Evolving headquarters-subsidiary dynamics in international R&D: the case of Japanese multinationals

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The paper identifies the evolving nature of headquarters-subsidiary relations during the whole process of R&D internationalization. In-depth data on five Japanese multinationals revealed that the role of overseas laboratories actually evolved over time, from the 'starter' to the 'innovator' and then to the 'contributor'. Such a shift in role of overseas laboratories affected the nature of headquarters-subsidiary relationship accordingly. 'Semi-connected freedom' was identified as an optimal condition for the overseas laboratories to reconcile the two competing pressures: need for local autonomy and need for internal information connectivity. Various managerial steps were suggested for the laboratories to reach that state: increase in process linkage, active broker's role, short-term socialization, and project-level socialization. Some practical and theoretical implications were drawn from this research, and future research direction was suggested.

1. Introduction

While research on international R&D management is still growing (Cheng and Bolon, 1993), the scope of international R&D research is already extensive. Some of the typical areas of research include site selection, local autonomy, international coordination, organizational structure, human resource management (Cheng and Bolon, *op.cit.*), as well as contexts, internationalization of R&D, determinants, and effects (Granstrand, Hakanson and Sjolander, 1993). More recently, the trend of international R&D research has expanded even further to include such issues as international learning and knowledge creation (DeMeyer, 1993; Nonaka and Takeuchi, 1995) and international technology alliances (Dunning, 1995; Duysters and Hagedoorn, 1996) as summarized by Niosi (1999). And various new typologies were developed to capture various dimensions of international R&D (Chiesa, 1996; Gassmann and von Zedtwitz, 1999; Gerybadze and Reger, 1999; Kuemmerle, 1999).

At the same time, the internationalization of R&D as a phenomenon is evolving as well. Therefore, any emerging phenomenon is a source of new insights to our discussion. In this paper, we take the R&D internationalization of Japanese multinationals as a recent phenomenon (Papanastassiou and Pearce, 1994; Pearce and Singh, 1992), and revisit the following critical research agenda with the new data: 1) evolution of R&D internationalization and 2) coordination and control of global R&D.

Regarding the evolution of R&D internationalization, a majority of extant studies focused primarily on the Western multinationals (see Ronstadt, 1977, 1978; Pearce and Singh, 1992; Dunning, 1995; Hakanson and Nobel, 1993), and the internationalization of Japanese R&D attracted only a marginal attention (see Granstrand *et al.*, 1993). Therefore, although it is pointed out that ordered or sequential evolutionary models of

international expansion are becoming increasingly insufficient for describing the strategic behavior of advanced MNCs (Granstrand *et al. op.cit.*), it should not be meaningless to identify the Japanese pattern of R&D internationalization and juxtapose it with the Western model.

Regarding the coordination and control of global R&D, the degree of local autonomy has been a major issue (Behrman and Fischer, 1980; DeMeyer and Mizushima, 1989; Ghoshal and Bartlett 1988; Asakawa, 1996a). Another important issue was international coordination through information sharing (Hakanson and Zander, 1986; DeMeyer, 1991; Hakanson and Nobel, 1993; Asakawa, 1996b; Nobel and Birkinshaw, 1998). Probably due to the convenience of measuring autonomy and communication, most of the studies here are cross-sectional rather than longitudinal. As a result, we do not know much about the way coordination and control mechanisms would actually evolve over time, during the whole process of R&D internationalization.

As a first step to fill in such gaps, we investigate the evolving nature of R&D internationalization pertinent to the Japanese multinationals, and identify some coordination mechanisms that are suitable for different stages of R&D internationalization.

First, as R&D internationalization is a fairly recent phenomenon for many Japanese firms (Papanastassiou and Pearce, 1994), identifying the most appropriate process of R&D internationalization is a big issue for them. Arguably, R&D internationalization by Japanese firms is a real-time phenomenon, and it provides researchers with the opportunities to document its evolving process, just as Ronstadt (1977, 1978) had done more than two decades ago with the R&D investments made abroad by seven US based multinational organizations. According to Ronstadt, US multinationals tend to follow a common pattern of evolution when they change their original purpose over time. Today, Japanese multinationals offer a similar opportunity to identify a common evolving pattern of R&D internationalization.

