worthy of investigation and
could provide a more complete picture of the benefits and effectiveness of knowledge
transfer. Further, it would be interesting to test this model in knowledge transfers across
developed country contexts, and within a single firm in a developed country. These studies
could yield additional useful insights on knowledge transfer, when the skill gaps between
transferor and recipient may not be large.

Other follow-up studies would be useful, to address issues that usually cannot be
examined because of data collection problems, such as evaluating knowledge transfer
processes and effectiveness, and tracking these issues over an extended duration. Indeed, it is
noticeable that improved understanding of the knowledge transfer process is perhaps more
significantly hindered by data limitations than by conceptual limitations. In undertaking a
sizeable and difficult data collection effort in a challenging though suitable context to
evaluate a comprehensive knowledge transfer model, this study has improved understanding
of the multitude of factors that influence knowledge transfer from an MNC to its foreign
subsidiary. Further empirical research will support this effort.
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TABLE 1
Measurement of Variables

All items measured on 7 point Likert scales (1 = strongly disagree to 7 = strongly agree, 1 = little and 7 = extensively, or 1 = very unsatisfied to 7 = very satisfied).

Dependent Variables

1. **Technological knowledge contributed by parent**: Mean of the two items on the extent to which the foreign parent contributed to its China subsidiary advanced a) manufacturing related technology; and b) product related technology (1 = little and 7 = extensively; alpha = .87; mean = 5.07, s.d. = 1.60).

2. **Management knowledge contributed by parent**: Mean of the five items on the extent to which the foreign parent contributed to its China subsidiary advanced a) managerial skills; b) marketing/sales skills; c) human resource management skills; d) business strategy thinking and techniques; and e) corporate culture and value (1 = little and 7 = extensively; alpha = .90, mean = 4.82, s.d. = 1.33).

3. **Technological knowledge acquired by subsidiary**: Mean of the two items on the extent to which the China subsidiary has learned from its foreign parent advanced a) manufacturing related technology; and b) product related technology (1 = little and 7 = extensively; alpha = .79; mean = 4.96, s.d. = 1.51).

4. **Management knowledge acquired by subsidiary**: Mean of the five items on the extent to which the China subsidiary has learned from its foreign parent advanced a) managerial skills; b) marketing/sales skills; c) human resource management skills; d) business strategy thinking and techniques; and e) corporate culture and value (1 = little and 7 = extensively; alpha = .91, mean = 4.70, s.d. = 1.32).

5. **Growth, profitability, overall performance and management localization**: Separate items measuring the extent of satisfaction with the China subsidiary on a) growth (mean = 4.80, s.d. = 1.56); b) profitability (mean = 4.21, s.d. = 1.77); c) overall performance (mean = 4.84, s.d. = 1.30); and d) management localization (mean = 5.09, s.d. = 1.36) (1 = very unsatisfied to 7 = very satisfied).

6. **Improved capability**: Two items measuring the extent of satisfaction with the China subsidiary on a) improved management capability; and b) improved technological capability (alpha = .82, mean = 4.72, s.d. = 1.17) (1 = very unsatisfied to 7 = very satisfied).

Key Explanatory Variables

H1. **Quality of knowledge base - Firm skills**: Two items on the extent to which the foreign parent possesses a) advanced management know-how; and b) advanced technical know-how (alpha = .82; mean = 5.53, s.d. = 1.31) (1 = strongly disagree to 7 = strongly agree).

H2. **Knowledge transfer skills - Expatriate competencies**: Eight items on the extent to which expatriates in the China subsidiary: a) possess excellent management skills; b) possess excellent technical skills; b) unreservedly transfer their know-how to Chinese employees; d) undertake great effort to develop Chinese successors; e) delegate important tasks to Chinese
managers; f) are able to adapt their management styles to China’s context; g) are skilful in imparting their knowledge to Chinese employees; and h) frequently communicate with Chinese employees in Mandarin (alpha=.88; mean = 5.22, s.d. = 1.09) (1 = strongly disagree to 7 = strongly agree).

