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MANAGING COMPETENCY CREATING R&D SUBSIDIARIES: EVIDENCE FROM JAPANESE MULTINATIONALS

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Abstract

Globalization of business activities is imperative for Japanese manufacturers, as an international market, particularly in emerging economies, grows much faster than domestic market. In this regards, the relative importance of their overseas subsidiaries to home base headquarter become greater. One of strategic roles of overseas subsidiary is that of competence creation, not only for its host country, but for a whole company wide activity in the world. In this paper, the shift of overseas 'subsidiary role to competence creation is analyzed by the dataset from the METI 's Survey on Overseas Business Activities (SOBA) from 1999 to 2008. It is found that a balance between control of headquarter and autonomy of subsidiary is required to make this shift. In addition, it is important for a headquarter to accumulate experiences at host country operation to manage competence creating overseas subsidiary, particularly in emerging economies such as China, where a local business context is much different from Japan.

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Managing competency creating R&D subsidiaries: Evidence from Japanese multinationals[1]

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Abstract

Globalization of business activities is imperative for Japanese manufacturers, as an international market, particularly in emerging economies, grows much faster than domestic market. In this regards, the relative importance of their overseas subsidiaries to home base headquarter become greater. One of strategic roles of overseas subsidiary is that of competence creation, not only for its host country, but for a whole company wide activity in the world. In this paper, the shift of overseas' subsidiary role to competence creation is analyzed by the dataset from the METI's Survey on Overseas Business Activities (SOBA) from 1999 to 2008. It is found that a balance between control of headquarter and autonomy of subsidiary is required to make this shift. In addition, it is important for a headquarter to accumulate experiences at host country operation to manage competence creating overseas subsidiary, particularly in emerging economies such as China, where a local business context is much different from Japan.

Keywords: Japan, multinational R&D, competency creation, knowledge perspective of multinational

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1. Introduction

The life cycle theory of globalization of business activities suggests that a multinational company's overseas subsidiary starts with simple function such as production and sales facility to integrated entity of multiple activities in including R&D (Dunning, 1993). Japanese manufacturing firms has been actively investing in overseas market for more than 30 years, and a growing number of foreign subsidiaries with R&D activities are observed. Recently, R&D activities at foreign sites can be found not only in developed economies such as Europe and US, but also in emerging economies such as China (UNCTAD, 2005). In addition, an international business activity is not a peripheral one, as compared to domestic one, but becomes to be strategically important for whole multinational company. A financial crisis in 2008 hit Japanese economy severely, but economies in emerging economies such as China and India was not affected so much. Therefore, a substantial numbers of manufacturing firms in Japan gain their operational profit from overseas market, recently. In addition, in developed economies including in Japan, its market is saturated as GDP growth rate slows down, while a growth expectation of emerging economy is tremendous.

As strategic importance of overseas subsidiary increases, a managerial tension between headquarter and overseas sites arises (Asakawa, 1996). It is found that Japanese firms used to control their overseas sites strongly, while European and US firms allows more autonomy for them (Bartlett and Ghoshal, 1989). However, as R&D activity requires spontaneous knowledge generations at local inventors, a strong control by headquarter at home country do harmful to local incentive to innovate (Aghion and Tirole, 1994). At the same time, as a local subsidiary is given competency creation mission to its whole MNE (multinational enterprise) group, the activities at local should be aligned with group wide R&D strategy. Therefore, its headquarter has greater incentive to control over local R&D. How to manage balance between autonomy and control becomes to be a critical factor to effective use of competency creating overseas R&D subsidiary for MNEs.

This paper empirically investigate the tension between headquarter and its competency creating R&D subsidiary in Japanese multinationals, in order to draw some managerial implications. We take an knowledge perspective of multinationals, which focuses on the evolutionary process of multinational's learning of managing tacit knowledge flow between patent and subsidiary (Kogut and Zander, 1993), to analyze the balance between control and autonomy when a subsidiary is evolved into competency creating

one (Cantwell and Mumdabi, 2005). We use a large firm level panel dataset from the Survey of Overseas Business Activity by the Japanese Ministry of Economy, Trade and Industry for our empirical analysis. This dataset covers 5,000 to 10,000 overseas subsidiaries by Japanese multinationals every year from 1999 to 2008, which allows us more systematic view on management of competency creating subsidiary, as compared to past literature, relying on smaller scale questionnaire survey (Papanastassiou and Pearce, 1999; Manolopoulosa et. al, 2005; Cantwell and Mumdabi, 2005). Another contribution of this paper is to compare international management of developed and developing countries. While overseas R&D in developing countries, such as China and India, becomes important, most of empirical literature on this issue is focusing on one host country (Luo, 2002; Luo, 2006; Motohashi, 2010 for China, Franco et. al, 2011 for Brazil and India), and comparative study between developed and developing countries is scarce.

2. Analytical framework and hypotheses

Firm's R&D activities involves substantial amount of tacit knowledge exchanges among researchers. It is also important to access to the home location's innovation system, so that maintain embeddedness to home country creates an "inertia" to international location of R&D sites (Narula, 2002; Kogut and Zender, 1993). Therefore, the function of R&D usually has lower degrees of internationalization, as compared to other business activities such as production and sales (Alcacer, 2006; Asakawa, 2003). However, it is found that multinational corporations have increasingly internationalized R&D since the 1980's (Gammeltoft, 2006). Foreign R&D spending concentrates in OECD countries, but recently, it growth rate is higher in emerging economies such as China and India (OECD, 2008). Lowering trade barriers as a consequence of WTO rounds and acceleration of regional integration by FTAs, makes multinationals extend their business deeply into emerging economies, and geographical specialization of production and intense innovation competition pushes their R&D activities to go international as well (Gammeltoft, 2006).

