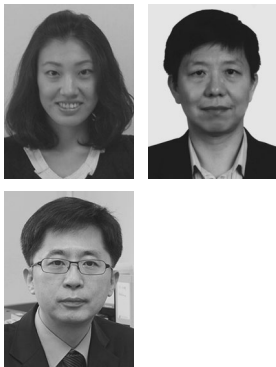


Transferring subsidiary knowledge in the global learning context

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Abstract

Purpose – The purpose of this paper is to explore organizational factors that affect the transfer of subsidiary knowledge to both parent companies and peer subsidiaries.

Design/methodology/approach – The hypotheses are tested using multivariate regression, based on a survey of 81 foreign subsidiaries in South Korea.

Findings – The findings show that organizational factors that affect the transfer of subsidiary knowledge differ according to whether the recipient is the parent or the peer subsidiary. Subsidiary-to-parent knowledge flow is facilitated by establishing efficient formal mechanisms such as an expatriation policy, a subsidiary performance evaluation system, etc., whereas knowledge transfer to peer subsidiaries is enhanced by the length of a subsidiary's operation period and the frequency of its managers' communications with other managers in peer subsidiaries.

Practical implications – This analysis suggests that managers of multinational companies should apply different approaches in managing these two distinct knowledge flow patterns in the MNC network.

Originality/value – This study offers new insights into the challenges of global learning by highlighting the difficulty of transferring subsidiary knowledge to peer subsidiaries through formal organizational apparatuses.

Keywords Knowledge transfer, Subsidiaries, Learning, Multinational companies, South Korea

Paper type Research paper

Introduction

It is critical in global learning to be aware of valuable knowledge accumulated at the subsidiary level and to utilize such knowledge to benefit the whole organization at the corporate level (Bartlett and Ghoshal, 1990; Rugman and Verbeke, 2001). Although knowledge flow from a subsidiary to both the parent company and to its peer subsidiaries contributes to a multinational company (MNC)'s global learning, the two types of knowledge transfer associated with each play distinctive strategic roles. Bartlett and Ghoshal (1989) pointed to subsidiary-to-parent knowledge transfer as an essential condition for facilitating "local-for-center" innovations. Peer-to-peer knowledge transfer is critical in strategically developing and sharing regional firm-specific advantages (Rugman and Verbeke, 2004; Asakawa and Lehrer, 2003). Moreover, the sharing of knowledge between parent and subsidiary takes place through vertical exchange relationships, whilst the sharing of knowledge between peer subsidiaries is based on lateral relationships (Schulz, 2001). These differences between the two types of knowledge transfer, in terms of their strategic roles and their specific organizational contexts, imply the necessity of analyzing them separately.

However, few empirical studies have examined these distinct knowledge transfer processes comparatively (e.g. Schulz, 2001; Gupta and Govindarajan, 2000; Noorderhaven and Harzing, 2009). Consequently, understanding of this subject is still limited, which increases the risk that managers of MNCs may mistakenly apply a uniform approach in managing their companies' knowledge, even when these two types of knowledge transfer are in fact

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affected by quite different organizational factors. To help fill the gap in the literature, this study undertakes a comparative analysis of organizational factors that may influence the transfer of subsidiary knowledge to the parent and peer subsidiaries.

In this analysis, the authors adopt an overarching framework that highlights the organizational factors that influence the knowledge stock of a subsidiary and the effectiveness of knowledge transfer mechanisms, building on the literature on organizational learning and cross-border knowledge management. This framework incorporates various detailed and multifaceted measures of key organizational factors. For instance, the authors divide the host country experience of a subsidiary into time-based and diversity-based experiences, and distinguish internally- and externally-oriented autonomy conditions. The authors also examine the expatriate staffing policy at the CEO level, the top management team (TMT) level, and the total employment level. This multilateral investigation provides insight into how knowledge transfer capability is cultivated within an MNC.

Although previous researchers have studied subsidiaries in various host country contexts (Schulz, 2001; Minbaeva *et al.*, 2003; Bjorkman *et al.*, 2004; Noorderhaven and Harzing, 2009), few of them focus on subsidiaries in newly industrialized countries. South Korea is one of the most typical and successful newly industrialized economies (Amsden, 2003). Therefore, the authors choose this research setting, intending to contribute to the development of a more general international business theory on subsidiary knowledge transfer within the MNC organization.

Theory and hypotheses

Organizational learning theory suggests that knowledge flows from units that are relatively knowledge-rich to units that are relatively knowledge-poor (Rogers, 2003). From this theoretical standpoint, it is inferred that a subsidiary with abundant knowledge stock can be an attractive knowledge source for other units in the MNC network (Gupta and Govindarajan, 2000; Schulz, 2001; Frost *et al.*, 2002). In line with this view, previous research has found that the accumulation of new knowledge at the subsidiary level is a prerequisite for global learning and knowledge transfer in MNCs (Gupta and Govindarajan, 2000; Schulz, 2001). However, subsidiary-specific knowledge accumulated in the local context is often tacit and sticky, making it difficult to transfer to other subunits within the MNC organization (Szulanski, 1996). To overcome these barriers and access subsidiary skills successfully, MNCs need to develop effective knowledge transfer mechanisms between the source and recipient units (Teece, 1977).

Taking into account the importance of both knowledge stock and knowledge transfer mechanisms in global learning, therefore, this study develops an overarching theoretical framework, as depicted in Figure 1. In the framework, two major factors influence the amount of knowledge that a subsidiary transfers to its parent and peer subsidiaries:

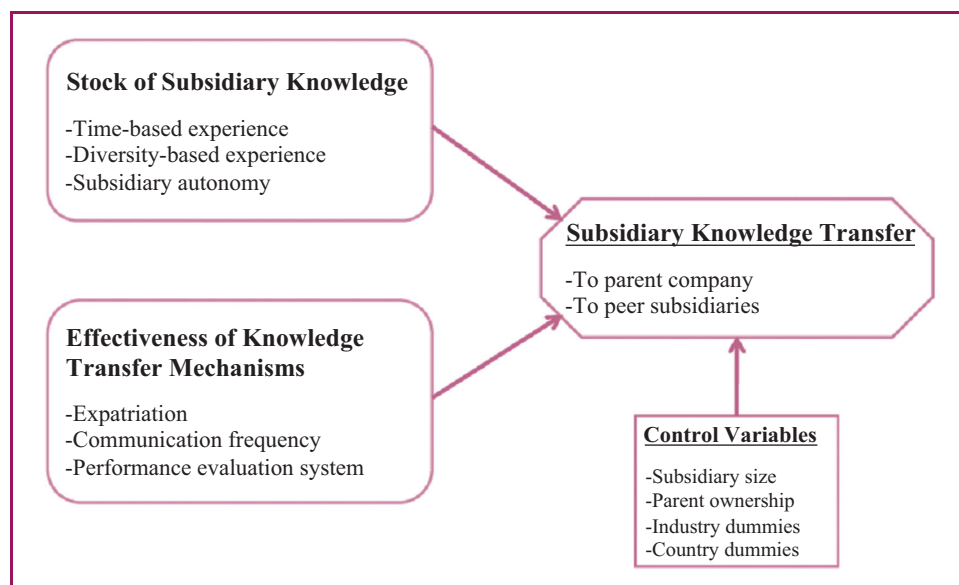
1. the stock of knowledge possessed by the subsidiary; and
2. the effectiveness of knowledge transfer mechanisms.