H3. Benefits from knowledge transfer
1. Importance of subsidiary: Log of reported amount invested in the China subsidiary (mean = .82, s.d. = .82).

All the following items were measured on 7 point Likert scales (1 = strongly disagree to 7 = strongly agree).

2. Time orientation of investment: One item on the extent to which the foreign parent holds a long-term view on its investment in the China subsidiary (mean = 5.82, s.d. = 1.43).

H4. Risks of transferring knowledge
1. Control over subsidiary: Two items as follows: a) percentage of the foreign parent’s equity in its China subsidiary (mean = 82%, s.d. = 23%); and b) seven point scale on extent to which the foreign parent exercises strong control over the China subsidiary (mean = 4.88, s.d. = 1.73).

2. Competitive intensity: One item on extent to which rivalry among competitors is intense (mean = 6.06, s.d. = 1.18).

3. Intellectual property rights (IPRs) infringement: One item on extent to which trademark/patent infringement and counterfeiting in the industry are serious (mean = 4.04, s.d. = 1.98).

4. Inter-partner relationship: Four items on the extent to which a) partners are confident that their counterparts will honour their promises; b) partners willingly share information with each other; c) there is a high level of trust between partners; and d) there is a good relationship between partners (alpha = .94; mean = 5.15, s.d. = 1.61).

H5 – Technological and management knowledge contributed by parent (same as dependent variables 1 & 2)

H6 – Subsidiary’s absorptive capacity – Quality of employees: Two items on the extent to which a) the quality of Chinese employees meets the foreign parent’s requirement; and b) the foreign parent feels satisfied with the quality of China subsidiary’s employees (alpha = .77; mean = 4.65; s.d. = 1.22).

H7 – Provision of training: Three items on the extent to which the China subsidiary provides a) sufficient resources to employee training; b) sufficient training opportunities for employees; and c) effective training programs for employees (alpha = .91; mean = 4.93, s.d. = 1.29).

H8 – Subsidiary’s learning intent – Learning intent of employees: Two items on the extent to which Chinese employees are a) eager to acquire new knowledge; and b) willing to accept new concepts and values (alpha = .85; mean = 5.28, s.d. = 1.25).
H9 - Link between rewards and learning: One item on the extent to which Chinese employees’ rewards and punishments are linked to their learning results (mean = 4.79, s.d. = 1.48).

H10 – Objective of JV partner to learn skills: Two items on the extent to which the JV objective of the Chinese partner is to learn advanced: a) management skills (mean = 5.02, s.d. = 1.66); and b) technological skills (mean = 5.08, s.d. = 1.71).

Control Variables

1. Origin of parents: Three dummy variables, with “Other Asian” as base category (= 0) against US, Japan or Europe origin (=1).

2. Subsidiary age: Age of firm in years, as measured at end of 2000.

3. Number of expatriate managers: Number of expatriate managers working in the China subsidiary.

4. SOE Employees. Percent of employees formerly from state-owned enterprises (SOEs).

5. JV on partner’s site: Dummy variable identifying location of JV. Takes value of 1 if on the Chinese partner’s site and 0 otherwise.


7. Supply/demand condition: One item on the extent to which supply exceeds demand in the industry (mean = 4.54, s.d. = 1.77) (1= strongly disagree to 7 = strongly agree).