Off-shore R&D activities can be broadly grouped into the following two categories: (1) technology-acquisition activities intended to apply advanced technologies from overseas to domestic business activities; (2) local-development activities intended to localize overseas business activities based on domestic technologies. Kuemmerle (1997) defined the former as home-base augmenting (HBA) and the latter as home-base exploiting (HBE). A typical example of HBA type is a R&D center close to overseas

universities with high technological level to tap into scientific finding over there. A new technology captured over there augments the knowledge base of its headquarter. In contrast, HBE R&D center is typically for localization of its products and services to overseas market. From the viewpoint of Japanese firms, a greater degree of local adaptation is needed for emerging economies, so that presumably more HBE type R&D is conducted over there.

Cantwell and Mudambi (2005) investigate the difference between "competence exploiting" and "competence creating" mandates at local R&D subsidiary. This distinction is related to "exploration" and "exploitation" in organizational leaning (March, 1991), in a sense that activities at R&D subsidiary is whether exploring new competency or exploiting existing capabilities at headquarters. Cantwell and Mudambi (2005) use the dynamic framework, based on Birkinshaw and Hood (1998), in order to show the evolution of subsidiary mandate toward competence creating or exploiting depends on subsidiary location, subsidiary level and multinational's group level condition (Frost et. al, 2002).

It is envisaged that the relationship between parent and subsidiary changes as the role of subsidiary evolves. A competency creation mandate at subsidiary can be attained either by parent driven or subsidiary driven (Cantwell and Mudambi, 2005). It is found that a Japanese multinational controls overseas subsidiary more strictly, as compared to that of US and European firms (Bartlett and Ghoshal, 1989). However, this is applied for green field wholly owned entry in foreign country, while joint venture with foreign firm starts with autonomy mode of management (Belderbos, 2002). Therefore, a parent driven competence creation mission will be achieved by a subsidiary with green field entry with greater control by patent, while a subsidiary driven will be observed for the case of joint venture with local firms with more autonomous management style.

Figure 1 describes the evolutionary process of subsidiary' role toward competence creating mission, as regards to the mode of overseas subsidiary management. A horizontal axis represents the balance between control and autonomy. A green field wholly entry subsidiary starts with control mode by its parent, and gradually movies toward autonomy direction. At the same time, when this subsidiary is given competency creating mandate, allowing an appropriate level of autonomy is beneficial by encouraging local inventive activities. It is difficult for a parent to come up with a contract with overseas R&D site, which appropriately induces R&D over there, due to the fact that R&D output is hard to be measured by its parent (Aghion and Tirole, 1994).

Therefore, as an overseas subsidiary by green field entry gradually moves toward autonomy direction (rightward), and also downward when it is given competency creating mandate.

(Figure 1)

In contrast, a joint venture will start with more autonomy mode. However, as the competency creating mandate is given to this subsidiary (moving downward in the Figure 1), a parent's incentive control over joint venture subsidiary increases, since R&D activities at local site is better to be aligned with its MNE group's whole strategy. Therefore, a joint venture subsidiary starting with autonomy mode will be move toward control (leftward) direction as well.

By combining the presumptions of green field entry and joint venture subsidiaries, we come to the following hypothesis on the relationship between level of competence creating mission and the level of control over autonomy.

H1-1: The degree of control over local subsidiary moves toward autonomy direction as the degree of competency creating R&D increases, for wholly owned green field entry subsidiary

H1-2: The degree of control over local subsidiary moves toward control direction as the degree of competency creating R&D increases, for joint venture subsidiary

H1-3: The degree of control over local subsidiary has the relationship of inverted U-share with the degree of knowledge creation role, when we combine H1-1 and H1-2 together.

It should be note that not all subsidiaries become to be competency creation mandate one, and only those which are in favorable conditions of host country environment, local subsidiary and MNE group level characteristics do so. In addition, the level of control over joint venture has to be decided jointly with a local partner. A headquarter may not give competency creating mission to its joint venture subsidiary, provided that its joint venture partner may not give up its control over it, even though all conditions for that subsidiary are favorable to competency creating mandates.

A difficulty in managing competency creating overseas subsidiary is not only the case for joint venture one, but also for wholly owned subsidiary. Knowledge flows between parent and subsidiary takes two way direction for competency creating subsidiary, as

compared to one way flow from parent to subsidiary for competency exploiting one. An effective knowledge transfer between two parties requires absorptive capacities at information receiver side (Lane et. al, 2000). In addition, it is important for a parent to manage the incentive for its subsidiary's incentive for information disposition as well (Gupta and Govindarajan, 2000). Along the line of this knowledge based perspectives of multinational enterprises (Kogut and Zandar, 1993; Kogut, 1997; Tallman and Fladmoe-Lindquist, 2002), the following hypothesis can be introduced.

H2: Managing competency creating subsidiary requires international management capabilities at parent company, so that an experience of international business at headquarter is positively correlated with the degree of competency creating R&D of its subsidiary

As compared to overseas subsidiary in developed countries, managing subsidiary in developing countries, such as China and India, requires more local experience, due to the fact that local environment such as customer's income level and taste, legal institutions, and government policy, is substantially different from Japan. Therefore, the following corollary to H2 can be developed.

