MNCs Innovation, Reverse Knowledge Transfer and Firm Absorptive Capacity

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Abstract: Organizational innovation is one of the main tools for attaining a competitive advantage. Multinational corporations operate in different countries may capture new knowledge from diverse markets, customers or suppliers. This paper focuses on the knowledge transfer from the subsidiaries to the headquarters (knowledge transfer reverse). Furthermore, we try to analyse how this transferred knowledge facilitates the generation of innovations. Its study has demanded the analysis of the mediator role of absorptive capacity. Our results show that reverse knowledge influences indirectly on the headquarters' innovation trough the existence of an absorptive capacity. Several conclusions and managerial implications are derived.

Keywords: absorptive capacity, knowledge transfer, MNCs and innovation

1. Introduction

Innovation is increasingly considered to be one of the key drivers of the long-term success of a firm and knowledge is frequently cited as antecedent of innovation (Kogut and Zander, 1992, Crossan and Apaydin, 2010, Nonaka and Takeuchi, 1995). The basic assumption here is that companies which are able to renew their knowledge stand a better chance of understanding the consequences of the changes in their environments and are better suited than competitors to respond faster and better to them (Tippins and Sohi, 2003, Sinkula, 1994).

Multinational companies (MNCs) are considered to have better opportunities to acquire and exploit knowledge than domestic organizations since they are open to new experiences, markets, cultures and ideas (Bonache and Zárraga-Oberty, 2008) which can foster their innovation capability. In this line, Almeida and Phene (2004) suggest that MNCs innovate by integrating and acquiring these culturally diverse knowledge bases from multinational locations to their own core capabilities.

For this potential advantage to become real it is necessary to transfer knowledge from one location to the others (Kotabe et al., 2007). Knowledge transfer is a process of systematically organized exchange of information and skills between entities (Wang et al., 2004). Intra-corporate knowledge transfer is a complex process in general, but it is even more difficult within the MNCs due to the distance among organizational units, both geographical and cultural. Among other factors, successful knowledge transfer requires that the business unit which receipts knowledge has the capacity to absorb it and use it for developing innovations (Andersson, 2003). According to literature, companies with superior knowledge-processing practices are likely to be better positioned to develop innovations (Jantunen, 2005, Tsai, 2001, Nieto and Quevedo, 2005).

The purpose of this paper is analyses the relation between MNC innovation, absorptive capacity and knowledge transfer. In particular, this paper focuses on knowledge transferred from subsidiaries to the parent business unit. Literature names this process as reverse knowledge transfer (Rabbiosi, 2011). Some studies have

Reference this paper as: Daniel Jimenéz-Jimenéz, Micaela Martínez-Costa and Raquel Sanz-Valle. "MNCs Innovation, Reverse Knowledge Transfer and Firm Absorptive Capacity" *The Electronic Journal of Knowledge Management* Volume 11 Issue 5 (pp437-446) available online at www.ejkm.com

examined the process of knowledge transfer within MNCs but most of them have focused on the transfer from parent to subsidiaries. Very few papers examined the process of knowledge transfer from subsidiaries to the parent unit. Thus, literature dos not provide accurate information about how this process takes place.

2. Theoretical framework

Innovation has been conceptualised in a variety of ways (Wolfe, 1994) but, according to Hage (1999), most of the authors define it as the adoption of an idea or behaviour –regarding a system, policy, program, device, process, product or service- that is new to the adopting organization. Furthermore, attending to the Oslo Manual (OCDE, 2005), it can be understood as ''the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations''.

Innovation processes are considered crucial activities for the contemporary multinational corporation (Ciabuschi et al., 2012). MNCs need to attend to different market and are been exposed to a local and international competition. In this context, these companies have to look up new ways to be competitive by offering new products, making new changes in their operation processes or improving their general processes of managing the company. However, MNCs have the opportunity to acquire knowledge from different sources because they count with a great variety of subsidiaries that operate in different markets, customers, suppliers and institutions. Only companies that count with efficient international knowledge management initiatives will be in a position of generating innovation for competing overseas.