Ronstadt (1977) classified four types of R&D investments: Transfer Technology Units (TTUs),[1] Indigenous Technology Units (ITUs),[2] Global Technology Units (GTUs)[3] and Corporate Technology Units (CTUs),[4] and showed that the foreign R&D investments follow a particular evolutionary pattern, from TTUs to ITUs, then to GTUs. Such a transition can be recapitulated using Ghoshal and Bartlett's (1988) typology of global innovation: from 'center-for-global', to 'local-for-local', to 'local-for-global', and 'global-for-global'). In Kuemmerle's (1996, 1997) terms, it is a transition from home-base-exploiting (HBE) to home-base-augmenting (HBA) foreign direct investment (FDI). However, such a pattern might be specific to the US firms which adopt what Bartlett and Ghoshal (1989) termed the 'International' strategy, in which sources of core competencies are centralized, and knowledge is developed at the center and transferred to overseas units. If the whole purpose of establishing the basic research laboratories abroad is for many Japanese firms to compensate for what they do not have at home, their typical transition pattern should be different from that of the US firms identified by Ronstadt (see Westney, 1993). What kind of evolving pattern would the Japanese multinationals demonstrate in their R&D internationalization process? Such an investigation could add value to the field of international R&D management.

Second, it is important for us to identify a particular coordination mechanism which is suitable for each stage of R&D internationalization. Conducting R&D abroad has a potential in taking advantage of globally dispersed knowledge and skills, if managed properly. Such advantages include appropriation of overseas knowledge, combining and sharing it throughout the firm, and exploiting it to enhance the firm's core competence. However, managerial difficulty in coordinating the geographically-dispersed operations within a firm seems obstinate (e.g. Bartlett and Ghoshal, 1989; Nobel and Birkinshaw, 1998; DeMeyer, 1993). R&D being the last stage of international product life cycle (Vernon, 1966, 1979; Ohmae, 1985, 1987), the firms are generally less experienced with managing overseas R&D activities than with their overseas operations in other functions (Terpstra, 1977; Pearce, 1989). Therefore, it becomes important to understand some of the most appropriate coordination mechanisms at differing stages of R&D internationalization.

The paper is also intended to add new perspectives to the two related fields: multinational management and Japanese headquarters-subsidiary relations.

First, in the field of international management, new models of multinational corporations were presented with a particular focus on dispersion of knowledge, resources and innovation. Among the most typical models are heterarchy (Hedlund, 1986), multi-focal (Prahalad and Doz, 1987), transnational (Bartlett and Ghoshal, 1989) and metanational (Doz *et al.*, 1997). In all these models, enhanced strategic role of overseas subsidiary has been recognized (Hedlund, 1986; Birkinshaw, 1995). In a way, many of these models present an anomaly in the traditional logic of internationalization based on the exploitation of home-country advantage (see Porter, 1990). Similarly, exploitation as the logic of FDI was questioned by the alternative logic of exploration and renewal (Doz *et al.*, 1997). However, we still need a much more empirical evidence to support such models. In such a context, the research on international R&D added value by providing empirical data on globally-dispersed knowledge creation activities (DeMeyer, 1993), on the growing role of overseas subsidiary laboratories as the locus of innovation (Ronstadt, 1977, 1978; Nobel and Birkinshaw, 1998; Kuemmerle, 1997), on

the increasing weight of periphery-in flow of knowledge (Frost, 1998), and on its implication for competitiveness (Cantwell, 1993). These studies, while focused on R&D function, help to advance our knowledge of multinational management in general by providing rich data and conceptual frameworks on the growing roles of overseas subsidiaries.

Second, the study could also add a perspective to the discussion of the Japanese headquarters-subsidiary relationship in general. Some of the typical large Japanese multinationals such as Matsushita, NEC and Kao have been regarded by Bartlett and Ghoshal (1989) as adopting what they called the 'Global' strategy, in which key knowledge is developed and retained at the center and key assets and capabilities are centralized and globally scaled. Internationalization of R&D by the Japanese firms should challenge such a view by counter arguing that key knowledge is created and retained in the overseas R&D laboratories and that key assets and capabilities are decentralized accordingly.

Similarly, the headquarters-subsidiary relationship in the traditional Japanese multinationals can be characterized by their ethnocentricity serving as an integrating mechanism. Under the ethnocentric mode, expatriates were frequently used as a tool for cultural control (Edström and Galbraith, 1977), and the key management roles in the overseas subsidiaries have been assigned almost exclusively to the Japanese managers (Yoshino, 1976). Again, internationalization of R&D presents an anomaly to such a model. Particularly in basic research, overseas laboratories do not always operate under the ethnocentric mode, as key management and research roles are often held by the locally hired non-Japanese staff who maintain strong external linkages in the local environment. Such a symptom of 'ethnocentricity breakdown' should challenge our traditional, commonly shared view of the Japanese multinational management system.