H3: The association between headquarter experience and the degree of competency creating mandate is stronger for subsidiary in developing economies (such as China) as compared to that in developed economies (such as US and Europe), because business environment and local context is more difficult for Japanese firm to learn in developing economies.

An appropriate alignment of control-autonomy balance in managing overseas subsidiary is related also to the information requirement of local for its parent, which depends on (1) task characteristics of R&D, (2) task environment, such as market and regulation uncertainty at host country and (3) task interdependence between parent and its subsidiary (Luo, 2006). In this information processing perspective, the level of local information requirement at parent determined the level of its control over subsidiary, in a way that more (less) information requirement induces more control (autonomy) style (Egelhoff, 1982; Wolf and Egelhoff, 2002).

Here, we discuss about the equilibrium point between developed and developing ones. In terms of task environment, market and regulation uncertainty is higher for developing economies, where local information requirement for its parent is higher. Therefore, the equilibrium point for control-autonomy balance for competency creating mandate is

shift toward more control for subsidiary in developing economies, as compared to that in developed countries. However, it should be noted that the task characteristics of R&D is related to this distinction, in a sense that localization activities, instead of R&D for global business, are more relevant for developing economies (Li and Kozhikode, 2009). Localization R&D requires less local information for parent, so that the parent can manage this subsidiary in more autonomous way. Therefore, it is important to control for this task characteristics, in order to look into the relationship between task environment (developing or developed economies) and control-autonomy balance. Therefore, our hypothesis drawn from information processing perspective is as follows.

H4: The equilibrium point of control-autonomy balance for competency creating mission (inverted U shape) is different between developing and developed economies, in a sense that more control is appropriate for developing economies, and vice versa. But this relationship can be found after controlling for the task characteristics of overseas R&D, whether it is for localization or for global business.

3. Dataset

In this study, we use a firm level data set from the Survey on Overseas Business Activity (SOBA), conducted by the Ministry of Economy, Trade and Industry, the Japanese Government. SOBA is an annual survey conducted from 1971 for all Japanese firms with foreign subsidiaries.[2] A survey instrument is sent to parent companies located in Japan, and each parent company is supposed to answer all questions concerning its foreign subsidiaries. The cross section data of this survey is used for analyzing Japanese multinational's R&D extensively (Berderbos, 2003; Iwasa and Odagiri, 2004), but we construct panel dataset for our analysis from 1999 fiscal year (2000 survey) to 2008 fiscal year (2009 survey). The sample size increases over time, and the number of overseas subsidiary is 13,939 in 1999 and 18,733 in 2008, while the number of parent companies is 2,105 in 1999 and 3,822 in 2008.

Figure 2 shows the number of overseas subsidiary by region. In general, a growing trend is found for all regions, but the number of subsidiaries in China is particularly increases over this period. It is also found that the number of subsidiaries in ASEAN and NIES faster than those in the North America and Europe, which implies that

[2] A foreign subsidiary is defined as a company no less than 10% of whose stocks are owned by a parent company in Japan, or a so-called grandchild company of no less than 50% owned by a child company of no less than 50% owned. All parent companies in Japan, except those in financial services and real estate sector are covered.

recently, Japanese multinationals expand their business areas into Asia, rather than developed countries.

(Figure 2)

Figure 3 shows the total overseas sales by region. Here, the size of the North America is the largest, and more than double of those in other regions. It is followed by ASEAN, Europe and China. In 2008 fiscal year (ending 2009 March for most firms), the sales value declines sharply, particularly in the North America due to the effect of financial crisis. It should be noted that the sale value in China increases rapidly, and was not heavily affected by this financial crisis.

(Figure 4)

In this paper, one of key variables is the degree of competency creating R&D for each subsidiary. We use the ratio of R&D over sales (R&D intensity) for this indicator. It is found that R&D intensity at competency creating subsidiary is substantially higher than that of competency exploiting subsidiary, based on the results from questionnaire survey (Cantwell and Mudambi, 2005). Competency exploitation is conducted based on the technological capability at headquarter, so that the local R&D is only for localization part of a whole product. In contrast, a headquarter expects substantial knowledge input from subsidiaries with competency creating mandate. Therefore, an activity at subsidiary becomes R&D intensive, as the degree of competency creating mandate becomes greater.

An alternative indicator for competency creating role at local subsidiary is knowledge flow between parent and subsidiary in patent citations, and this methodology is extensively used for identifying the role of subsidiary as a function of knowledge creation for whole MNE group (Almeida, 1996; Cantwell and Janne, 1999; Criscuolo et. al, 2005) . These studies are tracking knowledge flows for overseas R&D in developed countries, but comparing developed and developing countries is one of major objectives of this paper. Motohashi (2011) investigated the patent citation flows in multinational R&D in China, and found that very small numbers of patents are applied by local subsidiaries. In addition, patent based statistics covers only partial technological activities (Nagaoka, et. al, 2010). Therefore, we use R&D intensity, instead of patent based indicators, for overseas knowledge creation activities, not only in developed but also in developing countries.

Table 1 shows the R&D intensity by year, industry and region. It should be noted that substantial numbers of manufacturing subsidiaries do not have R&D activities. Over the period from 1999 to 2008, the number of R&D firms increases, but the share of R&D firms and R&D intensity stay over time basically. In contrast, a significant industry variation can be found, and firms in high tech sectors, such as chemical, electronics and precision machinery, have relatively higher R&D intensity. Finally, regional variation is also large. For developed countries such as North America and Europe, the R&D intensity is higher, while it is substantially lower for ASEAN and Others. It is interesting to see that R&D intensity of subsidiary in China is not so low, and is comparable to that of NIES countries.