2.1 Knowledge transfer in MNCs

Knowledge management has been showed as a crucial process for the majority of the companies. Furthermore, for those that have to operate with different subsidiaries distributed overseas, knowledge management is required for the transmission of knowledge and the adoption of right strategies on specific contest. Knowledge transfer can be understood as the process of a systematically organized exchange of information and skills between entities (Wang et al., 2004). It implies direct collaborative relationships between two entities within the MNC, involving creation, transfer, and/or exchange of valuable knowledge. In this process, the entities from an MNC acquire knowledge from other entities in order to improve their productive capability. Traditional models of knowledge transfer focus on the conventional forward transfer of knowledge from headquarters to foreign affiliates. However, one impact of globalization is that knowledge transfer takes place across multiple dimensions (space, time, language, culture etc.) as well as in multiple directions (forward, backward and lateral). The reverse knowledge transfer (RKT) could be understood as the knowledge transfer from foreign subsidiaries to local headquarters.

RKT has important profits for local headquarters. They can benefit from their subsidiary knowledge coordinating a global strategy, so by improving processes in their own or other units in the network, or by simply providing the missing link in the quest to develop a new product (Ambos et al., 2006). Such knowledge transfer presumably contributes to the buildup of innovative capabilities of local parent firms (Li and Zhou, 2008). RKT is also useful for the development of new products, and the realization and use of innovations in different units (Hansen, 1999, Tsai and Ghoshal, 1998, Tsai, 2001)– all of which can crucially facilitate the development of competitive advantage. Some studies in international business offer valuable insights into how firms invest abroad (Ito and Wakasugi, 2007), create patents (Singh, 2008) and transfer knowledge across units (Kurokawa et al., 2007) to obtain competitive advantages (Kafouros et al., 2012).

This recent trend is in line with the broader recognition that foreign subsidiaries can serve as sources of innovations (Birkinshaw et al., 1998, Pearce and Papanastassiou, 1999) that can be transferred to and used by parent companies. What is more, some results show how local headquarters increase their innovative skills and capabilities benefit from the use of knowledge transferred from foreign subsidiaries (Rabbiosi and

Santangelo, 2013). Thus, RKT provides potential opportunities for headquarters to develop new products through the combination of existing and different complementary skills (Kotabe et al., 2011).. Thus, we propose that:

H_1. RKT from foreign subsidiaries positively influences local parent company's innovation.

2.2 The mediation role of absorptive capacity

Reverse knowledge transfer is called to be an important factor for developing parent innovations. Although knowledge acquisition is important for MNCs to catch up in the international environment, they need to possess organizational capabilities to deploy resources (Dierickx and Cool, 1989, Teece et al., 1997). One of the most frequently cited factors as determinant of knowledge transfer is absorptive capacity. Absorptive capacity is defined as the ability to use prior knowledge to recognize the value of new information, assimilate it, and apply it to create new knowledge and capabilities (Cohen and Levinthal, 1990). From an organizational learning perspective, firms need to possess a considerable level of realized absorptive capacity to capitalize on knowledge acquisition from external sources to facilitate organizational learning (Lane et al., 2006, Argote and Ingram, 2000).

Firm's absorptive capacity involves using mechanisms through which knowledge outside the firm is identified, acquired, assimilated, transformed and applied (Liu and Chen, 2012, Jansen et al., 2005). Consequently, local headquarters' benefits from RKT will be positively related to its absorptive capacity (Ambos et al., 2006). Thus, according to some studies, the absorptive capacity is positively related to knowledge transfer. The knowledge transferred will foster the acquisition of new knowledge that could be used for developing innovations. In consequence, we consider that RKT will be a key determinant for the absorptive capacity of an MNC. In particularly, RKT from foreign subsidiaries to local headquarter will facilitate the acquisition of knowledge that could be assimilated, distributed and exploited for generating innovation on the headquarters. Thus, we propose:

H_2. A local parent-firm' absorptive capacity positively influences the RKT from foreign subsidiaries.

