

The Influences of Trust and Knowledge Inflows/Outflows on Innovation and Performance for Parent-Affiliate Multinational Operations

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Abstract

Recently, many studies have discussed that MNC subsidiary operations rely not solely on their parent company's knowledge instillation but their own generation from combining local experience and knowledge inflows. And this new knowledge will then trigger further innovation. Our model for this study is aimed at testing the impacts of knowledge inflows/outflows on subsidiaries' innovation, as well as the moderating effect of trust on the above relationship. According to the results of this study, several conclusions were made as followings: (1) For MNC's subsidiaries, not only knowledge inflows from parent firms or peer firms but also knowledge outflows to parent firms or peer firms did have significantly positive impact on subsidiaries' innovation and management performance. (2) Trust have significant moderating effects on the interrelationship between knowledge inflows/outflows and MNC's innovation.

Keywords: Knowledge inflows, knowledge outflows, trust, innovation, MNC operation

INTRODUCTION

In recent, many studies discuss that MNC's subsidiaries rely not solely on their parent company's resources instillation but their own generation from combining local experience and resource inflows. Subsidiaries can play as a knowledge exploration role to provide knowledge for other units in the network to improve the company's performance (Grant, 1996). Although there are plenty of studies that discussing about the interrelationship between knowledge inflows/outflows and innovation, the empirical validation about this research issue is limited. Further validations are required.

In addition, the moderating effect that affects the relationships between knowledge inflows/outflows, and innovation have created a lot of attention. For example, Szulanski asserts that one of the most important barriers to the transfer of best practices within organizations is the poor relationship between the source and recipient. At this instance, the importance of trust is

significant. According to Tsai and Ghoshal, trust can alleviate exchange partner's opportunistic behavior, and the two parties are willing to share their resources without worrying about being taken advantage of by the other one. As a result, trust assists resource exchange and combination in the entire network. Szulanski also asserts that knowledge is "sticky" and often difficult to spread across different units within an organization if preexisting relationship among units are absent. Thus trust may serve as a moderating variable for the relationships between knowledge inflows/outflows, innovation and performance. However, more specific empirical variations are required to verify this issue.

The purpose of this study is to connect the above research gaps and provide meaningful information for MNC operations in the overseas marketplaces. Specifically, the objectives of this study are as follows: (1) To verify effects of knowledge inflows /outflows on innovation of an MNC subsidiary. (2) To evaluate the effects of knowledge inflows/outflows on performance of an MNC subsidiary. (3) Taking the level of trust as the moderating variable to explore its effects on the relationships between knowledge inflows/outflows, and innovation of an MNC subsidiary.

LITERATURE REVIEW

The Effects of Knowledge Inflows on Innovation and Performance of a Subsidiary

From knowledge-based view, knowledge is one of the most important resources of a firm (Grant, 1996; Mahnke, Pedersen, & Venzin, 2005). Every organization is a knowledge base that can supply members with useful support. Therefore, it is a challenge for a manager to reinforce the quality and quantity of firm's knowledge base and to make use of it effectively. A firm's motive to go abroad and expand its domain is largely determined by its intangible assets (knowledge) (Caves, 1996). In many cases, when an MNC enters a host country by forming a subsidiary, it has competitive disadvantage to run its operation compared to local competitors. Subsidiary is able to overcome this inferiority by learning about host country conditions through accumulating operating experience in local markets or utilizing knowledge from the home country. Firm-specific knowledge that generates advantage from the home country can be exploited in overseas markets. This kind of unique knowledge is usually embedded and dispersed in organizations. The mission for managers is to facilitate the mobility of knowledge in "knowledge network" (Hansen, 2002).

In knowledge-based theory, many previous empirical researches have proved that there is a positive relationship between knowledge flows and competitive advantages that raises competence and performance of the organization from the perspective of organizational learning (Schulz, 2001), knowledge transfer (Gupta & Govindarajan, 2000; Tsai, 2000; Hansen, 2002), and knowledge integration (Grant, 1996; Foss & Pedersen, 2005). These studies show that knowledge flows are basis of knowledge management. When MNC expands foreign markets, its subsidiaries become the agents exploiting firm-specific knowledge. However, recent studies indicate that MNC subsidiaries also have contributions to firm-specific assets (Gupta and Govindarajan, 1994; Birkinshaw, Hood, and Jonsson, 1998; Minbaeva, Pedersen, Bjorkman, Fey & Park, 2003). It can be shown that the subsidiary plays not only a knowledge-exploiting role, but a knowledge explorative one. Thus, we shed a new light on subsidiary's perspective to discuss the influence of knowledge inflows and knowledge outflows on the subsidiary's performance.