(Table 1)

Another key variable in this paper is the degree of control over autonomy. Two kinds of indicators are available from SOBA, i.e., (1) the share of Japanese board members to total board (s_board) and (2) the share of Japanese employees (s_emp). In addition, the following questionnaire, directly addressing the control-autonomy scale, was asked in the 2008 survey (for 2007 data).

Please choose one of the following statements which represent your management style most?

1 Management decision is delegated to non-Japanese in host country
2 Management decision is delegated to non-Japanese outside of host country
3 Management decision is made by Japanese, but involves local staffs as well
4 Management decision is made solely by Japanese at local site
5 Management decision is made by headquarter, instead of local site

We call this variable “control” (from 1 to 5) and make a cross tabulation of two kinds of control variables presented in Table 2. The average value of all three indicators monotonically increase as “control” becomes larger, except for one case. In addition, Table 3 shows a pair-wise correlation matrix of the two variables and “control. All correlation coefficients are positive and statistically significant at 1% level, so that these two variable can be used as a proxy for the degree of control over autonomy.

(Table 2), (Table 3)

4. Quantitative analysis

In this section, we conduct regression analysis to test hypotheses developed in the section 2. A dependent variable is R&D intensity and we apply Tobit model since there are substantial numbers of observations with no R&D investment. Our key independent variable is the share of Japanese board members (s_board) and the share of Japanese employees (s_emp). We conduct our regression analysis by using these two variables to check the robustness of the results. We use also the square terms of these two variables (s_board2 and e_emp2) to see inverted-U shape relationship with R&D intensity. In addition, we use the following independent variables in our model, and the results are presented in Table 4.

- Exiting overseas sites: dummy variable whether its parent firm already has another overseas subsidiary
- Exiting overseas sites in the same region: dummy variable whether its parent firm already has another overseas subsidiary in the same region
- % of procurement from local: the share local procurement
- % of procurement outside local and Japan: the share of procurement amount from outside of local and Japan to total procurement
- % of sales to local: the share of local sales
- % of share to outside local and Japan: the share of sale to the third country
- Log of age: Log of subsidiary's age
- Industry dummies by 25 industry
- Region dummies by 12 regions
- Year dummies

(Table 4)

A negative relationship between R&D intensity and control is found in model (1), but when a square term of s_board is included, we have positive coefficient with s_board and positive coefficient with its square term, implying inverted U-shape relationship. This relationship is robust for model (3) and model (4), the model for including parent's overseas experience variables. Furthermore, the same patterns of coefficients, indicating inverted U shaped relationship, are found for e_emp (model (5) and model (6)). Therefore, the hypothesis 1-3 is supported. In order to see the hypothesis 1-1 and 1-2, we separate whole samples into three parts, (1) a subsidiary founded as a wholly owned by Japanese parent, (2) a subsidiary founded as a joint venture with local partner, with majority share of Japanese parent and (3) a subsidiary founded as a joint venture with local partner with minority share of Japanese parent. It should be noted that this division

of samples is made by the ownership structure at the time of subsidiary's foundation, instead of current status, since the ownership structure may be changed by the degree of control over autonomy. We try to evaluate the dynamics process of subsidiary's status, described in Figure 1. The regression results by using three sub-samples are shown in Table 3. For a subsidiary founded as wholly owned or majority share JV, negative and statistically significant coefficients are found to both s_board and s_emp, implying autonomy direction is found in a process of competency creating R&D. In contrast, a positive and statistically significant coefficient is found to s_emp for minority share JV, implying control direction. These findings are consistent to the hypotheses 1-1 and 1-2.

(Table 5)

In terms of the effect of parent experience of international business, we have found that the dummy variable for existing subsidiary in the same region has positive and statistically significant coefficients (Model (4)-Model (6) of Table 4), while the coefficient to existing overseas subsidiary in any region is not statistically significant (Model (3) of Table 4). This implies that region specific experience at parent is important for competency creating mandate of its subsidiary, which is supporting hypothesis 2.

In order to distinguish the difference between developed and developing countries, we divide the whole samples into two, i.e., a subsidiary located in developed countries (North America, Europe and NIES) and developing countries (ASEAN, China and Others). The regression results are found in Table 6, showing that the positive and statistically significant coefficient to "existing overseas sites in the same region" is found only for developing samples (Model (3) and (4)), and not for developed samples (Model (1) and (2)). This finding is consistent to the hypothesis 3, saying that subsidiary's experience effect is larger for developing countries.

(Table 6)

Finally, hypothesis 4 predicts difference in equilibrium point in the share of Japanese board member (or Japanese employees) between developed and developing economies. In order to see test hypothesis, we derive the marginal effect of regression results in Table 6, conditional on uncensored samples in Tobit regression, shown in the right hand side column of each result (Model (1) to (4)). Since we could not get a statistically significant coefficient to s_emp2 in Model (4), we focus on comparing Model (1) and (3) by using s_board as a variable for the degree of control over autonomy. Figure 4

shows the inverted U shape curve of the share of Japanese board members and the R&D intensity by using marginal effect in Model (1) (for developed countries) and Model (3) (for developing countries). The equilibrium point (highest R&D intensity) of s_board is 33% for developed country and 49% for developing countries.. Therefore, more control is required for developing economies, as compared to for developed ones, supporting hypothesis 4. It should be noted that these results are obtained after controlling for the type of R&D activities, such as the share of local sales and the third countries. A positive coefficient is found in general for the share of sales to the third countries, while most of coefficients to the share of local sales are not statistically significant or negative. Therefore, it is confirmed that R&D for global (competency creating mandate) induces more R&D intensity at local subsidiary as compared to R&D (competency exploiting mandate) for localization.