Finally, literature often underlines the relation between absorptive capacity and organizational innovation (Chang and Cho, 2008, Lynn et al., 2000, Madhavan and Grover, 1998). As the firm's absorptive capacity and the processes that develop its innovative capabilities are difficult to imitate, companies with superior knowledge-processing practices are likely to sustain innovativeness and thus be better positioned in long-term competition (Jantunen, 2005). Cohen and Levinthal (1990) understood absorptive capacity as a highly important organizational capability to recognize, value and assimilate external knowledge in order to increase a firm's innovativeness. Furthermore, many scholars have emphasized the extent to which innovation firm's ability involves the integration of external knowledge with the existing organization (Powell, 1998). Thus, most studies consider that absorptive capacity injects new ideas into the organization, increases the capacity to understand new ideas and strengthens creativity and the ability to spot new opportunities (e.g. Chesbrough, 2003, Gray, 2006, García-Morales et al., 2008). Furthermore, absorptive capacity facilitates the development of a company's innovation capacity through the application of knowledge acquired from internal and external sources. Therefore, organizational innovativeness can be considered as the output of absorptive capacity deployment. Hence, we state that:

H_3. A local parent-firm' absorptive capacity positively influences local parent company's innovation.

In consequence, we propose that absorptive capacity plays a mediation role on the relation between RKT and organizational innovation.

3. Methodology

3.1 Population, data collection and sample

The sample for this research includes Spanish MNCs with more than 100 employees, tenure of more than 5 years, and having at least one subsidiary in a foreign country. According to the Amadeus database, the number of MNCs fulfilling these requirements in Spain is 1.397.

The data were collected using a structured questionnaire through phone interviews. A specialized market research company managed the process. Different steps were followed to carry out the data collection. We contacted the CEO or innovation executive of each organization. The market research company then tracked completion of the questionnaire and helped organizations to complete it. All the processes were supervised and the quality of this activity was tested by contacting a randomly selected sample of firms that had answered the questionnaire. The authors monitored the performance of the companies that had completed the survey. No problems were found. The unit of analysis for this study was the company.

Of the 1397 companies invited to participate, a total of 104 usable questionnaires were received (a response rate of 7,44%). The responding companies belong to different sectors of the economy, which allows for a good representation of companies in general (table 1). The food and beverage industry, the furniture industry and metal production have the highest representation in the sample. A routine check for industry bias indicated no significant differences in the mean responses on any construct across firms from different industries. In addition, Chi-square distribution analysis revealed no significant differences between the sample and the population, which was drawn from in terms of industry distribution, the number of employees and sales volume.

Table 1: Sample characteristics

	Employees	Operating Revenue Turnover	Num. of recorded shareholders	Num. of subsidiaries	Num. of countries with subsidiaries
Mean	1388	201965	5	19	10
Min	100	694	0	1	1
25%	179	34337	1	5	3
50%	387	82237	2	9	5
75%	654	159196	5	17	11
Max	27299	2175749	106	209	78

Source: Amadeus database

3.2 Measures

The key variables in this study were measured using 5-point Likert scales based on previous literature.

Reverse knowledge transfer was measured by asking the respondent the degree to which the knowledge they had acquired from their subsidiaries was useful in improving a list of tasks. We adapted the Rabbiosi (2011)' scale. After the scale depuration process through CFA, the scale includes 6 items.

Organizational innovation measure includes four scales, each referring to one of the four types of innovation (OCDE, 2005): innovations in product, process, commercialization and management.

Absorptive capacity measure was based in the scales used on three academic papers (Egan et al., 2004, Yang et al., 2004, Marsick and Watkins, 2003), which focus on the degree in which the culture of the firm has a learning orientation. After scales depuration, a six-scale measure was used.

Control variables. Age (numbers of years since the headquarters' constitution) and size (number of headquarters' employees) were introduced from AMADEUS database. They were recoded on the same scale as the rest of variables.