Hypotheses related to these two major dimensions are offered below.

Subsidiaries' knowledge stock

Firms seek new knowledge and information to augment their existing technological and managerial capabilities (Levitt and March, 1988; Teece *et al.*, 1997). In the case of MNCs, foreign subsidiaries with superior capabilities can be a useful source of knowledge and information to the parent company and other subsidiaries (Frost *et al.*, 2002; Rugman and Verbeke, 2001). Shan and Song (1997) show that foreign direct investment (FDI) is not only stimulated by the parent ownership advantage, but also driven by the motivation to source valuable knowledge and capabilities embedded in host countries. Subsidiaries which have developed superior capabilities in their respective foreign environments are likely to build "competence-creating mandates" (Cantwell and Mudambi, 2005), transferring their unique knowledge to other units within the MNC network (Schulz, 2001; Frost *et al.*, 2002).

Figure 1 Theoretical framework



Prior studies suggest that locational factors, such as technical resources of the host country (Frost, 2001; Song and Shin, 2008), and organizational factors, such as subsidiary experience and autonomy (Luo and Peng, 1999; Delios and Beamish, 2001; Bartlett and Ghoshal, 1990; Birkinshaw *et al.*, 1998), contribute to the building up of a subsidiary's knowledge stock. This paper focuses mainly on organizational factors that influence the accumulation of valuable knowledge at the subsidiary level, examining foreign subsidiaries' knowledge transfer activities in a single host country context.

Host country experience. For foreign subsidiaries, a major source of learning is their operational experience in the host country (Johanson and Vahlne, 1977; Penrose, 1959). This study subdivides a subsidiary's host country experience into time-based experience and diversity-based experience. Some previous studies find that a longer period of operation in the host country increases a subsidiary's chances of survival and improved performance (Delios and Beamish, 2001; Pennings *et al.*, 1994). This suggests that time allows a foreign subsidiary to acquire valuable local knowledge in the host country (Martin and Salomon, 2003), which can then be passed on to the parent company and peers. Other researchers report that diversity of experience facilitates knowledge acquisition in a foreign market (Luo and Peng, 1999; Almeida and Phene, 2004). Diverse experience helps firms expand and enrich their knowledge bases by allowing them opportunity to incorporate new problem-solving routines (Nelson and Winter, 1982; Levitt and March, 1988). Hence, subsidiaries with more diverse experience are likely to accumulate more knowledge that is potentially valuable to both the parent and peer subsidiaries.

In line with this view, Schulz (2001) pointed out that newness of subsidiary knowledge generates both "push" and "pull" forces. Subsidiaries that have acquired new and valuable knowledge are motivated to signal their performance and strategic importance by transferring their knowledge to other subunits so that they can attract more support from the parent ("push" forces). For their part, the parent company and other subsidiaries want to test new knowledge to discover its potential relevance for their own businesses ("pull" forces). Thus, the following hypotheses are proposed:

H1a/H1b. The longer the time-based experience of the subsidiary in the host country, the more knowledge is transferred from it to the parent company (*H1a*) and to its peer subsidiaries (*H1b*).

H1c/H1d. The more diverse the experience of the subsidiary in the host country, the more knowledge is transferred from it to the parent company (*H1c*) and to its peer subsidiaries (*H1d*).

Subsidiary autonomy. Subsidiary autonomy has been emphasized as an important organizational determinant of global learning in MNCs (Bartlett and Ghoshal, 1990; Schulz, 2001). Centralized control imposed by a parent company deteriorates a subsidiary's motivation to learn, limits innovative initiatives by hindering autonomous searching and learning activities, and thus ultimately prevents development of new capabilities in the local markets (Birkinshaw *et al.*, 1998; Frost *et al.*, 2002). By the same token, a high level of autonomy allows subsidiaries to go beyond simply running their current operations to develop new, innovative ways of improving their performance in the foreign environment (Garvin, 2000; Bartlett and Ghoshal, 1990).

Supporting this view, prior studies find that managerial autonomy contributes to the upgrading of subsidiary competence (Birkinshaw *et al.*, 1998) and the enhancement of innovation activities (Bartlett and Ghoshal, 1990). Thus, a subsidiary with a high level of autonomy is more likely to develop valuable knowledge and to play the role of knowledge provider within the network of an MNC organization. Therefore, the following hypotheses are proposed:

H2a/H2b. The higher the level of autonomy given to the subsidiary, the more knowledge is transferred from it to the parent company (*H2a*) and to its peer subsidiaries (*H2b*).

Knowledge transfer mechanisms

The second major dimension that affects the sharing of subsidiary knowledge with the parent and peer subsidiaries is the effectiveness of the knowledge transfer mechanisms within the MNC (Gupta and Govindarajan, 2000; Bjorkman *et al.*, 2004). Subsidiaries may have accumulated substantial knowledge that is potentially useful to the parent company and peer subsidiaries, but poor communication and lack of incentives could hinder the transfer and utilization of that knowledge. To overcome such barriers, MNCs need to build effective knowledge transfer mechanisms, including staffing expatriate managers in foreign subsidiaries (Lazarova and Tarique, 2005), facilitating direct contact between managers in different subunits (Bartlett and Ghoshal, 1990), and setting knowledge sharing as an important management goal (Bjorkman *et al.*, 2004).

Expatriate management policy. Gupta and Govindarajan (2000) and Bjorkman *et al.* (2004) view expatriates as playing an important role in fostering knowledge transfer between the parent company and each subsidiary, and among subsidiaries. Expatriate managers share work experience and culture with parent company managers and other workers from the home company, thus forming informal communication networks within the MNC organization (Bartlett and Ghoshal, 1990; Scullion, 1994). Moreover, their shared business experience, common language and cultural homogeneity can enhance the absorptive capacities of all parties in terms of inter-unit knowledge transfer in MNCs (Gupta and Govindarajan, 2000). In terms of motivation, expatriates can also be more effective and cooperative in facilitating knowledge transfer to the parent company and other subsidiaries, because they tend to be

“The results of this study not only reveal important organizational factors that may influence the transfer of subsidiary knowledge, but also suggest that their influence can differ according to whether the recipient of knowledge is the parent company or the peer subsidiaries.”

concerned with the performance of the entire MNC organization more than locally hired managers do (Zeira, 1976). Consequently, expatriate managers can be efficient and reliable facilitators of knowledge transfer in MNCs (Bartlett and Ghoshal, 1990; Scullion, 1994).