(Figure 4)

5. Conclusion

In this paper, the shift of overseas' subsidiary role to competence creation is analyzed by the dataset from the METI's Survey on Overseas Business Activities (SOBA) from 1999 to 2008. Quantitative analysis based on the large firm level dataset gives a robust result on the U shaped relationship of the degree of control and R&D intensity at subsidiary. This result implies that a balance between control and autonomy is required when a multinational expects its overseas subsidiary to play competency creating role. In addition, it is important for a headquarter to accumulate experiences at host country operation to manage competence creating overseas subsidiary, particularly in emerging economies such as China, where a local business context is much different from Japan.

Another managerial implication drawn from this study is that the equilibrium point of control-autonomy balance for competency creating subsidiary is different between developed and developing economies. In general, uncertainty in market and regulatory environment is higher in emerging economy, where the local information requirement for headquarter is greater if its subsidiary there are given competency creating mandate. Therefore, the equilibrium point of control-autonomy balance for competency creating subsidiary in emerging economies is more control rather than autonomy, as compared to that in developed countries. However, it should be noted that this is the case after controlling for the type of R&D activities, since overseas R&D in developing economies tends to be for local market (instead of global market), which is better to be

managed in autonomous style.

Controlling over subsidiary induces substantial tensions between patent and subsidiary, when subsidiary becomes to be strategically important player in a whole MNE group. In addition, a patent has to deal with the joint venture partner, if its subsidiary is jointly owned with local partner. Therefore, the reality is much more complex, and more detail study is needed. In this paper, the mechanism of competency creation by overseas R&D is not discussed in detail. Various factors, such as local innovation activities, effective transmission mechanism of local knowledge to its parent, and absorptive capacity at home country, are important in this process (Gupta and Govindarajan, 2000). In addition, local subsidiary's role in a center for accessing to local innovation system, such as universities, public research institutions and local firms, is also important (Castellani and Zanfei, 2004: Narula and Zanfei, 2005). A micro study on knowledge creation and diffusion among these entities is our next step to provide more detail managerial implications for overseas R&D.

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Figure 1: Balance between control and autonomy in knowledge creating subsidiary