3.3 Validity and reliability check

We conducted our analyses with structural equation modelling (SEM) using the statistical program EQS 6.1 for Windows (Bentler, 1995). Following the two-stage model-building process for applying SEM (Hair et al., 1998, Jöreskog and Sörbom, 1996, Hoyle and Panter, 1995), in the following section, we carried out a confirmatory factor analysis (CFA) and then we tested the structural models corresponding to our hypotheses. To assess the single dimensionality of each construct, a confirmatory factor analysis of the five constructs was conducted employing all the items (Anderson and Gerbing, 1988), including all independent, mediator, and dependent variables so as to analyse their dimensionality, which is the relations between latent and observed variables. The results of the confirmatory factor analysis (CFA) to test the validation of the measures ($\chi^2_{(74)}$= 103.477 CFI=.957 IFI=.958 BNNFI=.947 RMSEA=.068 SRMR=.068) indicate a good fit for the model.

Reliability of the measures was calculated with Bagozzi and Yi's (1998) Composite Reliability Index and with Fornell and Lacker's (1981) Average Variance Extracted Index. Discriminant validity is indicated first since the confidence interval (± 2 S.E.) around the correlation estimate between any two latent indicators never includes 1.0 (Anderson and Gerbing, 1988). Secondly, discriminant validity was tested second by comparing the square root of the AVEs for a particular construct to its correlation with the other constructs (Fornell and Larcker, 1981). Table 2 provides an overview of the means and standard deviations of the constructs. The results show that there is no multi-collinearity. In addition, the table shows basic information about each factor.

4. Results

After satisfying the requirements discussed above, we tested the structural model, which summarizes the three proposed hypotheses. Conventional maximum likelihood estimation techniques were used to test the model (Jöreskog and Sörbom, 1996). The fit of the model is satisfactory, thereby suggesting that the nomological network of relations fits the data. This is another indicator that supports the validity of these scales (Churchill, 1979).

Table 2: Reliability, validity and measurement model

Constructs	Mean	SD	Lowest t-value	Cronbach alpha	SCR[a]	AVE[b]
Reverse knowledge transfer	2.8974	1.05798	7.208	.910	.915	.642
Absorptive capacity	3.8264	.80121	6.587	.876	.888	.615
Innovation	3.7212	.74298	5.379	.732	.761	.515
CFA Goodness of Fit: $\chi^2_{(74)}$= 103.477 CFI=.957 IFI=.958 BNNFI=.947 RMSEA=.068 SRMR=.068; [a] Scale composite reliability (qc=(Aki)2 var (n)/[(Aki)2 var (n) +Ahii]; (Bagozzi and Yi 1988); [b] Average variance extracted (qc=(Aki)2 var (n)/[(Aki)2 var (n) +Ahii]; (Fornell and Larcker 1981)						