In this article, only Japanese firms were focused on for several reasons. First, R&D internationalization by Japanese firms is a relatively recent phenomenon, and compared with the Western firms our knowledge of the phenomenon is still limited. Second, these Japanese firms offer the real-time data on R&D internationalization process and the evolving headquarters-subsidiary relations, and they provide researchers with an opportunity to study the evolving process of R&D internationalization, just as Ronstadt (1977, 1978) had done more than two decades ago with the US firms. Third, the R&D internationalization by Japanese firms could also add a new perspective to the traditional view of Japanese multinational management in general. In the new emerging model, the locus of innovation and knowledge creation lies within the overseas R&D subsidiaries, and the implicit assumption of ethnocentricity has collapsed in the overseas R&D laboratories. In spite of such a focused sample, implications drawn from this research are more general in nature and could be applicable to non-Japanese R&D management research and practice as well.

2. Data and method

With the grounded theory approach (Glaser and Strauss, 1967), the project began with an exploratory study of the managerial challenge of R&D internationalization facing the Japanese MNCs in Europe. Given the recent nature of the phenomenon, the exploratory case study was the most appropriate method of research (Eisenhardt, 1989). Later, the exploratory study was followed by more systematic field interviews in both Japan and Europe. At this stage, the kind of data gathered was focused on evolving stages of R&D internationalization and their corresponding linkage mechanisms that are strategically effective.

For this particular study, five Japanese MNCs internationalizing their basic research laboratories in Europe were selected: Canon, Sharp, Eisai, Yamanouchi, and Kobe Steel.[5] All these companies have localized their basic research laboratories in the UK. I purposively selected companies with their basic research laboratories abroad. Given the new, emerging nature of the phenomenon, and that only a limited number of Japanese companies truly engage in overseas R&D activities, the most advanced R&D internationalizers provide the richest dynamics of headquarters-subsidiary relations (see Eisenhardt, 1989). The selection was skewed more toward pharmaceutical and electronics industries than others, and all of the studied overseas laboratories were located in Europe (mostly in the UK). Such a focus was intended to control spurious influences, so that not only the internal but also the external validity could be enhanced within certain confines.

Internal validity was sought by way of in-depth clinical fieldwork in the smaller and relatively homogeneous group of companies to gain insight into the dynamic aspect of MNC organizational phenomena. Spurious factors were controlled as much as possible to reduce variance in the research task (basic research was chosen as the main focus), industry (pharmaceuticals and electronics industries as the main focus), as well as geographic region (Europe, especially the UK). Within this limited context, generalizability was sought.

A within-triangulation method was adopted (Jick, 1979) to secure reliability of data analysis. To reconfirm important points made by the interviewees, a large number of them were revisited at different stages of the research project – exploratory, clinical fieldwork, and follow-up interviews. By occasionally repeating the same questions at each stage, answers given at the previous stages could be compared. If different answers were given, it provided an opportunity to investigate the reasons for difference in

perception since the previous stage. Telephone conversations were often used for more immediate clarification. Second, interviews with multiple respondents in the same division or position helped differentiate commonly-held perceptions from individually idiosyncratic ones. In many companies, interviews were also conducted with several individuals simultaneously, during which the interviewees conferred with one another to seek a common denominator of collective perception. Third, some interviews (Canon and Eisai) at the follow-up stage were conducted jointly with another interviewer with whom the discussion points were extensively reviewed and conclusions mutually drawn. Fourth, a feedback session with selected interviewees was helpful in testing the emerging framework eliciting criticism from the field. A session with British R&D directors of overseas laboratories was particularly useful for verifying data as well as theory. Fifth, the personal ties I have developed with many interviewees in the past few years helped me develop the skill needed to evaluate the degree of reliability of data through subtle channels of information (e.g. facial expressions and gestures of the interviewees).

3. Evolving roles of overseas laboratories

Internationalization of R&D operations typically involves a series of evolutionary transitions in terms of the role of overseas R&D subsidiaries (Asakawa, 1996b). Such a trend is especially salient in the case of basic research, where the role of the local laboratories tends to shift from the 'starter' of the newly-established laboratory, to the 'innovator' in charge of capability enhancement within the laboratory, and to the 'contributor' in charge of diffusing knowledge and technology developed within the laboratory to the rest of the company. Definition of each role is as follows: [6]