Previous studies suggest that expatriate management policies for overseas subsidiaries are implemented at the subsidiary CEO level (Belderbos and Heijltjes, 2005), at the subsidiary top management team (TMT) level (Gupta and Govindarajan, 2000; Bjorkman *et al.*, 2004; Crowne, 2009), and at the total subsidiary employment level (Gong, 2003). Therefore, the authors propose the following hypotheses to test the impact of having a subsidiary expatriate management policy at these levels.

H3a/H3b. The more expatriates there are in the subsidiary, the more knowledge is transferred from it to the parent company (*H3a*) and to its peer subsidiaries (*H3b*).

Communication frequency. Galbraith (1973) identifies frequent communication among staff as the simplest but most powerful means of enhancing organizational information-processing capabilities. Consistent with this view, Ghoshal and Bartlett (1988) find that frequent communication between subsidiary managers and parent company managers plays a crucial role in the transfer of innovations from a parent company to its overseas subsidiaries. Frequent contacts between managers located in different subunits within the MNC network can thus facilitate communication and inter-unit knowledge transfer (Ghoshal *et al.*, 1994). Recent studies (Monteiro *et al.*, 2008; Noorderhaven and Harzing, 2009; Corredoira and Rosenkopf, 2010) provide consistent evidence that social interactions significantly promote knowledge flows by serving as knowledge channels.

Frequent communication not only increases the absolute quantity of knowledge and information being exchanged (Allen, 1977), but also provides opportunity for the recipient to receive continuous support and help from the knowledge provider (Nonaka and Takeuchi, 1995; Bartlett and Ghoshal, 1990). Such assistance from the knowledge provider is especially important in transferring knowledge that is difficult for the recipient to understand (Tushman, 1978; Szulanski, 1996). Hence, the following hypotheses are put forth:

H4a/H4b. The more frequent the communication between subsidiary managers and parent company managers, the more knowledge is transferred from the subsidiary to the parent company (*H4a*) and to its peer subsidiaries (*H4b*).

Performance appraisal system. Knowledge transfer within an MNC organization may also be promoted by the establishment of a subsidiary performance appraisal system that rewards knowledge transfer from a focal subsidiary to its parent and peer subsidiaries. Specific evaluation criteria give clear signals to subsidiary managers about the priorities of the parent company and the important business goals that their subsidiaries need to achieve (Hendry, 2002). By meeting these criteria, subsidiary managers ensure that their businesses are run in line with the parent company's overall management plan.

The authors posit that, if a parent company emphasizes inter-unit knowledge sharing as an important aspect of its subsidiary performance evaluation system, managers in the subsidiary are more likely to put effort and time into transmitting their knowledge to other parts of the MNC organization. Consistent with this view, Bjorkman *et al.* (2004) find evidence that specification of knowledge transfer as an important evaluation criterion increased knowledge outflow from foreign subsidiaries located in China and Finland to other units in their MNC networks. In that study, however, they did not distinguish the knowledge outflow to the parent from the knowledge outflow to peer subsidiaries, but treated both flows as a single dependent variable. To better our understanding of this issue, therefore, the authors examine the effect of appraisal systems on two distinct knowledge transfer processes.

H5a/H5b. The stronger the emphasis on knowledge sharing as a criterion for evaluating the performance of a subsidiary, the more knowledge is transferred from it to the parent company (*H5a*) and to its peer subsidiaries (*H5b*).

“Time-based experience facilitates knowledge transfer to peer subsidiaries, whereas diversity-based experience increases knowledge transfer to the parent company.”

Data and methods

Sample and data collection

Data were collected through a mail survey of foreign subsidiaries operating in South Korea. Although an MNC can set up overseas subsidiaries to perform various business-related activities (e.g. manufacturing, sales, R&D, services, etc), the authors chose to confine this analysis only to subsidiaries which conducted both manufacturing and sales activities in the host country, in order to minimize the disturbing effects that might result from variations in subsidiary activities. The authors initially identified all foreign-affiliated firms that conducted manufacturing activities and had at least two years of operational experience by the end of 2005 according to KISLINE, a commercial database compiled by the Korea Information Service. Then firms whose employee base was less than 50 were excluded, because smaller ventures could be run like personal businesses by their foreign owners. Firms in which foreign parent firms had less than a 50 percent equity stake were also excluded, to ensure that sample firms were under the full control of their parents. In total, 404 firms were included in the mail survey.

Next, the authors prepared the first version of the questionnaire and pre-tested it with three senior managers from different foreign-owned firms. The questionnaire was revised and finalized according to their comments. Then, the authors contacted a person on the top management team of each subsidiary, either the chief operational officer or the head of a strategic division, who was likely to have a good understanding of the subsidiary's knowledge-sharing activities. The authors explained the purpose of this study, and asked if the team member was willing to participate in the mail survey. Managers in 195 out of 404 firms agreed to do so. The questionnaire was sent to them by fax or e-mail, depending on their preference. A month later, a reminder was sent to those who had not answered yet.

Finally, 98 completed questionnaires were received, i.e. a 50.3 percent response rate. Among these, 17 questionnaires, which either had insufficient responses (four cases) or reported conducting only manufacturing activities but no sales activities (13 cases) were excluded. Of the remaining 81, ten respondents noted that their parent companies had no foreign affiliates other than the Korean subsidiary. Therefore, 81 cases were available for analyzing knowledge transfer to the parent company, and 71 cases for analyzing knowledge transfer to peer subsidiaries.

Dependent variables

Two dependent variables measured the amount of knowledge that the focal subsidiary transferred to the parent company and to its peer subsidiaries. Following previous studies (Gupta and Govindarajan, 2000; Schulz, 2001; Bjorkman *et al.*, 2004), the first dependent variable was measured as follows. The respondents indicated on a seven-point Likert scale the amount of knowledge that the focal subsidiary transferred to the parent company in five major dimensions:

1. the development of basic and applied technologies;
2. new product design and development;
3. manufacturing activities;
4. sales, marketing and distribution; and
5. general management (Cronbach's $\alpha = 0.911$).

In the same manner, the second dependent variable was measured as the amount of knowledge that the focal subsidiary transferred to its peer subsidiaries (Cronbach's $\alpha = 0.952$). Multivariate linear regression models demonstrated the influence of the following independent variables on these dependent variables.

Independent variables

Time-based experience was measured by the number of operational years of the subsidiary in Korea as of the year 2005. Following Luo and Peng (1999), diversity-based experience was operationalized by the extent to which the subsidiary:

- produced and sold diverse products;
- served diverse wholesale markets;
- served diverse retail markets; and
- dealt with diverse buyers and customers (seven-point Likert scale).