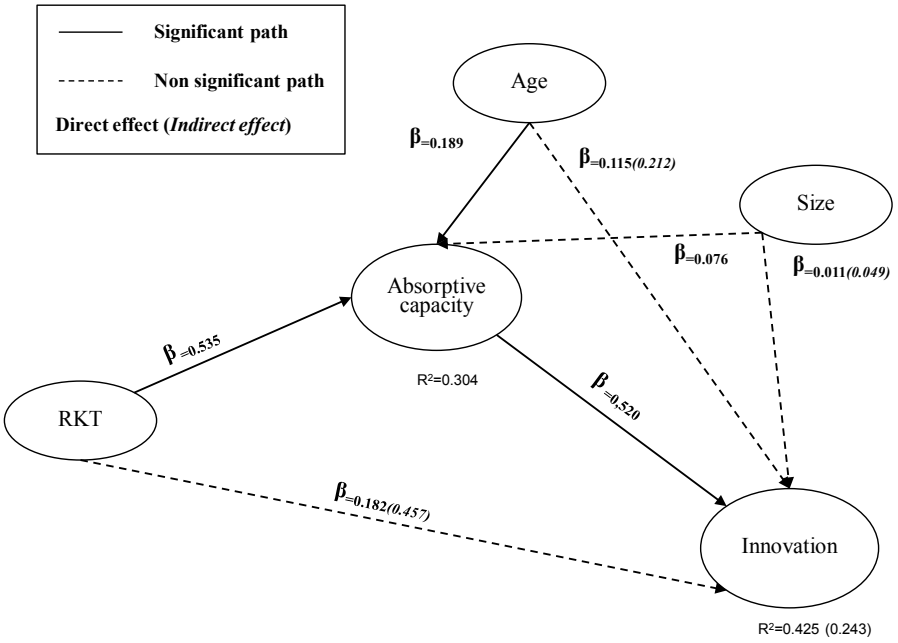

Figure 1: Structural model

We do not found support for supporting hypothesis H_1 concerning the relationship between reverse knowledge transfer and organizational innovation (table 3). In this case, the knowledge acquired for the local headquarters from foreign subsidiaries are not affecting the development of organizational innovation in the central organization (β = .182) when we included the mediation variable (absorptive capacity) on the model. The findings also support H_2 and H_3. As table 3 shows, there is a positive relation between RKT and the absorptive capacity of the firm (H_2; β = .535***) and a positive relation between the latter and the generation of innovations on the headquarters (H_3; β = .520***). This supports the idea of the crucial role of absorptive capacity of headquarters for obtaining organizational innovations from the knowledge acquired from subsidiaries.

Although we have not found evidence for supporting a relation between RKT and innovation, results show some evidence of positive, significant, but indirect, effects of RKT on organizational innovation (κ=0.278, p<0.01). Furthermore, in order to test that RKT has an indirect effect on innovation, we compared the propose model with an alternative model that does not include absorptive capacity (Andreson and Gerbing, 1988). In this alternative model, a direct path from RKT to innovation (table 3) was specified in order to apply Baron and Kenny´s general idea (1986) about mediating variables which has been adapted to causal models. The results of the mediation link support our hypothesis. Firstly, the mediation model (with absorptive capacity) explains more variance on innovation (R^2=.425) than the direct effect model (R^2=.243). Secondly, positive relationships exist between RKT and absorptive capacity, and between absorptive capacity and innovation. Thirdly, the significant relationship between RKT and innovation in the direct effect model (β =.457, p < 0.01) is not significant in the model with mediation (β=0.182, p> 0.1). Together these three points provide evidence that there is a discernible mediating effect of absorptive capacity in the relationship between RKT and innovation and that the mediation model represents a significant improvement over the direct effect model. We can conclude that the effect of RKT on innovation is completely mediated by absorptive capacity (Baron and Kenny, 1986).

Table 3: Construct structural model relationships

Main relationships	Model with mediation		Model without mediation	
	Coefficient	*td*	*Coefficient*	*td*
Main paths				
RKT → Innovation	0.182	1.341	.457***	3.333
RKT → Absorptive Capacity	0.535***	4.126		
Absorptive Capacity → Innovation	0.520***	3.317		
Control variables				
Age → Absorptive Capacity	0.189*	1.867		
Size → Absorptive Capacity	0.076	0.769		
Age → Innovation	0.115	1.067	0.212*	1.853
Size → Innovation	0.011	.103	0.049	0.446
Indirect effects				
RKT → Innovation	0.278***	2.846		
	Goodness of Fit from the model with mediator variable $\chi^2_{(96)}$= 117.322 CFI=.968 IFI=.969 BNNFI=.960 RMSEA=.051		Goodness of Fit from the model without mediator variable $\chi^2_{(40)}$= 62.550 CFI=.947 IFI=.949 BNNFI=.927 RMSEA=.079	

5. Conclusions

This paper has focused on the relationship between reverse knowledge transfer, absorptive capacity and organizational innovation. Despite the presumed positive effect of knowledge management on innovation, empirical studies do not always provide evidence to support it in international companies. This paper explores focus on the process of transferring knowledge from different subsidiaries to the headquarters in order to foster the generation of innovations in MNCs. A review of the literature on the relation between, on the one hand, RKT and absorptive capacity, and on the other hand, absorptive capacity and innovation, seems to support the idea that absorptive capacity may mediate the relation between RKT and innovation. However, no empirical research had examined this suggestion from the headquarters point of view. Many studies have focused on the paper of the headquarters for transmitting information and not for receiving from the subsidiaries. The purpose of this paper was to fill this gap.