Knowledge generation, accumulation, and application may be the sources of superior performance. Especially for MNCs, when operating in foreign markets, they will face different

conditions from those in home country. The way to solve this disadvantage is to exercise learning by doing in the local markets or using established knowledge from parent firms (Hymer, 1976; Dunning, 1988). Receiving knowledge from home base can be a source of competitive advantage because it is hard to purchase in the markets and it should take time and efforts to develop (DeCarolis & Deeds, 1999; Mudambi & Navarra, 2004). Szulanski (1996) asserts that the ability to transfer “best practice” among MNC’s subsidiaries dispersed globally is crucial for organizational learning, competitive advantage, and corporate performance. In previous researches, there are two kinds of knowledge inflows, including vertical inflows and horizontal inflows (Gupta and Govindarajan, 1993; Schulz, 2003). Vertical inflows mean the knowledge inflows from the parent corporation. And horizontal inflows mean the knowledge inflows from peer subsidiaries. With knowledge inflows within intra-organizational network, the subsidiary in host country does not have to rely solely on local knowledge development (Yang & Kang, 2005). By receiving and accumulating knowledge, the knowledge stock of a subsidiary is enhanced. Knowledge stock then is not only the result of local development but also inflows from the rest of the organization. With abundant knowledge stock in the host country, firms’ subsidiaries can deal with problems they encounter and facilitate innovation. We extend this point and propose that subsidiaries can benefit from intra-organizational learning (knowledge inflows) to expedite innovation and advance the subsidiary’s performance. Hence, the following hypotheses are proposed:

H1a : The knowledge inflows from peer firms will be positively associated with MNC subsidiary’s innovation.

H1b : The knowledge inflows from the parent firms will be positively associated with MNC subsidiary’s innovation.

H2a : The knowledge inflows from peer firms will be positively associated with MNC subsidiary’s performance.

H2b : The knowledge inflows from the parent firms will be positively associated with MNC subsidiary’s performance.

The Effects of Knowledge Outflows on Innovation of a Subsidiary

Previous researches have focused on parent firms that creating and possessing firm-specific advantages (FSAs) to run successful global operation (Hymer, 1976; Dunning, 1988). It means subsidiaries solely rely on parent corporations’ know how and information when operating in host markets. However, in recent years the study focus has shifted to MNC subsidiaries as sources of firm-specific advantages (Gupta and Govindarajan, 1994; Birkinshaw, Hood, and Jonsson, 1998; Yang and Kang, 2005) or “centers of excellence” (Birkinshaw and Moore, 1998; Birkinshaw, Frost, and Ensign, 2002). “A center of excellence” is defined as “an organizational unit that embodies a set of capabilities that have been explicitly recognized by the firm as an important source of value creation, with the intention that these capabilities be leveraged by and/or disseminated to other parts of the firm”. To be a center of excellence, the subsidiary not only provides its know how and information to the MNC, but receives more resources from parent firms to strive for value creation. Consequently, Birkinshaw, Frost, and Ensign (2002) argue that foreign subsidiaries can obtain competitive advantage by dispersing capabilities effectively if they are positioned at the “center of excellence”.

Nowadays, more and more evidences reveal that subsidiaries are not merely a recipient of parent firms’ technology transfers. Subsidiaries combine their local experience and knowledge

inflows from parent firms to develop innovations for use in the local markets. And these new knowledge or innovations can also be diffused to other markets in the MNC network. In previous studies, there are two kinds of knowledge outflows, including vertical outflows and horizontal outflows (Gupta and Govindarajan, 1993; Schulz, 2001, 2003; Bjorkman, Barner-Rasmussen, & Li, 2004). Vertical outflows mean the knowledge outflows to the parent corporation. And horizontal outflows mean the knowledge outflows to peer subsidiaries. These knowledge outflows can generate substantial benefits for MNC through leveraging knowledge created by individual subunits and facilitating innovations (Bartlett and Ghoshal, 1989). In this way, subsidiaries contribute to the FSAs of the MNC (Birkinshaw, Hood, and Jonsson, 1998).

Through intra-organizational learning, subsidiaries can receive knowledge inflows to deal with disadvantages occurring in host countries. In addition to assimilating knowledge from the rest of the organization, local subsidiaries accumulate these valuable assets as their own knowledge base. They are able to internalize knowledge inflows then have opportunities to generate new knowledge that is related to innovations. After that, subsidiaries can provide the precious assets for the multinational system by creating a “spiral of knowledge” (Nonaka and Takeuchi, 1995) with four steps: socialization, articulation, combination, and internalization (Nonaka, 1994). For this reason, parent firms should invest more resources in these subsidiaries to continue the process of knowledge spiral. If the endless loop of knowledge generation sustains, the innovation ability and competitive advantage of subsidiaries will enhance. According to above discussion, knowledge outflows of subsidiaries will result in rich instillation of resources from parent firms to subsidiaries to support their innovative position.

As a result, appropriate knowledge management in MNC network is helpful for firm’s innovation and performance. Similarly, subsidiaries themselves can gain abundant advantages from knowledge outflows. From these arguments, we derive the next four hypotheses:

H3a : The knowledge outflows to peer firms will be positively associated with MNC subsidiary’s innovation.

H3b : The knowledge outflows to the parent firms will be positively associated with MNC subsidiary’s innovation.

H4a : The knowledge outflows to peer firms will be positively associated with MNC subsidiary’s performance.

H4b : The knowledge outflows to the parent firms will be positively associated with MNC subsidiary’s performance.

The Effects of Trust on Innovation and Performance

From knowledge-based view, the reason why MNC is engaged in international expansion is not resulted from market failure but from knowledge transfer (Kogut and Zander, 1993; Holm, Holmstorm & Sharma, 2005; Couto, Vieira & Borges-Tiago, 2005). Through setting up subsidiaries around the world, MNC is able to transfer its own knowledge to assist local operation. Moreover, it can also access experience from host country.