Similar to Ghoshal *et al.* (1994), subsidiary autonomy was measured by asking the respondents to indicate the extent to which a subsidiary could make its own decisions without interference from the parent company in six management domains:

1. development and launch of new products;
2. pricing decisions and marketing activities;
3. expansion and reduction of manufacturing facilities;
4. human resources management policies;
5. borrowing and raising capital; and
6. setting annual business goals (seven-point Likert scale).

The expatriate policy for the focal subsidiary was measured at three different levels using three different variables. In line with prior research, the first is a dummy variable, which took the value of "1" if the CEO of the subsidiary was an expatriate, and "0" otherwise (Gong, 2003). The second is the number of expatriates among the top five positions in the TMT of the subsidiary (Harzing, 2002). The third is the ratio of expatriates to the total number of employees in the subsidiary (Gong, 2003).

Following Ghoshal *et al.* (1994), communication frequency between the parent and subsidiary managers was measured according to:

- how often the subsidiary manager communicates with managers in the parent company through e-mail, telephone, and other telecommunication facilities; and
- how often the subsidiary manager takes business trips to the parent company to have face-to-face meetings (seven-point Likert scale: 1 = less than once a month, 4 = once a month, 7 = more than twice a month).

The communication frequency between managers in the focal subsidiary and those in its peer subsidiaries was measured in the same manner.

Finally, the performance appraisal system of overseas subsidiaries was measured using a single question item borrowed from Bjorkman *et al.* (2004): the extent to which knowledge transfer to the parent company and peer subsidiaries is emphasized when the parent evaluates the focal subsidiary's performance (seven-point Likert scale).

Control variables

In order to control for additional factors that might affect the knowledge transfer activities of foreign subsidiaries, several control variables were included in the model. One is the size of the subsidiary, measured by the total number of employees as of 2005, and another is the ownership percentage of the foreign parent in the subsidiary, measured by a dummy variable, which took the value of "1" if the foreign parent had an equity stake over 95 percent, and "0" otherwise. Home country effects in Japan and the USA were also

controlled, accounting for almost 40.8 percent and 19.7 percent of the sample, respectively. Finally, three industry dummies for chemicals, motor vehicles, and machinery were included in the model, since the firms in each of these industries accounted for more than 10 percent of the sample.

Methods

Ordinary Least Square (OLS) regression was used to test the hypotheses. The authors regressed each of the two dependent variables (knowledge transfer to parent company and knowledge transfer to peer subsidiaries) on five independent variables (subsidiary experience, subsidiary autonomy, expatriate policy, communication frequency and performance appraisal) and seven control variables (subsidiary size, parent ownership, three industrial dummies and two home country dummies). Before the regression analyses, the authors also performed exploratory factor analysis and confirmatory factor analysis to assess the construct validity of the measures used in this study.

Results

Assessment of measures

The construct validity of the instrument was assessed in several ways. The authors first performed exploratory factor analysis for four multi-item scales (i.e. diversity of experience, subsidiary autonomy, communication frequency with parent, communication frequency with peers). Each of the constructs is confirmed as one dimension, with the exception of subsidiary autonomy, whose related items were grouped into two different factors: one associated with activities such as the expansion and reduction of manufacturing facilities, borrowing and raising capital, and setting annual business goals; and the other concerned with activities such as development and launch of a new product, pricing decisions, marketing activities, and human resources management (HRM) policies. Thus, the analysis resulted in a five-factor solution.

Second, confirmatory factor analysis was run to evaluate the convergent and discriminant validity of the five factors extracted by exploratory factor analysis. Results show a good fit for the five-factor model ($\chi^2 = 73.63$, $df = 67$, $P = 0.38$, comparative fit index [CFI] = 0.98, goodness-of-fit index [GFI] = 0.89, incremental fit index [IFI] = 0.98, root mean square error of approximation [RMSEA] = 0.023). All of the items loaded significantly on their latent variable (t -statistics ranging from 3.91 to 9.62), indicating convergent validity of the measures.

To check discriminant validity, the authors compared the model in which the latent variables were allowed to correlate freely with a series of nested models in which each pair of constructs was restricted to correlate perfectly. All the chi-square differences are highly significant ($p = 0.000$), supporting discriminant validity. Further, the authors compared the five-factor model with the alternative four-factor model, which includes only a single construct for autonomy. Fit index comparison for the first and second models ($\chi^2 = 94.97$, $df = 71$, $P = 0.03$, RMSEA = 0.061, CFI = 0.95, GFI = 0.86) and the chi-square difference test ($\Delta\chi^2(4) = 21.34$, $p < 0.005$) reveal that the five-factor model fits the data better. Thus, this study measured subsidiary autonomy in two separate dimensions, labeling them autonomy 1 (production capacity expansion, capital raising, and business goal setting) and autonomy 2 (new product introduction, marketing, and HRM), respectively. In addition, Cronbach's alphas for all of these independent variables range from 0.660 to 0.828, suggesting adequate internal consistency.

Lastly, the authors checked the common methods variance of the analysis using Harman's one-factor test (Podsakoff and Organ, 1986), since the independent and dependent variables were collected from single respondents. This test resulted in four factors with eigenvalues above 1, with the largest factor accounting for 28.2 percent of the variance in the sample. Thus, common methods variance does not appear to be a problem in this empirical analysis.

“Given the relatively weak absorptive capacity of peer subsidiaries compared to parent companies, a more autonomous subsidiary may choose to transfer its unique and valuable knowledge to the parent company rather than to peers.”

Tests of hypotheses

Tables I–II exhibit the correlation coefficients among all independent variables. All variables measured by multi-items are calculated by averaging the scores of their related items. Most of the correlation coefficients in the tables are within the acceptable range, except for relatively high correlations between autonomy 1 and autonomy 2 and among the three variables measuring the expatriate policy. Thus these variables are included alternately in the models to avoid multicollinearity problems. In addition, variance inflation factors (VIF) for all regressions were checked. The findings show that they remained within acceptable ranges (the maximum value was 1.78).

The parameter estimates of the regression models are shown in Table III (knowledge transfer to the parent company) and Table IV (knowledge transfer to peer subsidiaries)[1]. All models were highly significant ($p < 0.001$), indicating that their explanatory power was satisfactory.

In the case of knowledge transfer to the parent company, time-based experience shows no significant effect, whereas diversity-based experience shows significant or moderately significant positive effects in most models, as reported in Table III. These findings support *H1c*, but not *H1a*. In addition, both variables measuring subsidiary autonomy (autonomy 1 and autonomy 2) have positive and significant effects in the model, providing support for *H2a*. The results also suggest that autonomy 2 has more significant positive effects on knowledge transfer than autonomy 1 ($p < 0.01$ and $p < 0.05$, respectively).