Our findings provide evidence, first, that there is a positive relation between RKT and absorptive capacity. In particular, we found that when subsidiaries distribute their knowledge to the headquarters, the last one will be more able to acquire and applied new knowledge for commercial ends. Thus it, companies count with new international knowledge that could be exploited for different uses. Obviously, one of the main purposes is the generation of innovations. Our results show, how absorptive capacity has a positive influence on the generation of innovation in the headquarters. Finally, according to the literature, in this paper we proposed that RKT could influence on generation of innovations. However, we do not found a direct effect between these two variables, but an indirect effect. The analysis shows that knowledge transferred from subsidiaries will improve the generation of innovations if companies have an absorptive capacity to acquire, assimilate,

distribute and exploit this knowledge for innovative ends, what suggests that absorptive capacity plays a total mediation. This study has also implications for practitioners. On the one hand, like previous research, our data show that in order to achieve better performance, companies should foster their organizational learning capability. The reason is that the organizational learning capability and its output, organizational knowledge, enable companies to anticipate and understand better the customer needs and the competitive situation, to process this information faster and to develop new products, processes or systems which allow them to achieve a competitive advantage.

Despite the contributions of this paper, its results should not be interpreted without recognizing the potential limitations of this study. The more important one is its cross-sectional design, which may constrain both the observation of multiple long-term effects of each variable and the elucidation of causal relationships between the variables. This limitation could be avoided by employing a longitudinal study design. Other recommendations for future research on the relationship between RKT and innovation emerge from the present study. Since the premise that RKT is based on the transmission of knowledge, it would be necessary to analyse how this knowledge is distributed. Two main ideas to examine are the use of expatriates (Minbaeva, 2008) and the role the knowledge management strategies (Edvardsson, 2008, Hansen et al., 1999). This could help to understand how this knowledge could be easily transmitted to the headquarters.

Acknowledgements

The authors acknowledge the funding received from the Spanish Ministry of Science and Technology (research project ECO2009-12825) to undertake this research

References

Almeida, P. & Phene, A. (2004) Subsidiaries and knowledge creation: The influence of the MNC and host country on innovation. *Strategic Management Journal,* 25**,** 847–864.

Ambos, T. C., Ambos, B. & Schlegelmilch, B. B. (2006) Learning from foreign subsidiaries: An empirical investigation of headquarters' benefits from reverse knowledge transfers. *International Business Review,* 15**,** 294-312.

Anderson, J. C. & Gerbing, D. W. (1988) Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin,* 103**,** 411-423.

Andersson, U. (2003) Managing the transfer of capabilities within multinational corporations: The dual role of the subsidiary. *Scandinavian Journal of Management,* 19**,** 425-442.

Argote, L. & Ingram, P. (2000) Knowledge transfer: A basis for competitive advantage in firms. *Organisational Behaviour and Human Decision Processes,* 82**,** 150-167.

Bagozzi, R. P. & Yi, Y. (1998) On the evaluation of structural equation model. *Journal of the Academy of Marketing Science,* 16**,** 74-94.

Bentler, P. M. (1995) *EQS structural equations program manual,* Encino, CA, Multivariate Software Inc.

Birkinshaw, J., Hood, N. & Jonsson, S. (1998) Building firm-specific advantages in multinational corporations: The role of subsidiary initiative. *Strategic Management Journal,* 19**,** 221–241.

Bonache, J. & Zárraga-Oberty, C. (2008) Determinants of the success of international assignees as knowledge transferors: A theoretical framework. *International Journal of Human Resource Management,* 19**,** 1-18.

Chang, D. R. & Cho, H. (2008) Organizational memory influences new product success. *Journal of Business Research,* 61**,** 13-23.

Chesbrough, H. W. (2003) The logic of open innovation: Managing intellectual property. *California Management Review,* 45**,** 33-58.

Churchill, J. L. C. (1979) A paradigm for developing better measures of marketing construct. *Journal of Marketing Research,* XVI**,** 64-73.

Ciabuschi, F., Forsgren, M. & Martín Martín, O. (2012) Headquarters involvement and efficiency of innovation development and transfer in multinationals: A matter of sheer ignorance? *International Business Review,* 21**,** 130-144.