In recent years, many MNCs realize that subsidiaries contribute to the accumulation of intangible assets, such as know how and information (Delios and Beamish, 2001). And these contributions are founded in cross-border network. For example, MNC can improve its competitive advantage by using this network to facilitate resource leverage, knowledge transfer, innovation, etc (Bartlett and Ghoshal, 1989). With the “transnational network”, MNC’s advantages can be derived from overseas subsidiaries. Bartlett and Ghoshal (1989) argue that

assets and capabilities are dispersed, interdependent, and specialized in MNC's subsidiaries. Furthermore, knowledge is developed jointly and shared worldwide. As a result, the whole company benefits from individual contribution of subsidiaries in MNC's global network.

Thus, it can be seen that the relationship between parent company and local subsidiaries might affect the flow of knowledge. Each subsidiary is embedded in the MNC network, and it's necessary to contact with other units when running operations. Nahapiet and Ghoshal(1998)assert that social capital is "the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit". Social capital facilitates inter-unit resource exchange and product innovation (Tsai and Ghoshal, 1998) and the creation of intellectual capital (Nahapiet and Ghoshal, 1998). In this study, the elements of social capital are used as moderators to explore what the influence will be on the relationships between knowledge flows, innovation and performance.

In addition, tons of studies have focused on the notion of social capital to explain the benefits which firms obtain from network relationships. A social network can be defined as" a set of nodes (e.g., persons, organizations) linked by a set of social relationships (e.g., friendship, transfer of funds, overlapping membership) of a specified type" (Laumann, Galaskiewicz, and Marsden, 1978; Gulati, 1998). Economic actions are affected by the social context in which they are embedded in social networks (Gulati, 1998). Drawing upon the studies of network relationship, the construct of network embeddedness is differentiated between relational embeddedness and structural embeddedness (Gulati, 1998; Rowley, Behrens, and Krackhardt, 2000). Relational embeddedness means the repeated relationship dynamics between the partners (Koka and Prescott, 2002) or cohesive ties that can gain fine-grained information (Gulati, 1998). Relational embeddedness is usually associated with "trust" that is essential for continued benevolent exchange (Ouchi, 1980). Higher levels of trust between partners are positively related to the access of rich information between the partners (Koka and Prescott, 2002). Partners share information without feeling concern about opportunistic behavior because they develop norms of reciprocity and sanctions for the violation of trust (Coleman, 1988; Minbaeva & Michailova, 2004). Structural embeddedness represents a firm's structural position that partners occupy in the network (Koka and Prescott, 2002; Gulati, 1998). The concept of structural embeddedness is similar to "power" or "control". When a firm occupies a good position in the network, it is able to acquire control benefits by acting as intermediary between disconnected partners who rely on the firm to facilitate exchange flows across the network (Rowley, Behrens, and Krackhardt, 2000; Phene, Madhok, & Liu, 2005). No matter in a dense (Coleman, 1988) or sparse (Burt, 1992) network, social capital will enhance benefits even though it provides in different ways. This concept is extended to the parent-subsidiary relationship in this study, to see what the result is if a subsidiary occupies a better position.

Gnyawali and Madhavan (2001) propose that higher centrality leads to higher volume and speed of asset, information, and status flows. A central actor can access assets from connected actors, such as technology, money, management skills and is able to receive new information sooner than less central ones by being at the confluence of a huge volume of information. Consequently, a subsidiary that is able to get a central position in MNC's network can have greater potential to exchange knowledge or information with other units because of its location advantage.

Taggart (1997) states that, on the one hand, retaining control at headquarters level will increase MNC's efficiency in implementing corporate strategy. On the other hand, decentralization to local affiliates expands the flexibility to deal with unanticipated problems or

react positively to unexpected opportunities. It is suggested that MNC exercising greater autonomy to its subsidiaries is likely to motivate the local subsidiary managers to take initiatives that may generate innovation for utilization in the local markets or in the MNC's network through leveraging (Birkinshaw, Hood, and Jonsson, 1998). Based on the above discussions, the following two hypotheses are developed:

H5 : Trust will be positively associated with MNC subsidiary's innovation.

H6 : Trust will be positively associated with MNC subsidiary's performance.

Moderating Effects of Trust

Mishra(1996) argues that trust is multidimensional and indicates a willingness to be vulnerable to another party. This willingness arises from confidence in four aspects: (1) belief in the good intent and concern of exchange partners, (2) belief in their competence and capability, (3) belief in their reliability, (4) belief in their openness. Kostova and Roth (2002) define trust as a common belief within the subsidiary that its parent: (1) makes good-faith efforts to behave in accordance with commitments, both explicit and implicit, (2) is honest in whatever discussions preceded such commitments, (3) does not take excessive advantage of the subsidiary, even when the opportunity is available.

Szulanski (1996) asserts that one of the important barriers to the transfer of best practice within organizations is the poor relationship between the source and recipient. Distance and special local environment make the situation more complicated and uncertain. In this case, the importance of trust is significant. Trust can alleviate exchange partner's opportunistic behavior, and the two parties are willing to share their resources without worrying about being taken advantage of by the other. When developing the relationship of trust in the network, actors also build up reputations of trustworthiness that may become important information for other actors in the network (Tsai and Ghoshal, 1998; Foss & Pedersen, 2004). As a result, trust assists resource exchange and combination in the entire network. Tsai and Ghoshal (1998) also find that trust between functional units will facilitate the exchange of knowledge. Because of the expectation of trust and reciprocity, it provides assurance that knowledge transfer will be used to the mutual benefits of both parties (Uzzi, 1999).