Concerning knowledge transfer mechanisms, among the three variables measuring expatriate policy at the different levels, only the number of expatriates in the TMT shows a significant effect on knowledge transfer to the parent. Thus, *H3a* was partially supported. On the other hand, the effects of communication frequency are insignificant in all models, providing no support for *H4a*. Finally, as expected in *H5a*, the specification of knowledge sharing as an important criterion in performance evaluation of subsidiaries has highly significant positive effects in all models ($p < 0.01$).

Table IV shows the results of the regression analysis on the determinants of knowledge transfer to peer subsidiaries. Consistent with *H1b*, time-based experience has significant positive effects on the outflow of subsidiary knowledge in all models ($p < 0.05$). By contrast, diversity of subsidiary experience does not have similar effects, according to the results. Of the two variables measuring subsidiary autonomy, only the second variable, autonomy 2, has significant positive effects on the outflow of subsidiary knowledge in Models 2b and 6b ($p < 0.05$), providing partial support for *H2b*.

The analysis finds no evidence for the significant influence of expatriate policy on the outflow of subsidiary knowledge to peer subsidiaries. Thus, *H3b* receives no support. In contrast, communication frequency between the focal subsidiary and its peer subsidiaries shows highly significant positive effects in all models, as shown in Table IV (at $p < 0.01$), thereby supporting *H4b*. Lastly, as predicted in *H5b*, the emphasis on knowledge transfer as an important performance criterion in the subsidiary appraisal system has a moderately significant positive effect in Models 1b and 3b ($p < 0.1$).

In summary, the results of OLS regressions show that the transfer of subsidiary knowledge to the parent company is positively associated with diversity-based experience, autonomy 1

Table I Descriptive statistics and correlation matrix: knowledge transfer to the parent company

Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 Time-based experience	16.05	10.19	1.00															
2 Diversity-based experience	3.48	1.48	0.18	1.00														
3 Autonomy 1 ^a	4.10	1.46	0.01	0.02	1.00													
4 Autonomy 2 ^b	4.92	1.24	0.07	0.21	0.57	1.00												
5 Expatriate CEO	0.38	0.49	-0.20	-0.20	-0.27	-0.24	1.00											
6 No. of expatriates in TMT	1.84	1.65	0.00	-0.04	-0.24	-0.11	0.41	1.00										
7 Expatriate ratio	1.17	1.83	-0.18	-0.13	-0.21	-0.32	0.39	0.50	1.00									
8 Communication frequency	4.88	1.18	-0.10	0.26	-0.12	-0.02	0.32	0.30	0.13	1.00								
9 Sub evaluation system	4.56	1.53	0.14	0.13	-0.03	0.24	-0.11	0.01	-0.08	0.17	1.00							
10 Subsidiary size	431.49	478.99	0.16	0.16	0.09	0.23	0.02	0.33	-0.19	0.17	0.24	1.00						
11 Parent ownership	0.60	0.49	0.11	0.09	-0.46	-0.26	0.24	0.04	0.25	0.05	0.03	-0.14	1.00					
12 Chemicals	0.22	0.42	0.25	0.10	-0.18	-0.15	0.00	-0.06	0.05	0.11	-0.04	-0.26	0.05	1.00				
13 Automobile	0.21	0.41	0.04	-0.14	0.19	0.22	-0.17	-0.05	-0.11	-0.26	0.14	0.22	-0.17	-0.28	1.00			
14 Machinery and equipment	0.12	0.33	-0.06	-0.04	0.00	0.02	0.11	-0.11	0.03	-0.13	-0.14	-0.18	0.05	-0.20	-0.19	1.00		
15 Japan	0.38	0.49	0.20	-0.06	0.30	0.12	-0.17	-0.02	0.17	-0.21	-0.09	-0.01	-0.08	-0.10	-0.21	0.21	1.00	
16 USA	0.22	0.42	-0.07	0.15	0.11	0.20	-0.20	-0.28	-0.25	0.04	0.11	0.13	-0.01	-0.07	-0.10	-0.43	-0.10	1.00

Notes: ^aProduction capacity expansion, capital raising, business goals setting; ^bNew product introduction, marketing and HRM; The numbers in italics are significant at $p < 0.05$ or higher; $N = 81$, but $N = 75$ for the statistics related to "No. of expatriates in TMT", and $N = 77$ for the statistics related to "expatriate ratio".

Table II Descriptive statistics and correlation matrix: knowledge transfer to peer subsidiaries

Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 Time-based experience	16.15	10.04	1.00															
2 Diversity-based experience	3.47	1.46	0.13	1.00														
3 Autonomy 1 ^a	4.04	1.45	0.02	0.02	1.00													
4 Autonomy 2 ^b	4.89	1.24	0.04	0.19	0.52	1.00												
5 Expatriate CEO	0.42	0.50	-0.22	-0.21	-0.24	-0.20	1.00											
6 No. of expatriates in TMT	1.84	1.57	0.08	-0.01	-0.20	-0.04	0.40	1.00										
7 Expatriate ratio	1.11	1.64	-0.11	-0.14	-0.17	-0.27	0.40	0.42	1.00									
8 Communication frequency	3.47	1.54	0.05	0.24	0.08	0.09	0.23	0.28	0.07	1.00								
9 Sub evaluation system	4.42	1.55	0.17	0.10	-0.08	0.24	-0.07	0.00	-0.19	0.22	1.00							
10 Subsidiary size	453.07	494.51	0.14	0.16	0.15	0.29	-0.02	0.35	-0.30	0.09	0.28	1.00						
11 Parent ownership	0.63	0.49	0.10	0.09	0.42	-0.21	0.22	0.05	0.26	0.21	0.04	-0.20	1.00					
12 Chemicals	0.24	0.43	0.25	0.03	-0.23	-0.22	-0.01	-0.08	0.10	0.05	-0.05	-0.28	0.09	1.00				
13 Automobile	0.21	0.41	0.10	-0.10	0.20	0.25	-0.17	0.01	-0.10	-0.11	0.18	0.27	-0.19	-0.29	1.00			
14 Machinery and equipment	0.11	0.32	-0.11	-0.03	-0.07	-0.05	0.18	-0.03	0.14	-0.19	-0.20	-0.15	0.07	-0.19	-0.18	1.00		
15 Japan	0.35	0.48	0.18	-0.14	0.31	0.10	-0.17	-0.02	0.13	-0.34	-0.19	-0.02	-0.11	-0.13	-0.15	0.15	1.00	
16 USA	0.24	0.43	-0.06	0.17	0.17	0.27	-0.22	-0.28	-0.30	0.13	0.16	0.14	-0.06	-0.07	0.23	-0.08	-0.42	1.00

Notes: ^aProduction capacity expansion, capital raising, business goals setting; ^bNew product introduction, marketing and HRM; The numbers in italics are significant at $p < 0.05$ or higher; $N = 71$, but $N = 66$ for the statistics related to 'No. of expatriates in TMT', and $N = 68$ for the statistics related to 'expatriate ratio'.