8. Technology intensity: One item on extent to which foreign parent is in a technology intensity industry (mean = 4.37, s.d. = 1.78) (1= strongly disagree to 7 = strongly agree).
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*p<.05, **p<.01, ***p<.001; * Can not be computed due to at least one of the variables is constant.
### TABLE 3

Correlation Coefficients for Analysis of Knowledge Contributed by Parent

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*p < .15,  **p < .05,  ***p < .01;  ****p < .001;  * Can not be computed due to at least one of the variables is constant.
TABLE 5
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<td>-.029</td>
<td>-.049</td>
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<td>.039</td>
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<td>-.003</td>
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*p<.1,  **p<.05,  ***p<.01
### TABLE 6
Multiple Regression Models for Knowledge Acquired by Subsidiaries

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<thead>
<tr>
<th></th>
<th>WOVs (N=152)</th>
<th>JVs (N=147)</th>
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<tr>
<td><strong>Parent’s Knowledge Contributed (H5) (+)</strong></td>
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<td>Management knowledge contributed</td>
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<td>Technological knowledge contributed</td>
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<td><strong>Subsidiary’s Capacity to Learn</strong></td>
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<tr>
<td>Subsidiary’s absorptive capacity (H6) (+)</td>
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<td>Provision of training (H7) (+)</td>
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<td>.253**</td>
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<td><strong>Subsidiary’s Intent to Learn</strong></td>
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<td>Subsidiary’s learning intent (H8) (+)</td>
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<td>Learning intent of employees (+)</td>
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<td>Link between rewards and learning (H9) (+)</td>
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<td>Objective of JV partner to learn (H10) (+)</td>
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<tr>
<td>- management skills (+)</td>
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<tr>
<td>- technological skills (+)</td>
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<td><strong>Control Variables</strong></td>
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<td>JV on partner’s site</td>
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*p<.1,  **p<.05,  ***p<.01,  ****p<.001
<table>
<thead>
<tr>
<th>Subsidiary’s Knowledge Acquired (H10) (+)</th>
<th>Growth (9)</th>
<th>Profitability (10)</th>
<th>Overall Performance (11)</th>
<th>Improved Capability (12)</th>
<th>Mgt Localization (13)</th>
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<tbody>
<tr>
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<td>.227***</td>
<td>.392***</td>
<td>.379***</td>
<td>.263***</td>
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<td>Japanese parent</td>
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<td>-.024</td>
<td>-.103*</td>
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<td>Importance of subsidiary</td>
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<td>No. of employees</td>
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<td>.132*</td>
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<td>.051</td>
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<td>No. of expatriates</td>
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<td>SOE employees (%)</td>
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<td>-.050</td>
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<tr>
<td>Employee turnover (%)</td>
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<td>-.156**</td>
<td>-.134*</td>
<td>-.106*</td>
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<td>Products sold domestically (%)</td>
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<td>Supply/demand condition</td>
<td>-.136*</td>
<td>-.136*</td>
<td>-.129*</td>
<td>-.016</td>
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</tr>
</tbody>
</table>

| R²                                       | .165       | .153               | .198                     | .272                     | .114                 |
| Adjusted R²                               | .123       | .111               | .158                     | .236                     | .070                 |

Model significance                       | .000       | .000               | .000                     | .000                     | .001                 |

*p<.1, **p<.05, ***p<.01, ****p<.001
FIGURE 1
Model of Knowledge Transfer from Parent Firm to Foreign Subsidiary

Parent Firm

Knowledge Contributed

Capacity to Transfer

Willingness to Transfer

Inter-partner Factors*

Knowledge Acquired

Performance

Host Country Partner

Foreign Subsidiary

Capacity to Learn

Intent to Learn

Knowledge Acquired

Performance

*Applicable to joint ventures only.
FIGURE 2
Factors Affecting Knowledge Transfer from Parent Firm to Foreign Subsidiary

Stage 1: Parent Firm Contributes Knowledge

**Capacity to Transfer**
- Quality of knowledge base (H1)
- Knowledge transfer skills (H2)

**Willingness to Transfer**
- Benefits from knowledge transfer (H3)
- Fear of appropriation of knowledge (H4)

Stage 2: Foreign Subsidiary Acquires Knowledge

**Capacity to Learn**
- Subsidiary’s absorptive capacity (H6)
- Provision of training (H7)

**Intent to Learn**
- Subsidiary’s learning intent (H8)
- Link between rewards and learning (H9)
- Objective of JV partner to learn skills (H10)

* Applicable to joint ventures only