In the view of knowledge inflows, if the initial level of trust between the subsidiary and parent firm is low, incremental path of trust will enhance the trustworthiness and interdependence between the parent firm and the subsidiary. Then the subsidiary will be willing to be engaged in innovation activities that are related to the mutual benefits. In such a case, the moderating effect of trust will be higher. If the level of trust between the subsidiary and its parent firm is too high, the subsidiary may too rely solely on the parent firm's knowledge inflows to go into innovation activities. In such a case, the moderating effects of trust will be lower.

In the view of knowledge outflows, if the initial level of trust between the subsidiary and parent firm is low, the subsidiary will worry about its know how and technology skills to be imitated or expropriated by other units of the MNC group companies, then the subsidiary's specific advantage will be vanished. Thus, the subsidiary may be unwilling to provide knowledge outflows to the parent or peer firms. In such a case, the moderating effects of trust will be lower. On the other hand, if the initial level of trust between the subsidiary and its parent firm is high, the subsidiary is willing to outflow its knowledge to the parent firm and peer firms. Resources from the parent firm will continuously instill into the focal subsidiary. Then the innovation process could be the endless loop (Almeida & Phene, 2004; Foss & Pedersen, 2004).

In this study, it is proposed that the association between knowledge inflows/outflows and innovation of MNC subsidiary will be positive and significant. According to above discussion, the following hypotheses can thus be formulated:

H7 : The effects of knowledge inflows on MNC subsidiary’s innovation would be weaker if the trust between headquarter and subsidiary becomes higher.

H8 : The effects of knowledge outflows on MNC subsidiary’s innovation would be stronger if the trust between headquarter and subsidiary becomes higher.

RESEARCH DESIGN AND METHODOLOGY

Research Framework

This study aims to investigate the interrelationships between knowledge inflows, knowledge outflows, innovation and performance. This study also aims to verify the moderating effects of social capital on the relationship between knowledge inflows, knowledge outflows and innovation. For the purpose of this study, the research framework is shown in Figure 1.

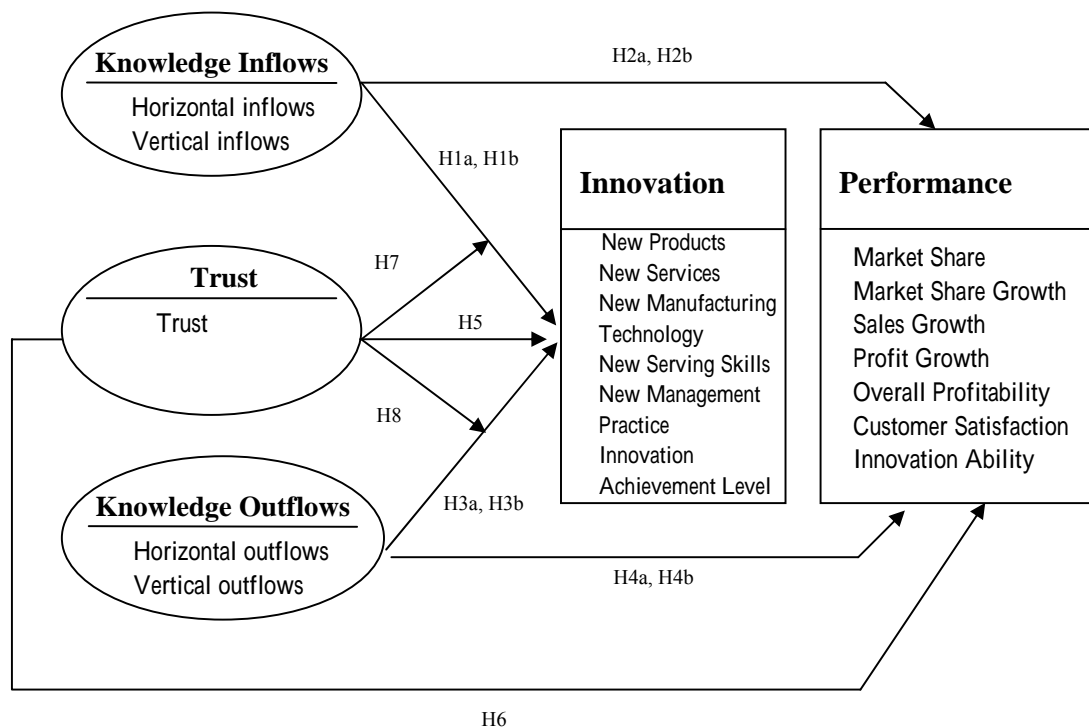


Figure 1 Research Structure of This Study

Sampling Plan

The following sources of the lists of MNC subsidiaries and were used as the sampling firms of this study: (1) The U.S. firms in Taiwan (2002~2003), (2) The Japanese firms in Taiwan (2002~2003), (3) The European firms in Taiwan (2002~2003)

RESEARCH ANALYSIS AND RESULTS

Characteristics of Respondents' Firms

Among 900 questionnaires which were mailed to the subsidiaries of the U.S., Japanese and European multinational corporations in Taiwan, 101 were valid, producing a usable response rate of 11.2%. More than 41.5% of the subsidiary firms have a subsidiary age more than 25 years. More than 42.6% of the subsidiary firms have an employee size less than 150 employees. More than 74% of the firms belong to manufacturing industry. The detailed data are shown in Table 1.