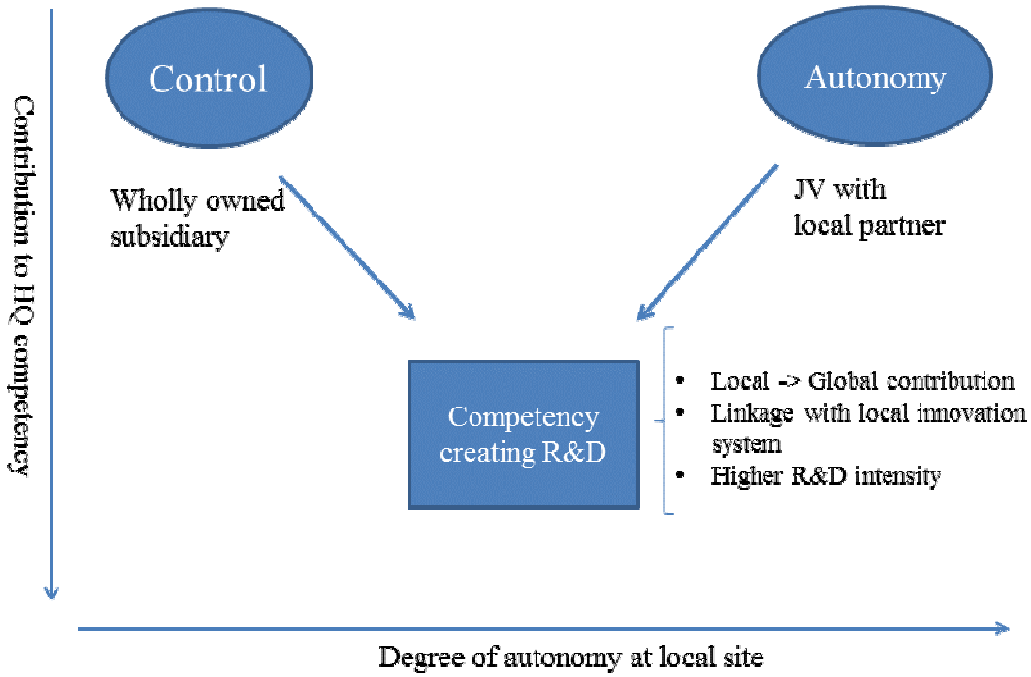

Figure 2: The number of subsidiaries by region

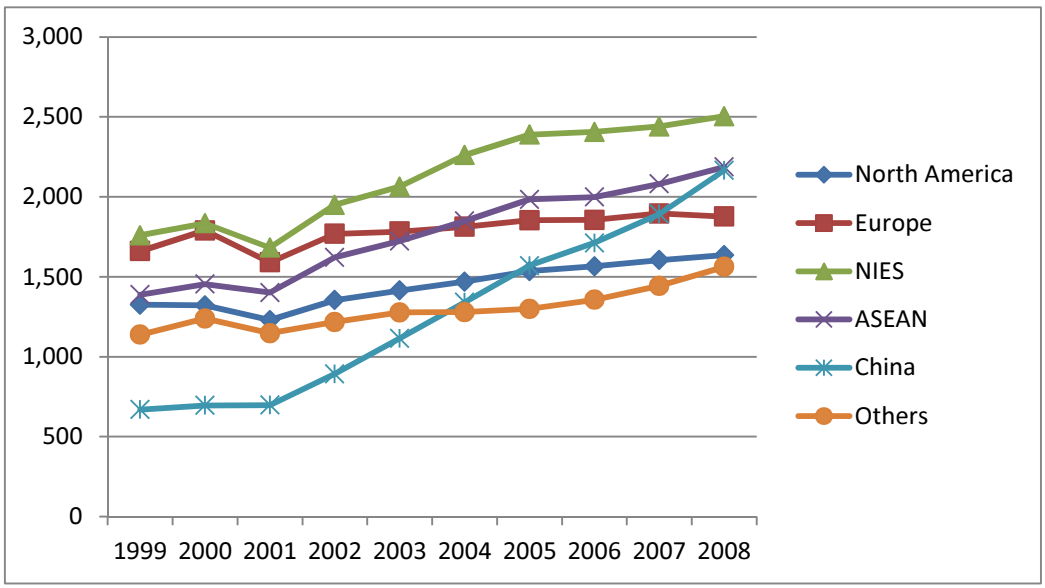

Figure 3: The total overseas sales by region (million JP yen)