Cohen, W. M. & Levinthal, D. A. (1990) Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly,* 35**,** 128-154.

Crossan, M. M. & Apaydin, M. (2010) A Multi-Dimensional Framework of Organizational Innovation: A Systematic Review of the Literature. *Journal of Management Studies,* 47**,** 1154-1191.

Dierickx, I. & Cool, K. (1989) Asset stock accumulation and sustainability of competitive advantage. *Management Science,* 35**,** 1504-1511.

Edvardsson, I. R. (2008) HRM and knowledge management. *Employee Relations,* 30**,** 553-561

Egan, T. M., Yang, B. & Bartlett, K. R. (2004) The effects of organizational learning culture and job satisfaction on motivation to transfer learning and turnover intention. *Human Resource Development Quarterly,* 15**,** 279-301.

Fornell, C. & Larcker, D. F. (1981) Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research,* XXVII**,** 39-50.

García-Morales, V. J., Lloréns-Montes, F. J. & Verdú-Jover, A. J. (2008) The effects of transformational leadership on organizational performance through knowledge and innovation. *British Journal of Management,* 19**,** 299-319.

Gnyawaḷi, D. R., Singal, M. & Mu, S. C. (2009) Knowledge ties among subsidiaries in MNCs: A multi-level conceptual model. *Journal of International Management,* 15**,** 387-400.

Gray, C. (2006) Absorptive capacity, knowledge management and innovation in entrepreneurial small firms. *International Journal of Entrepreneurial Behaviour and Research,* 12**,** 345-360.

Hage, J. (1999) Organizational innovation and organizational change. *Annual Review of Sociology,* 25**,** 597-622.

Hair, J. F., Anderson, R. L. & Tatham, W. C. (1998) *Multivariate data analysis with reading,* Upper Saddle River, NJ, Prentice-Hall.

Hansen, M., Nohria, T. & Tierney, T. (1999) What's your strategy for managing knowledge? *Harvard Business Review,* 77**,** 106-116.

Hansen, M. T. (1999) The search-transfer problem: The role of weak ties in sharing knowledge across organization subunits. *Administrative Science Quarterly,* 44**,** 82-111.

Hoyle, R. H. & Panter, A. T. (1995) Writing about structural equation modeling. IN HOYLE, R. H. (Ed.) *Structural equation modelling.* Thousand Oaks, Sage.

Ito, B. & Wakasugi, R. (2007) What factors determine the mode of overseas R&D by multinationals? Empirical evidence. *Research Policy,* 36**,** 1275–1287.

Jansen, J. J. P., Van Den Bosch, F. A. J. & Volberda, H. W. (2005) Managing potential and realized absorptive capacity: How do organizational antecedents matter? *Academy of Management Journal,* 48**,** 99-1015.

Jantunen, A. (2005) Knowledge-processing capabilities and innovative performance: An empirical study. *European Journal of Innovation Management,* 8**,** 336-349.

Jöreskog, K. G. & Sörbom, D. (1996) *LISREL 8 user's reference guide,* Chicago (IL), Scientific Software International.

Kafouros, M. I., Buckley, P. J. & Clegg, J. (2012) The effects of global knowledge reservoirs on the productivity of multinational enterprises: The role of international depth and breadth. *Research Policy,* 41**,** 848-861.

Kogut, B. & Zander, U. (1992) Knowledge of the firm, combinative capabilities and the replication of technology. *Organization Science,* 3**,** 383-397.

Kotabe, M., Dunlap-Hinkler, D., Parente, R. & Mishra, H. A. (2007) Determinants of cross-national knowledge transfer and its effect on firm innovation. *J Int Bus Stud,* 38**,** 259-282.

Kotabe, M., Jiang, C. X. & Murray, J. Y. (2011) Managerial ties, knowledge acquisition, realized absorptive capacity and new product market performance of emerging multinational companies: A case of China. *Journal of World Business,* 46**,** 166-176.

Kurokawa, S., Iwata, S. & Roberts, E. B. (2007) Global R&D activities of Japanese MNCs in the US: A triangulation approach. *Research Policy,* 36**,** 3-36.