Table 1 Characteristics of the Survey Samples

Item	Description	Frequency	Percent
Nationality	U.S firms	42	40.6%
	Japanese firms	35	34.7%
	European firms	24	24.7%
Subsidiary Age	Less than 5 years	9	9%
	5~15 years	26	25.7%
	15~25 years	24	23.8%
	25~35 years	23	22.8%
	35~45	11	10.9%
	More than 45	8	7.8%
Subsidiary Size	Less than 150 employees	43	42.6%
	150~500 employees	33	32.7%
	500~1000 employees	3	3%
	1000~1500 employees	4	4%
	1500~2000 employees	5	5%
	2000~2500 employees	3	3%
	More than 2500 employees	10	9.7%
Industry Type	Manufacturing Industry	75	74%
	Service Industry	26	26%
Efficient Samples		101	-
Survey Samples		900	-
Responses Rate		-	11.2%

Factor Analysis of the Major Variables

Factor analysis is utilized to examine the patterns or dimensions underlying the data. Its main purpose is to condense the key features of a large number of variables for further analysis. A principal component for analysis associated with varimax rotation is used in the procedure. The results of the factor analysis for the key variables including knowledge inflows, knowledge outflows, trust, and innovation are shown in Table 2, and all research variables within a factor tended to have very high factor loadings, item to total correlation, and cronbach's alpha. Based

on these results, it is concluded that the factors that extracted from factor analyses are valid. Thus, this study adapted factor score to represent variable for further multivariate analyses. The detailed list of questionnaire items are shown in the Appendix.

Table 2 Results of Factor Analysis and Reliability Tests

Factors	No. of Items	Factor Loading	Item-to-total Correlation	Cronbach's α
Knowledge Inflows from Peer Firms	3	0.880-0.945	0.799-0.899	0.934
Knowledge Inflows from Parent Firms	3	0.780-0.855	0.568-0.782	0.829
Knowledge Outflows to Peer Firms	3	0.882-0.910	0.743-0.885	0.914
Knowledge Outflows to Parent Firms	2	0.923-0.934	0.809-0.809	0.894
Trust	7	0.799-0.897	0.745-0.867	0.950
Innovation	6	0.784-0.849	0.689-0.762	0.899

Moderating Effects of Trust to Effect of Knowledge Inflows and Outflows on Innovation

Hypothesis 7 states that there is a significant moderating effect of trust on the relationships between knowledge inflows and innovation. To test this hypothesis, this study adopts multiple regression analysis using innovation as the dependent variable and research variables of knowledge inflows (including KIS and KIP) as the independent variables and interaction between knowledge inflows and trust as the moderator. The results are shown in Table 3. It is indicated that the moderating effect of trust (KIS *trust) is significant in the model.

**Table 3
Moderating Effects of Trust to Effect of Knowledge Inflows on Innovation**

	Dependent Variable : Innovation					
	M1		M2		M3	
	B	VIF	B	VIF	B	VIF
Constant	-0.324		-0.326		-0.299	
EUROPE	0.005	1.24	-0.036	1.28	-0.008	1.27
JAPAN	-0.097	1.27	-0.082	1.27	-0.077	1.27
Size	0.060	1.41	0.056	1.42	0.054	1.43
Industry	0.089	1.16	0.136	1.21	0.078	1.17
Age	0.001	1.28	0.002	1.31	0.002	1.30
IDV						
KIS	0.217**	1.17	0.198*	1.30	0.235**	1.18
KIP	0.307***	1.12	0.303***	1.13	0.277***	1.23
Moderator						
KIS*Trust			0.118*	1.25		
KIP*Trust					0.043	1.17
R^2	0.202		0.208		0.199	
Adj- R^2	0.137		0.133		0.122	
F-value	3.117		2.764		2.604	
P-value	0.006		0.009		0.014	
Dubrin-Watson	2.043		1.985		1.990	
*: P<0.1; **: P<0.05; ***: P<0.01;						
KIS= Knowledge Inflow from other Subsidiaries; KIP= Knowledge Inflow from Parent firm						

Hypothesis 8 states that there is a significant moderating effect of trust on the relationships between knowledge outflows and innovation. To test this hypothesis, this study adopts multiple regression analysis using innovation as the dependent variable and research variables of knowledge outflows (including KOS and KOP) as the independent variables and interaction between knowledge outflows and trust as the moderator. The results are shown in Table 4. The results also reveal that the moderating effect of trust is negatively significant in the model. Further validation should be conducted to verify the issue.