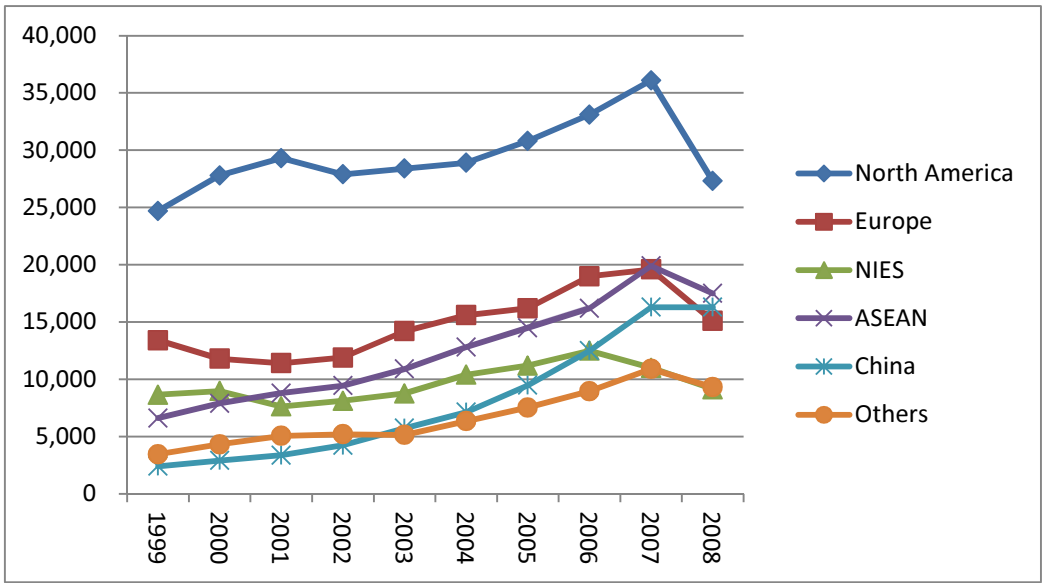

Figure 4: Relationship between JP board member share and R&D intensity

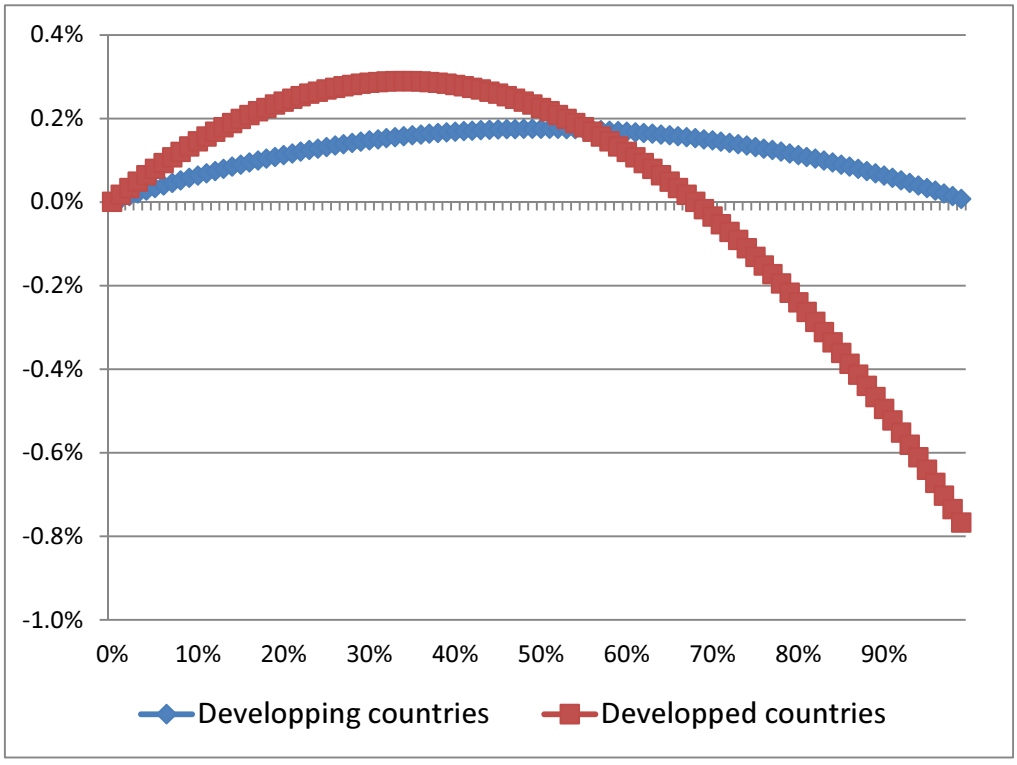

Table 1: R&D at subsidiary by year, industry and region

	Firms with RD	share	RD/sale	RD/sale(RD firms)
by year				
1999	1,028	7.37%	1.11%	5.83%
2000	1,039	6.93%	1.05%	5.65%
2001	1,009	7.37%	1.15%	5.93%
2002	1,224	7.89%	0.88%	5.68%
2003	1,248	7.96%	0.80%	5.19%
2004	1,340	8.11%	0.74%	4.82%
2005	1,357	7.86%	0.65%	4.74%
2006	1,528	8.66%	0.62%	4.41%
2007	1,579	8.64%	0.57%	4.58%
2008	1,554	8.23%	0.64%	5.40%
by Industry in 2008				
Agriculture, forestry, and fisheries	12	11.54%	1.29%	8.95%
Textile mill products and Apparel	48	10.53%	0.13%	0.92%
Lumber, wood, Pulp, paper products	15	8.82%	0.17%	1.42%
Printing and Allied Industry	5	5.21%	0.10%	1.27%
Chemical and allied products	209	19.28%	1.34%	4.88%
Petroleum and coal products	11	22.45%	1.03%	2.99%
Rubber products	19	12.84%	0.16%	0.82%
Cerami, stone and clay products	28	12.07%	0.23%	1.43%
Iron and Steel	15	5.07%	0.04%	0.47%
Non-ferrous metals and products	24	8.79%	0.10%	0.92%
Fabricated metal products	32	9.25%	0.11%	0.90%
General Machinery	107	15.83%	0.26%	1.34%
Electrical machinery, Equipment and Supplies	286	17.33%	1.48%	6.50%
Transportation Equipment	237	14.02%	0.72%	3.77%
Precision instruments and machinery	41	20.81%	3.84%	13.29%
Miscellaneous manufacturing industries	96	13.77%	0.49%	2.53%
Food, beverages, tabacco and animal foods	48	10.81%	0.90%	5.03%
Construction	4	1.25%	0.00%	0.08%
Wholesale and retail trade	163	2.91%	0.06%	1.41%
Finance and insurance	5	1.04%	0.05%	2.21%
Transport, electricity, gas	34	2.40%	0.38%	9.15%
Miscellaneous industries	92	4.69%	1.95%	26.99%
by region in 2008				
North America	360	11.68%	1.83%	10.52%
Europe	241	9.22%	1.18%	8.24%
NIES	230	7.16%	0.26%	2.68%
ASEAN	242	7.89%	0.19%	1.79%
China	380	8.46%	0.46%	4.11%
Others	101	4.20%	0.08%	1.14%

(Note): There are 25 industry categories, but the results of "mining", "leather products" and "real estate" cannot be displayed due to confidentiality constraint.

Table 2: Comparison of control indicators

		Share of Japanese in board members	Share of Japanese employees
control		s_board	s_emp
1	Management decision is delegated to non Japanese (host country)	18.3%	2.6%
2	Management decision is delegated to non Japanese (outside host country)	28.6%	3.5%
3	Management decision is made by Japanese, but involves local staffs as well	59.3%	5.8%
4	Management decision is made soley by Japanese at local site	88.1%	13.7%
5	Management decision is made by headquarter, instead of local site	76.4%	16.9%

Table 3: Pair wide correlation matrix of control variables

	control	s_board	s_emp
control	1		
s_board	0.5485	1	
s_emp	0.2597	0.2895	1

Table 4: Regression results (for all samples)

	(1)	(2)	(3)	(4)	(5)	(6)
s_board	-0.028	0.062	0.062	0.06		
	(7.34)**	(3.94)**	(3.92)**	(3.84)**		
s_board^2		-0.085	-0.084	-0.083		
		(5.91)**	(5.89)**	(5.80)**		
s_emp					-0.101	-0.203
					(7.56)**	(7.37)**
s_emp^2						0.153
						(4.46)**
existing overseas sites			0.001			
			(0.41)			
existing overseas sites in				0.009	0.010	0.009
the same region				(2.99)**	(3.54)**	(3.50)**
% of procurement from	0.049	0.049	0.049	0.048	0.042	0.040
local	(10.38)**	(10.29)**	(10.30)**	(10.08)**	(10.25)**	(9.79)**
% of procurement from	0.033	0.034	0.034	0.033	0.025	0.024
outside local and Japan	(3.50)**	(3.59)**	(3.57)**	(3.48)**	(3.16)**	(3.00)**
% of sales to local	-0.012	-0.015	-0.016	-0.017	-0.009	-0.009
	(2.35)*	(2.92)**	(2.94)**	(3.16)**	(2.07)*	(1.95)
% of sales to outside	0.027	0.024	0.024	0.022	0.027	0.026
local and Japan	(2.99)**	(2.60)**	(2.56)*	(2.41)*	(3.33)**	(3.29)**
Log of years	0.010	0.009	0.009	0.01	0.013	0.012
	(4.83)**	(4.05)**	(4.04)**	(4.64)**	(6.57)**	(6.32)**
Constant	-0.17	-0.17	-0.17	-0.17	-0.18	-0.17
	(6.96)**	(6.95)**	(6.94)**	(7.21)**	(7.89)**	(7.65)**
Log Liklihood	-495.18	-477.67	-477.59	-473.18	-569.56	-560.26
Prob > Chi(10)	0.00	0.00	0.00	0.00	0.00	0.00
Sigma	0.093	0.093	0.093	0.092	0.089	0.089
(Standard Error)	0.002	0.002	0.002	0.002	0.002	0.002
Industry Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Region Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9808	9808	9808	9808	12192	12192