Table III Results of regression analyses of knowledge transfer to parent company

Variables	Model 1a t-value	Model 2a t-value	Model 3a t-value	Model 4a t-value	Model 5a t-value	Model 6a t-value
Length of operation period	-0.080	-0.068	-0.068	-0.680	-0.056	-0.036
Diversity of experience	0.199**	0.161*	0.220**	0.176*	0.195**	-0.543
Autonomy 1 ^a	0.235**	0.272***	0.264**	0.304***	0.230**	0.150
Autonomy 2 ^b	0.046	0.031	0.231**	0.198*	0.282***	2.789
Expatriate CEO						
Number of expatriates in TMT						
Expatriate ratio						
Communication frequency	0.116	0.128	0.064	0.080	0.032	0.065
Sub evaluation system	0.510***	0.457***	0.490***	0.419***	0.132	0.146
Subsidiary size	0.030	-0.020	-0.066	-0.092	0.472***	0.416***
Parent ownership	-0.055	-0.084	-0.064	-0.101	0.012	-0.030
Chemicals	-0.167*	-1.734	-0.191*	-0.209**	-0.063	-0.096
Motor vehicles	-0.028	-0.267	-0.045	-0.057	-0.207*	-0.228**
Japan	-0.271**	-2.509	-0.264**	-0.257**	-0.031	-0.024
USA	-0.048	-0.488	-0.069	0.136	-0.308***	-0.296***
R square	0.541	0.558	0.555	0.579	0.529	0.550
Adjusted R square	0.452	0.472	0.460	0.490	0.432	0.458
N	81	81	75	75	77	77
F	6.076***	6.494***	5.850***	6.461***	5.453***	5.934***

Notes: ^aProduction capacity expansion, capital raising, business goals setting; ^bNew product introduction, marketing and HRM; * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$, two-tailed

Table IV Results of regression analyses of knowledge transfer to peer subsidiaries

Variables	Model 1a t-value	Model 2a t-value	Model 3a t-value	Model 4a t-value	Model 5a t-value	Model 6a t-value
Length of operation period	0.201**	2.124	0.212**	2.141	0.223**	2.312
Diversity of experience	0.006	0.060	-0.016	-0.171	-0.046	-0.509
Autonomy 1 ^a	0.045	0.413	0.082	0.682	0.019	0.168
Autonomy 2 ^b	-0.025	-0.252	0.206**	2.158	0.184	1.861
Expatriate CEO	-0.028	-0.298	0.088	0.792	0.069	0.676
Number of expatriates in TMT						
Expatriate ratio	0.629***	6.065	0.598***	5.245	0.604***	5.969
Communication frequency	0.164*	1.791	0.172*	1.781	0.129	1.377
Sub evaluation system	0.119	1.247	0.081	0.745	0.069	0.649
Subsidiary size	-0.003	-0.034	0.033	0.319	0.030	0.328
Parent ownership	-0.125	-1.283	-0.114	-1.081	-0.115	-1.132
Chemicals	-0.088	-0.867	-0.057	-0.540	-0.077	-0.761
Motor vehicles	-0.113	-0.985	-0.102	-0.838	-0.124	-1.122
Japan	-0.022	-0.223	0.010	0.094	-0.022	-0.209
USA	0.609	6.637	0.618	6.639	0.603	6.632
R square	0.521	0.556	0.525	0.550	0.509	0.544
Adjusted R square	71	71	66	66	68	68
N	6.947***	7.827***	6.609***	7.208***	6.421***	7.250***
F						

Notes: ^aProduction capacity expansion, capital raising, business goals setting; ^bNew product introduction, marketing and HRM; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, two-tailed

(production capacity expansion, capital raising, business goal setting), autonomy 2 (new product introduction, marketing, and HRM), number of expatriates in the top management team, and the subsidiary evaluation system, while the transfer of subsidiary knowledge to peer subsidiaries is positively related to time-based experience, autonomy 2 (new product introduction, marketing, and HRM), communication frequency and the subsidiary evaluation system.

Discussion

The results of this study not only reveal important organizational factors that may influence the transfer of subsidiary knowledge, but also suggest that their influence can differ according to whether the recipient of knowledge is the parent company or the peer subsidiaries.

Among the variables measuring subsidiary knowledge stock, time-based experience facilitates knowledge transfer to peer subsidiaries, whereas diversity-based experience increases knowledge transfer to the parent company. Although this intriguing difference calls for further research for a full understanding, a possible explanation that the authors put forward in this study is that the diversity-based experience of a subsidiary helps develop more unique and tacit knowledge in the host country than time-based experience does. Penrose (1959) emphasized diversity of experience as an important source of learning. Consistent with her view, Luo and Peng (1999) found evidence that diversity of experience is more important in acquiring valuable local knowledge than experience gained merely through the passage of time in the host country.

However, knowledge acquired through diverse experience, which is more tacit and valuable than knowledge acquired through time-based experience, requires enough absorptive capacity on the part of the recipients to grasp it (Szulanski, 1996; Schleimer and Riege, 2009). Parent companies have plenty of opportunity to exchange information with their foreign subsidiaries in the course of daily operation. Greater opportunity can increase their capacity to assimilate new knowledge from foreign subsidiaries. By contrast, the less frequent contact characteristic between subsidiaries may hinder them from sharing prior knowledge and developing a common code (both important antecedents of absorptive capacity), thereby limiting learning.

In addition, given the relatively abundant knowledge stock of parent companies compared to peer subsidiaries, the former may be more motivated to seek unique and highly valuable knowledge rather than routinized, explicit knowledge (Schulz, 2001). Therefore, the authors reason that subsidiaries have a tendency to choose to transfer this more unique and tacit knowledge accumulated through diverse experience to the parent company, while transferring more routinized knowledge amassed over a long history of operation to their peers.

This may also explain why the impact of autonomy is more significant in knowledge transfer to the parent than to peer subsidiaries in the results of this analysis. If, as argued previously, subsidiary autonomy is an important facilitator for knowledge accumulation at the subsidiary level, subsidiaries with high managerial autonomy are likely to gain more unique and valuable knowledge through daily operations in the local market than subsidiaries with low managerial autonomy. Given the relatively weak absorptive capacity of peer subsidiaries compared to parent companies, a more autonomous subsidiary may choose to transfer its unique and valuable knowledge to the parent company rather than to peers.

In addition, the results of this study suggest that autonomy 2 (new product introduction, marketing, and HRM) promotes more knowledge transfer than autonomy 1 (production capacity expansion, capital raising, business goal setting). This may be because the business activities associated with autonomy 2 generally require more customization and localization than those relating to autonomy 1. Therefore, subsidiaries with higher managerial autonomy in these domains may gain more valuable knowledge in the host country, subsequently increasing knowledge outflow to other subunits in the MNC organization.

“The results of the analysis suggest that subsidiary-to-parent knowledge transfer can take place more efficiently than subsidiary-to-subsidary knowledge transfer in the MNC organization.”