Table 4
Moderating Effects of Trust to Effect of Knowledge Outflows on Innovation

	Dependent Variable : Innovation					
	M1		M2		M3	
	B	VIF	B	VIF	B	VIF
Constant	-0.419		-0.358		-0.415	
EUROPE	-0.012	1.25	-0.048	1.26	-0.013	1.25
JAPAN	-0.038	1.25	-0.059	1.26	-0.037	1.25
Size	0.076	1.29	0.075	1.29	0.076	1.29
Industry	0.035	1.16	0.049	1.17	0.032	1.17
Age	0.003	1.20	0.003	1.20	0.003	1.20
IDV						
KOS	0.188*	1.06	0.222**	1.11	0.191*	1.08
KOP	0.261***	1.09	0.289***	1.13	0.265**	1.14
Moderator						
KOS*Trust			-0.191	1.09		
KOP*Trust					-0.019	1.09
R ²	0.176		0.201		0.177	
Adj- R ²	0.109		0.124		0.098	
F-value	2.603		2.635		2.256	
P-value	0.018		0.013		0.031	
Dubrin-Watson	2.024		2.023		2.024	
*: P<0.1; **: P<0.05; ***: P<0.01;						
KOS= Knowledge Outflow to other Subsidiaries; KOP= Knowledge Outflow to Parent firm						

The LISREL Model

The psychometric properties of the constructs were evaluated in one overall analysis through the use of LISREL. And Path Analysis was used to test hypotheses 1-6. Advantages of Path Analysis are that it helps to estimate the relative importance of alternative paths of influence and enables to measure the direct and indirect effects that one variable has on another. Generalized Least Squares method was used to derive parameter estimates for the model as shown in Figure 1.

We evaluated the conceptual model depending on the criterion proposed by Bagozzi and Yi (1998). Since Chi-square value would be fluctuated by sample size, we cannot make a result only judged by Chi-square value. As listed in Table 5 and Figure 2, root mean square residual (RMR) equals to 0.112, goodness-of-fit index (GFI) equals to 0.920, adjusted goodness-of-fit index (AGFI) equals to 0.843 and p-value equals to 0.068. All the results indicated that the entire model of this study has good fitness.

Although AGFI of 0.843 was less than the criterion of 0.9, it also indicated an adequate fit as stated in previous studies (Collier, 1991; Arjun and Morris, 2001; Jungki and Arthur, 2002; David and Catherine, 2003; Ronald and Thomas, 2003). The indicator of RMR of 0.112 was higher than the criterion of 0.05; in general, it represented an acceptable level of fit as suggested in previous researches (Collier, 1991; Bulent, 2000; John et al, 2000; Jungki and Arthur, 2002; Ronald and Thomas, 2003). Therefore, the results indicated that the overall fit of the measurement model was acceptable.

Table 5 The Standard Coefficients and Model Fit Statistics

Fit Statistics	Conceptual Model	Criterion	Reference
P-value	0.068	>0.05	Bagozzi & Yi (1998)
RMR	0.112	<0.05	Bagozzi & Yi (1998)
GFI	0.920	>0.9	Bagozzi & Yi (1998)
AGFI	0.843	>0.9	Bagozzi & Yi (1998)