Absolute value of t statistics in parentheses

* significant at 5%; ** significant at 1%

Table 5: Regression results by type of ownership

	(1)	(2)	(3)	(4)	(5)	(6)
	Wholly Owned	Wholly Owned	Majority JV	Majority JV	Minority JV	Minority JV
s_board	-0.034		-0.015		-0.005	
	(4.57)**		(4.10)**		(0.99)	
s_emp		-0.127		-0.139		0.041
		(6.28)**		(4.68)**		(2.59)**
existing overseas sites in	0.020	0.021	0.006	0.005	-0.007	-0.006
the same region	(3.42)**	(4.25)**	(2.32)*	(1.87)	(1.74)	(1.70)
% of procurement from	0.058	0.049	0.019	0.016	0.029	0.029
local	(6.85)**	(6.81)**	(4.38)**	(4.06)**	(3.94)**	(4.66)**
% of procurement from	0.032	0.026	0.020	0.014	0.025	0.021
outside local and Japan	(1.98)*	(1.95)	(2.26)*	(1.66)	(1.86)	(1.79)
% of sales to local	-0.049	-0.040	0.009	0.009	-0.002	0.002
	(5.08)**	(4.90)**	(1.97)*	(2.07)*	(0.29)	(0.31)
% of sales to outside	0.014	0.018	0.026	0.022	0.013	0.020
local and Japan	(0.84)	(1.29)	(3.18)**	(2.99)**	(0.90)	(1.55)
Log of years	0.010	0.012	0.007	0.006	0.010	0.011
	(2.52)*	(3.53)**	(3.29)**	(3.37)**	(3.45)**	(4.08)**
Constant	-0.16	-0.17	-0.10	-0.10	-0.12	-0.12
	(3.30)**	(3.77)**	(4.07)**	(3.93)**	(4.75)**	(5.61)**
Log Liklihood	-540.45	-624.74	290.12	294.10	146.45	175.60
Prob > Chi(10)	0.00	0.00	0.00	0.00	0.00	0.00
Sigma	0.125	0.117	0.043	0.043	0.053	0.050
(Standard Error)	0.003	0.003	0.001	0.001	0.002	0.002
Industry Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Region Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5568	7123	2583	3078	1652	1983

Absolute value of t statistics in parentheses

* significant at 5%; ** significant at 1%

Table 6: Regression results by region and marginal effects

	(1) Developped		(2) Developped		(3) Developping		(4) Developping	
	TOBIT results	Marginal coef.	TOBIT results	Marginal coef.	TOBIT results	Marginal coef.	TOBIT results	Marginal coef.
s_board	0.094	0.017			0.039	0.007		
	(3.45)**				(2.45)*			
s_board^2	-0.140	-0.025			-0.040	-0.007		
	(5.48)**				(2.88)**			
s_emp			-0.277	-0.048			-0.099	-0.017
			(6.71)**				(2.88)**	
s_emp^2			0.203	0.035			0.072	0.012
			(3.94)**				(1.63)	
% of procurement from local	0.051	0.009	0.042	0.007	0.031	0.005	0.025	0.004
	(6.11)**		(5.84)**		(6.56)**		(6.20)**	
% of procurement from outside local and Japan	0.066	0.012	0.056	0.010	0.009	0.002	0.004	0.001
	(4.04)**		(3.95)**		(0.98)		(0.55)	
% of sales to local	-0.056	-0.010	-0.046	-0.008	-0.001	0.000	0.003	0.000
	(4.80)**		(4.49)**		(0.13)		(0.78)	
% of sales to outside local and Japan	0.037	0.006	0.049	0.009	0.011	0.002	0.012	0.002
	(1.82)		(2.77)**		(1.45)		(1.82)	
existing overseas sites in the same region	0.002	0.000	0.003	0.001	0.010	0.002	0.010	0.002
	(0.43)		(0.70)		(3.62)**		(4.23)**	
Log of years	0.007	0.001	0.009	0.002	0.014	0.002	0.015	0.003
	(1.73)		(2.76)**		(6.31)**		(7.49)**	
Constant	-0.19	-0.03	-0.17	-0.03	-0.13	-0.02	-0.13	-0.02
	(7.05)**		(7.40)**		(7.48)**		(7.43)**	
Log Liklihood	-311.02		-379.40		25.70		36.67	
Prob > Chi(10)	0.00		0.00		0.00		0.00	
Sigma	0.115		0.111		0.062		0.059	
(Standard Error)	0.003		0.003		0.002		0.001	
Industry Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4414		5540		5394		6652	

Absolute value of t statistics in parentheses

* significant at 5%; ** significant at 1%