Lane, P. J., Koka, B. R. & Pathak, S. (2006) The reification of absorptive capacity: A critical review and rejuvenation of the construct. *Academy of Management Review,* 31**,** 833-863.

Li, J. & Zhou, C. (2008) Dual-edged tools of trade: How international joint ventures help and hinder capability building of Chinese firms. *Journal of World Business,* 43**,** 463-474.

Liu, M.-c. & Chen, S.-H. (2012) MNCs' offshore R&D networks in host country's regional innovation system: The case of Taiwan-based firms in China. *Research Policy,* 41**,** 1107-1120.

Lynn, G., Reilly, R. R. & Akgün, A. E. (2000) Knowledge management in new products team: Practices and outcomes. *IEEE Transactions on Engineering Management,* 47.

Madhavan, R. & Grover, R. (1998) From embedded knowledge to embodied knowledge: New product development as knowledge management. *Journal of Marketing,* 62**,** 1-12.

Marsick, V. J. & Watkins, K. E. (2003) Demonstrating the value of an organization's learning culture: The dimensions of the learning organization questionnaire. *Advances in Developing Human Resources,* 5**,** 123-151.

Minbaeva, D. (2008) HRM practices affecting extrinsic and intrinsic motivation of knowledge receivers and their effect on intra-MNC knowledge transfer. *International Business Review,* 17**,** 703–713.

Nieto, M. & Quevedo, P. (2005) Absorptive capacity, technological opportunity, knowledge spillovers, and innovative effort. *Technovation,* 25**,** 1141-1157.

Nonaka, I. & Takeuchi, H. (1995) *The knowledge-creating company,* New York. USA, Oxford University Press.

OCDE (2005) *Oslo Manual, The measurement of scientific and technological activities. Proposed guidelines for collecting and interpreting technological innovation data*, European Commission. Retrieved August, 2005, from World Wide Web: http://www.oecd.org.

Pearce, R. & Papanastassiou, M. (1999) Overseas R&D and the strategic evolution of MNEs: Evidence from laboratories in the UK. *Research Policy,* 28**,** 23-41.

Powell, W. W. (1998) Learning from collaboration: Knowledge and Networks in the biotechnology and pharmaceuticals industres. *California Management Review,* 40**,** 228-241.

Rabbiosi, L. (2011) Subsidiary roles and reverse knowledge transfer: An investigation of the effects of coordination mechanisms. *Journal of International Management,* 17**,** 97-113.

Rabbiosi, L. & Santangelo, G. D. (2013) Parent company benefits from reverse knowledge transfer: The role of the liability of newness in MNEs. *Journal of World Business,* 48**,** 160-170.

Singh, J. (2008) Distributed R&D, cross-regional knowledge integration and quality of innovative output. *Research Policy,* 37**,** 77–96.

Sinkula, J. M. (1994) Market information processing and organizational learning. *Journal of Marketing,* 58**,** 35-45.

Teece, D. J., Pisano, G. & Shuen, A. (1997) Dynamic capabilities and strategic management. *Strategic Management Journal,* 18**,** 509-533.

Tippins, M. J. & Sohi, R. S. (2003) IT competency and firm performance: Is organizational learning a missing link. *Strategic Management Journal,* 24**,** 745-761.

Tsai, W. (2001) Knowledge transfer in intraorganizational networks: Effects of network position and absorptive capacity on business unit innovation and performance. *Academy of Management Journal,* 44**,** 996-1004.

Tsai, W. & Ghoshal, S. (1998) Social capital and value creation: The role of intrafirm networks. *Academy of Management Journal,* 41**,** 464-476.

Wang, P., Tong, T. W. & Koh, C. P. (2004) An integrated model of knowledge transfer from MNC parent to China subsidiary. *Journal of World Business,* 39**,** 168-182.

Wolfe, R. A. (1994) Organizational innovation: Review, critique and suggested research directions. *Journal of Management Studies,* 31**,** 405-431.

Yang, B., Watkins, K. E. & Marsick, V. J. (2004) The construct of the learning organization: Dimensions, measurement, and validation. *Human Resource Development Quarterly,* 15**,** 31-55.