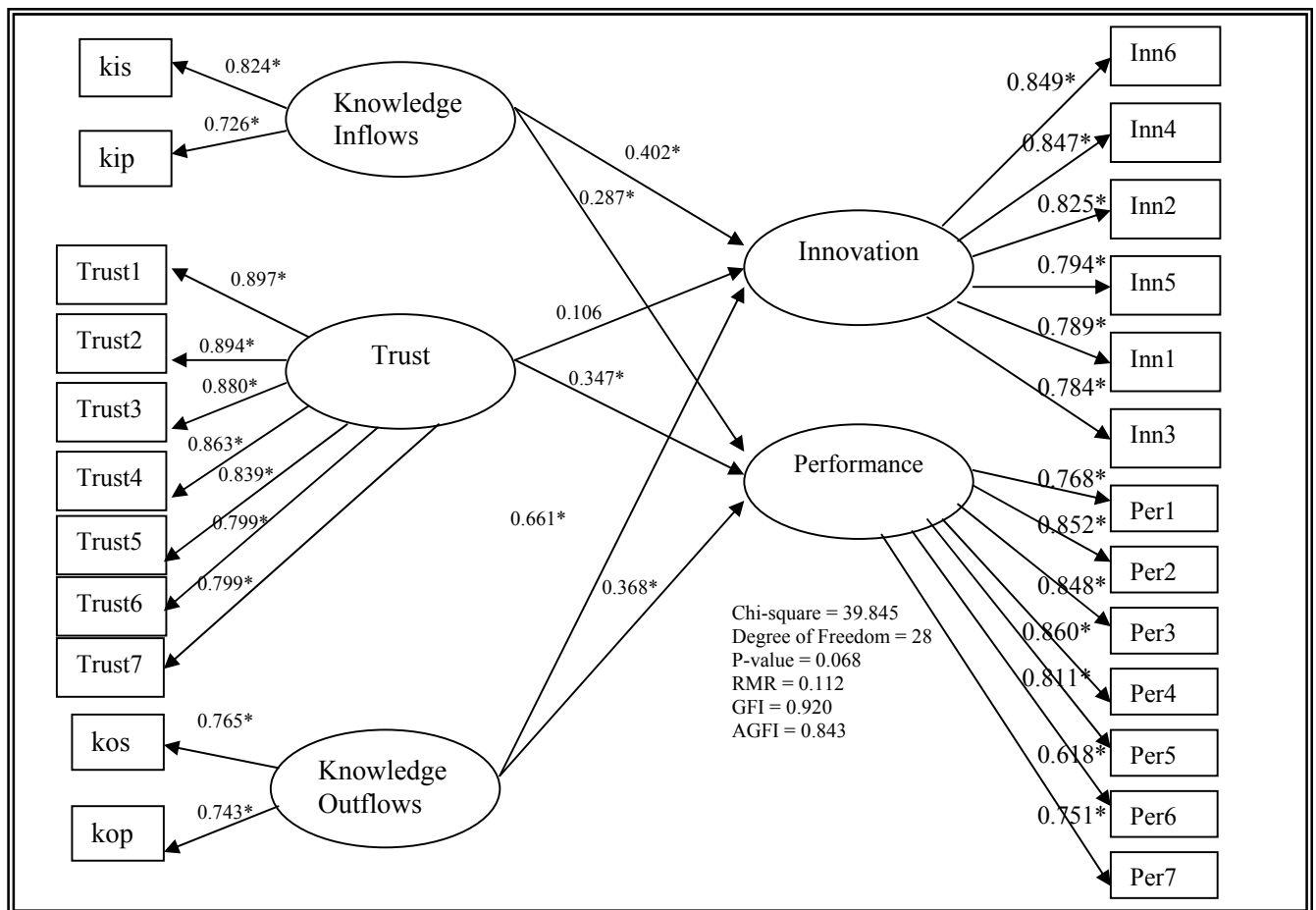


Figure 2 Conceptual Model of LISREL

The results of path analysis in Figure 2 and Table 6 show that the following effects (β coefficients) are significant: the effect of knowledge inflows on innovation, the effect of knowledge outflows on innovation, the effect of knowledge inflows on performance, and the effect of knowledge outflows on performance. Knowledge inflows from parent firms (KIP) and peer firms (KIS) have significant effect on innovation of MNC's subsidiary (PC=0.402, $t=8.348$, $p<0.05$) and on performance (PC=0.284, $t=4.989$, $p<0.05$). In addition, knowledge outflows to parent firms (KOP) and peer firms (KOS) have significant effect on innovation of MNC's subsidiary (PC=0.661, $t=14.265$, $p<0.05$) and on performance (PC=0.368, $t=7.632$, $p<0.05$).

These results again verify that knowledge inflows and outflows have direct influence on innovation and performance of MNC's subsidiary. And trust has also significant influence on performance (PC=0.347, $t=6.137$, $p<0.05$), though it's the influence on innovation is not significant (PC=0.106, $t=1.198$, $p=0.091$).

Table 6 Path Analysis for the Constructs of This Study

	Relations	Coefficients	C.R. value
Path	KI Innov	0.402*	8.348
	Trust Innov	0.106	1.198
	KO Innov	0.661*	14.265
	KI Perfor	0.287*	4.989
	Trust Perfor	0.347*	6.137
	KO Perfor	0.368*	7.632
Note: 1. *: C.R.> 1.96; using a significance level of 0.05, critical ratios that exceed 1.96 would be called significant. 2. The coefficients are standardized value.			

Based on the above empirical validation, hypothesis 1a, 1b, 2a, and 2b were all supported. The results are in accordance with previous studies (DeCarolis and Deeds, 1999; Delios and Beamish, 2001) and show that the MNC subsidiaries receiving more knowledge inflows from peer subsidiaries and parent firms tend to possess higher innovation and performance. These valued inputs from others are the foundation of the MNC's motivation to expand into new geographic markets (Delios and Beamish, 2001; Dunning, 1993). With the instillation of knowledge, subsidiaries in foreign countries do not need to rely solely on their own efforts that will need much time and costs while operating in global markets.

Hypotheses 3a, 3b, 4a, and 4b were also supported in this study. It indicates that the MNC subsidiaries executing more knowledge outflows to peer subsidiaries and parent firms are inclined to have good innovation and performance. The results fit our expectations. Nowadays, the role of subsidiary is not limited to be a recipient. More and more evidences reveal that subsidiary can play as a critical role in whole MNC's firm-specific advantages (FSAs) building (Gupta and Govindarajan, 1994; Birkinshaw, Hood, and Jonsson, 1998). As discussed above paragraphs, firms having higher levels of KOS and KOP tend to earn higher levels of respects from their peers. Consequently, a plenty of feedbacks or counter agreements could be available. Firms then are able to review these feedbacks and implement necessary improvement on their business operations. As a result, such valued knowledge outflows will facilitate innovation and make positive influences on subsidiary's performance.

In addition, this study also tests the interrelationship between trust and innovation. The results show that this relationship was not supported, and it means that trust may not perform a significant impact on innovation. As suggested by previous findings (Tsai and Choshal, 1998), under the conditions of higher trust between the parent firm and the subsidiaries, the parent firm may perceive lower level of risk. As a consequence, the parent firm may instill more resources to its subsidiaries for innovation. However, more empirical evidences may be required to justify this relationship.

Conclusions and Suggestions

The major objectives of this study have been to identify the interrelationships among knowledge inflows/outflows, trust and innovation/performance. Furthermore, trust is also adopted as the moderator to test its moderating effects. Based on the results of this study, several conclusions can be drawn.