Regarding the effectiveness of knowledge transfer mechanisms, the results showed that knowledge transfer to the parent could be facilitated by staffing more expatriates in the top management team of a subsidiary. This observation suggests that interpersonal networks between parent and subsidiary managers are especially important in the sharing of knowledge within the MNC organization (Athanasidou and Nigh, 2001). In addition, the findings imply that communication frequency tends to increase knowledge transfer to peer subsidiaries, but not to the parent company. One possible reason for this is that, compared to the close communication link between the parent and the subsidiary (e.g. a formal reporting system), communication channels between peer subsidiaries tend to be relatively weak or even absent (Gupta and Govindarajan, 2000; Monteiro *et al.*, 2008). As a result, subsidiary managers may have to make a conscious effort to maintain direct contact via telephone calls, e-mail exchanges, and business trips, to transmit knowledge to their peer subsidiaries.

Lastly, it is evident that a subsidiary performance appraisal system emphasizing inter-unit knowledge sharing plays an important role in facilitating the transfer of subsidiary knowledge to the parent company. However, it has only a limited impact on knowledge transfer to peer subsidiaries. This difference may be explained by the fact that the parent company holds the ultimate right to evaluate the performance of a subsidiary in the hierarchy of an MNC organization, whereas its peer subsidiaries do not. As a result, subsidiaries are more strongly motivated to share their knowledge with the parent company in order to receive a good evaluation.

Taken together, the results of the analysis suggest that subsidiary-to-parent knowledge transfer can take place more efficiently than subsidiary-to-subsidary knowledge transfer in the MNC organization, possibly because parent companies have a better understanding of their foreign subsidiaries' knowledge bases and have built richer communication channels with them through the course of daily operation. Furthermore, low absorptive capacities and poor or nonexistent organizational links among subsidiaries may be major barriers to subsidiary-to-subsidary knowledge flows.

Conclusions

Although subsidiary skills and experience have increasingly been viewed as an important source of new competitive advantage, the authors' analysis suggests that it is challenging for MNCs to nurture and utilize subsidiary capabilities effectively for two main reasons.

First, although there is evidence that the accumulation of new knowledge at the subsidiary level is an important condition for efficient global learning, the parent company often needs to exert strong control over foreign subsidiaries to create synergies and leverage inter-unit interdependencies. Thus, the ability of MNCs to encourage foreign subsidiaries to experiment and come up with new ideas and solutions on their own in order to create new knowledge can be constrained by the parent's strategic need to integrate subsidiary activities. Second, the findings of this study highlight the difficulty of transferring a subsidiary's knowledge to peer subsidiaries due to the lack of absorptive capacity and formal communication channels among subsidiaries. These conditions may prevent a foreign subsidiary from efficiently sharing its best practices and skills with other subsidiaries in the same or neighboring region, even when the subsidiary has developed new and

valuable skills, which are readily applicable to its peers owing to geographical proximity (e.g. localized marketing programs that can cover customers within the same region).

To overcome these barriers to global learning, MNCs first need to devise more sophisticated control mechanisms (e.g. cultural control) to enable subsidiary managers to contribute to overall company goals without dampening their willingness to try new creative ideas in the foreign environment. In addition, MNCs should provide more opportunities for subsidiary managers to build communication networks with other subsidiaries in the same or neighboring region, so that they can effectively share relevant information and combine their capabilities to build regional firm-specific competitive advantages.

This study provides new understanding about global learning in MNCs, but it also has some inevitable limitations. First, the findings of this study are confined to MNC subsidiaries operating in a single host country, which makes generalizations to other host country contexts difficult. Second, this study considered only subsidiaries that conduct both manufacturing and sales activities, in order to enhance statistical reliability. Thus, it cannot be assumed that the findings are applicable to subsidiaries with other strategic purposes (e.g. R&D subsidiaries). Lastly, since the data were collected through a mail survey, the possibility that the results of this analysis are distorted by the respondents' subjective opinions cannot be ignored. Future studies should extend the validity of the findings presented here and explore other critical factors influencing diverse knowledge flows in the MNC network context.

Note

1. In these two tables, the sample size decreases in some models due to missing values from some respondents for the variables measuring the number of expatriates in the TMT and the ratio of expatriates to total employees in the subsidiary.

References

- Allen, T.J. (1977), *Managing the Flow of Technology: Technology Transfer and the Dissemination of Technological Information within the R&D Organization*, MIT Press, Cambridge, MA.
- Almeida, P. and Phene, A. (2004), "Subsidiaries and knowledge creation: the influence of the MNE and host country on innovation", *Strategic Management Journal*, Vol. 25, pp. 847-64.
- Amsden, A.H. (2003), *The Rise of "The Rest": Challenges to the West from Late-Industrializing Economies*, Oxford University Press, New York, NY.
- Asakawa, K. and Lehrer, M. (2003), "Managing local knowledge assets globally: the role of regional innovation relays", *Journal of World Business*, Vol. 38 No. 1, pp. 31-42.
- Athanassiou, N. and Nigh, D. (2001), "Internationalization, tacit knowledge and the top management team", *Journal of International Business Studies*, Vol. 31 No. 3, pp. 471-87.
- Bartlett, C. and Ghoshal, S. (1989), *Managing Across Borders: The Transnational Solution*, Harvard University Press, Boston, MA.
- Bartlett, C. and Ghoshal, S. (1990), "Matrix management: not a structure, a frame of mind", *Harvard Business Review*, July-August, pp. 138-45.
- Belderbos, R.A. and Heijltjes, M.G. (2005), "The determinants of expatriate staffing by Japanese multinationals in Asia: control, learning and vertical business groups", *Journal of International Business Studies*, Vol. 36 No. 3, pp. 341-54.
- Birkinshaw, J., Hood, N. and Jonsson, S. (1998), "Building firm-specific advantages in multinational corporations: the role of subsidiary initiative", *Strategic Management Journal*, Vol. 19 No. 3, pp. 221-41.
- Bjorkman, I., Barner-Rasmussen, W. and Li, L. (2004), "Managing knowledge transfer in MNCs: the impact of headquarters control mechanisms", *Journal of International Business Studies*, Vol. 35 No. 5, pp. 443-55.
- Cantwell, J. and Mudambi, R. (2005), "MNE competence-creating subsidiary mandates", *Strategic Management Journal*, Vol. 26 No. 12, pp. 1109-28.

- Corredoira, R.A. and Rosenkopf, L. (2010), "Should auld acquaintance be forgot? The reverse transfers of knowledge through mobility ties", *Strategic Management Journal*, Vol. 31 No. 2, pp. 159-81.
- Crowne, K.A. (2009), "Enhancing knowledge transfer during and after international assignments", *Journal of Knowledge Management*, Vol. 13 No. 4, pp. 134-47.
- Delios, A. and Beamish, P. (2001), "Survival and profitability: the roles of experience and intangible assets in foreign subsidiary performance", *Academy of Management Journal*, Vol. 44 No. 5, pp. 1028-38.
- Frost, T.S. (2001), "The geographic sources of foreign subsidiaries innovations", *Strategic Management Journal*, Vol. 22 No. 2, pp. 101-23.
- Frost, T.S., Birkinshaw, J.M. and Ensign, P.C. (2002), "Centers of excellence in multinational corporations", *Strategic Management Journal*, Vol. 23 No. 11, pp. 997-1018.
- Galbraith, J.R. (1973), *Designing Complex Organizations*, Addison-Wesley, Reading, MA.
- Garvin, D.A. (2000), *Learning in Action*, Harvard Business School Press, Boston, MA.
- Ghoshal, S. and Bartlett, C.A. (1988), "Creation, adoption, and diffusion of innovations by subsidiaries of multinational corporations", *Journal of International Business Studies*, Vol. 19 No. 3, pp. 365-88.
- Ghoshal, S., Korine, H. and Szulanski, G. (1994), "Interunit communication in multinational corporations", *Management Science*, Vol. 40 No. 1, pp. 96-110.
- Gong, Y. (2003), "Subsidiary staffing in multinational enterprises: agency, resources, and performance", *Strategic Management Journal*, Vol. 46 No. 6, pp. 728-39.
- Gupta, A. and Govindarajan, V. (2000), "Knowledge flows within multinational corporations", *Strategic Management Journal*, Vol. 21 No. 4, pp. 473-96.
- Harzing, A. (2002), "Acquisitions versus greenfield investments: international strategy and management of entry modes", *Strategic Management Journal*, Vol. 23 No. 3, pp. 211-27.
- Hendry, J. (2002), "The principal's other problems: honest incompetence and the specification of objectives", *Academy of Management Review*, Vol. 27 No. 1, pp. 98-113.
- Johanson, J. and Vahlne, J.E. (1977), "Internationalization process of the firm", *Journal of International Business Studies*, Vol. 8 No. 1, pp. 23-32.
- Lazarova, M. and Tarique, I. (2005), "Knowledge transfer upon repatriation", *Journal of World Business*, Vol. 40 No. 4, pp. 361-73.
- Levitt, B. and March, J.G. (1988), "Organizational learning", *Annual Review of Sociology*, Vol. 14, pp. 319-40.
- Luo, Y. and Peng, M.W. (1999), "Learning to compete in a transition economy: experience, environment, and performance", *Journal of International Business Studies*, Vol. 30 No. 2, pp. 269-95.
- Martin, X. and Salomon, R. (2003), "Tacitness, learning, and international expansion: a study of foreign direct investment in a knowledge-intensive industry", *Organization Science*, Vol. 14 No. 3, pp. 297-311.
- Minbaeva, D., Pedersen, T., Bjorkman, I., Fey, C.F. and Park, H.J. (2003), "MNC knowledge transfer, subsidiary absorptive capacity, and HRM", *Journal of International Business Studies*, Vol. 34 No. 6, pp. 586-99.
- Monteiro, L.F., Arvidsson, N. and Birkinshaw, J. (2008), "Knowledge flows within multinational corporations: explaining subsidiary isolation and its performance implications", *Organization Science*, Vol. 19 No. 1, pp. 90-107.
- Nelson, R.R. and Winter, S.G. (1982), *An Evolutionary Theory of Economic Change*, Belknap, Cambridge, MA.
- Nonaka, I. and Takeuchi, H. (1995), *The Knowledge-Creating Company*, Oxford University Press, New York, NY.
- Noorderhaven, N. and Harzing, A. (2009), "Knowledge-sharing and social interaction within MNEs", *Journal of International Business Studies*, Vol. 40 No. 5, pp. 719-41.
- Pennings, J.M., Barkema, H.G. and Douma, S.W. (1994), "Organizational learning and diversification", *Academy of Management Journal*, Vol. 37 No. 3, pp. 608-40.

- Penrose, E. (1959), *The Theory of the Growth of the Firm*, Basil Blackwell, London.
- Podsakoff, P.M. and Organ, D.W. (1986), "Self-reports in organizational research: problems and prospects", *Journal of Management*, Vol. 12 No. 4, pp. 531-44.
- Rogers, E.M. (2003), *Diffusion of Innovations*, Free Press, New York, NY.
- Rugman, A.M. and Verbeke, A. (2001), "Subsidiary specific advantages in multinational enterprises", *Strategic Management Journal*, Vol. 22 No. 3, pp. 237-50.
- Rugman, A.M. and Verbeke, A. (2004), "A perspective on regional and global strategies of multinational enterprises", *Journal of International Business Studies*, Vol. 35 No. 1, pp. 3-18.
- Schleimer, S. and Riege, A. (2009), "Knowledge transfer between globally dispersed units at BMW", *Journal of Knowledge Management*, Vol. 13 No. 1, pp. 27-41.
- Schulz, M. (2001), "The uncertain relevance of newness: organizational learning and knowledge flows", *Academy of Management Journal*, Vol. 44 No. 4, pp. 661-81.
- Scullion, H. (1994), "Staffing policies and strategic control in British multinationals", *International Studies of Management and Organization*, Vol. 24 No. 3, pp. 541-54.
- Shan, W. and Song, J. (1997), "Foreign direct investment and the sources of technological advantage: evidence from the biotechnology industry", *Journal of International Business Studies*, Vol. 28 No. 2, pp. 267-84.
- Song, J. and Shin, J. (2008), "Paradox of technological capabilities: a study of knowledge sourcing from host countries of overseas R&D operations", *Journal of International Business Studies*, Vol. 39 No. 2, pp. 291-303.
- Szulanski, G. (1996), "Exploring internal stickiness: impediments to the transfer of best practice within the firm", *Strategic Management Journal*, Vol. 17 No. 2, pp. 27-43.
- Teece, D. (1977), "Technology transfer by multinational firms: the resource costs of transferring technological know-how", *Economic Journal*, Vol. 87 No. 346, pp. 242-61.
- Teece, D.J., Pisano, G. and Shuen, A. (1997), "Dynamic capabilities and strategic management", *Strategic Management Journal*, Vol. 18 No. 7, pp. 509-33.
- Tushman, M.L. (1978), "Technical communication in R&D laboratories: the impact of project work characteristics", *Academy of Management Journal*, Vol. 21 No. 4, pp. 624-45.
- Zeira, Y. (1976), "Management development in ethnocentric multinational corporations", *California Management Review*, Vol. 18 No. 4, pp. 34-42.

Further reading

- DiMaggio, P.J. and Powell, W.W. (1983), "The iron cage revisited: institutional isomorphism and collective rationality in organizational fields", *American Sociological Review*, Vol. 48 No. 2, pp. 147-60.

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