First, there are significant relationships between knowledge inflows/outflows and innovation/ performance of MNC's subsidiaries. This study shows that the MNC subsidiaries receiving higher knowledge inflows tend to possess good innovation and performance. The results are in accordance with previous studies (DeCarolis and Deeds, 1999; Delios and Beamish, 2001). Second, the result also indicate that the MNC subsidiaries executing higher knowledge outflows are inclined to have good innovation and performance. Therefore, for managers in MNC, it is an important to make good knowledge management in order to run the operation in global markets. Third, the interrelationships between trust and innovation/performance are tested. The results show that trust has significant impact on innovation and performance. As a result, it is an important issue for managers in MNC to construct a good relationship between subsidiary and parent firms. Finally, with regard to the interactions between parent firms and subsidiaries, building trust between the subsidiaries and parent firms is an important issue for managers in MNC to motivate reciprocity activities which will lead to improvement of innovation and performance.

In this study, research variable of trust is brought into the model to test its moderating effects to the interrelationships between knowledge inflows/outflows and innovation of MNC's subsidiaries. The results have several managerial implications. First, although previous studies have emphasized the relationship between innovation and performance, this study does not aim to pursue this research issue. The major focus of this study is to evaluate the influences of trust on innovation and performance independently. Thus further studies could concentrate on the interrelationships and interactions among trust, innovation, and performance. Second, the study results also show that trust has very strong moderately effects on the relationships between knowledge input/output and performance, however, trust has no significant and direct effects on innovation. Thus, it is suggested that trust may indirectly impact on innovation through knowledge inflow from parent firms or knowledge outflow from subsidiary firms. Third, as the impacts of trust and innovation on performance may need for further researches to conduct longitudinal studies to verify the role of time on trust-innovation-performance links.

Through verifying the interrelationships among research variables, there are some suggestions given to MNC managers. When MNC managers are planning to run operations in global markets, providing sufficient supports of knowledge for its subsidiaries are necessary to earn plentiful innovation. Furthermore, the role of foreign subsidiaries is no longer limited to be a

knowledge recipient. The results of this study indicate that foreign subsidiaries are able to contribute to the MNC's specific advantages and become centers of excellence which are related to higher levels of innovation. As a result, managers of MNC could try to foster these centers of excellence to leverage the benefits of foreign subsidiaries in its global network. In addition, it is suggested that building trust between the subsidiaries and parent firms is an important issue for managers in MNC to motivate reciprocity activities which will lead to improvement of innovation.

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Appendix

The Detailed Questionnaire Items of This Study

Section I: Knowledge Inflows

1. Our parent firm provides us with a great deal of knowledge about technology.
2. Our parent firm provides us with a great deal of knowledge about marketing/sales.
3. Our parent firm provides us with a great deal of knowledge about strategy.
4. Our peer firms provide us with a great deal of knowledge about technology
5. Our peer firms provide us with a great deal of knowledge about marketing/sales.
6. Our peer firms provide us with a great deal of knowledge about strategy

Section II: Knowledge Outflows

1. We provide a great deal of knowledge about sales and marketing to our direct-contact peer firms
2. We provide a great deal of knowledge about technology to our direct-contact peer firms
3. We provide a great deal of knowledge about strategies to our direct-contact peer firms
4. We provide a great deal of knowledge about sales and marketing to our parent firm
5. We provide a great deal of knowledge about technology to our parent firm.
6. We provide a great deal of knowledge about strategies to our parent firm.

Section III: Trust

1. We think that people in headquarter tell the truth when they deal with our firm.
2. We think our headquarter meets its agreed upon obligations to our location.
3. We feel that headquarter discusses issues with us honestly
4. We feel that parent company will keep its word.
5. We feel that headquarter does not mislead us.
6. We feel that headquarter discusses joint expectations fairly
7. We could share information openly with parent company because they do not take advantage of this by acting against our interests.

Section IV: Innovation

1. We launch new products frequently.
2. We launch new services frequently
3. We develop new manufacturing technology frequently
4. We develop new serving skills frequently
5. We will adopt new management practice to improve operating performance
6. To sum up, our innovation achievement level is high

Section V: Performance

1. Market share.
2. Market share growth.
3. Sales growth
4. Profit growth
5. Overall profitability

6. Customer satisfaction.
7. Innovation ability.

多國籍企業母子公司間之信任及子公司知識 流入/流出對創新及績效之影響研究

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摘要

近年來，許多研究均顯示多國籍企業子公司之運作知識依靠母公司之知識，並且依靠子公司本身在地主國之工作經驗所產生之知識，而這些知識並進一步整合創新，使子公司之運作更趨成熟。本研究之目的在於探討知識流入/流出與子公司創新之關係，並進一步確認多國籍企業母子公司間之信任與知識流入/流出之互動關係對於子公司創新之影響。本研究之結果顯示(1)多國籍企業子公司之運作模式中，由母公司或同業公司流入子公司之知識及由子公司流出之知識均對於子公司之創新及經營績效有顯著之影響；(2)母子公司之信任與子公司知識流入/流出之互動關係對於子公司之創新能力有顯著之影響。

關鍵詞：知識流入、知識流出、信任、創新、多國籍企業營運