- 'Starter' is defined as a role played by a newly established overseas laboratory in launching out into its new operations and in institutionalizing the new roles assigned by the corporate. At the stage of start-up, the overseas laboratories are playing the *starter*'s role with strong support and protection by the top management. At this stage, the nature of role played by the laboratory is largely administrative rather than innovative since substantive R&D activities are not yet conducted.
- After a while, the overseas laboratories typically begin to play the *innovator*'s role. It is defined as a role of facilitating research and development activities so as to develop their R&D competencies and to maximize output within the laboratories. For that purpose, a substantial amount of autonomy tends to be granted to the local laboratories, especially in the area of basic research. Still, the research efforts invested in the local laboratories do not yet result in any concrete output. Some obtained research results are even used locally instead of being diffused to other intra-firm units. The role defined here is similar to that of Indigenous Technology Unit (ITU) proposed by Ronstadt (1977) and local-for-local innovation categorized by Bartlett and Ghoshal (1989) and Nohria and Ghoshal (1997).
- More full-fledged overseas laboratories start to act as the *contributor*s.[7] It is defined as a role of diffusing the knowledge and technology developed within the overseas laboratory to the rest of the company. For that purpose, internal company linkages between the local laboratory and the parent would increase. This role defined here is similar to that of HBA facilities proposed by Kuemmerle (1996, 1997), Global Technology Unit and Corporate Technology Unit defined by Ronstadt (1977), Global creator (Nobel and Birkinshaw, 1998), and local-for-global innovation categorized by Bartlett and Ghoshal (1989) and Nohria and Ghoshal (1997).

Such a transition in role appears to be prevalent among many overseas basic research laboratories of the Japanese firms. Over time, many local laboratories which were assigned to pure basic research are either *shifting* their research focus or *expanding* their research domain to include more applied, shorter-term research. Kobe Steel's Surrey laboratory is an example of the former case (i.e. shifting the focus from long-term to medium-term research), and Sharp Laboratories Europe and Canon Research Europe are among the examples of the latter case (i.e. expanding their research domain to include shorter-term applied research).

Kobe Steel's Surrey laboratory has gone through an evolutionary change in its role. Since its start-up, the laboratory's main focus had been basic research in polymers and diamonds. Here the laboratory was focused on its role as the *innovator*. Over time, the focus has shifted toward more medium-term research due to financial pressures from the parent company. Such a pressure from the corporate called for the shift in role played by the local laboratory from the innovator toward the *contributor*. However, such a transition is typically not so easy. According to the director of the local laboratory, the laboratory is in a state of uncertainty; there is no consensus as to which direction it should evolve in – long-term research, short-term research, or a combination of both.

Sharp is expanding the role of its overseas basic laboratory, Sharp Research Europe (SRE), to include more applied research. SRE has been playing the *innovator*'s role since its start-up, and it has augmented its role subsequently. As some of the projects at SRE progressed into the product development stage after

five years, the laboratory naturally followed up on the projects they initiated in collaboration with the development laboratory. Here the laboratory is beginning to play the *contributor*'s role as well.

Canon's evolutionary shift may be seen as one from diffusion to differentiation, and then to integration. By establishing Canon Research Europe (CRE), the company's global innovation system has launched a new stage of differentiation through locally specific research. At this stage, CRE was focused on the *innovator*'s role. Over time, the company's strategic interest then moved into the direction of integrating these locally driven capabilities (such as Visual Programming, Natural Language Processing and 3D Graphics in UK) into its global network. Through such moves, the role of CRE altered by also encompassing the *contributor*'s role. While some projects are exposed to conflicting views of intellectual ownership between the local laboratory and the parent during this transition period, a majority of projects are on sounder footing in relations between the parent and the local laboratory. In the telecommunications project, complementarity between Canon Research France (CRF) and Japanese operations allowed mutual learning to take place.

It is important to note here that such an evolving pattern of overseas basic research units in Japanese multinationals differs from that in US multinationals identified by Ronstadt (1977). Regarding the development side of R&D activities, the Japanese multinationals may follow the evolving pattern identified by Ronstadt: shifting from TTUs to ITUs, and then to GTUs. On the other hand, internationalization of the basic research presents a different pattern of evolution, i.e. the shift from CTUs to GTUs or ITUs, especially for the Japanese multinationals. In contrast to many US multinationals which did not see a benefit of internationalizing their basic research function in addition to their powerful research laboratories in the home country, the Japanese multinationals studied here had a strong incentive to strengthen their basic research capabilities through their overseas research laboratories.

4. Changing headquarters-subsidiary relationship

Configuration of headquarters-subsidiary relationship

How does the shift in role of overseas laboratories affect the nature of headquarters-subsidiary relationship? As their role evolves from the 'starter' to the 'innovator', and then to the 'contributor', how would the nature of headquarters-subsidiary connectivity change accordingly?

At the start-up phase, the overseas laboratories need both internal connectivity and local autonomy. As the 'starters', the top management's support and encouragement is indispensable. In all the companies studied, top management's strong commitment to their start-up operations was evident. At the same time, the overseas laboratories were granted a substantial amount of autonomy regarding the recruitment of local scientists and the initial selection of their research topics. Such autonomy is considered especially important for attracting an excellent and prominent local director and scientists to the company. At this stage, many local laboratories report directly to the top management rather than to the corporate R&D headquarters to prevent the latter from intruding on overseas laboratories matters. Such a situation facing the overseas laboratories can be termed '*connected freedom*'. Connected freedom can be defined as the situation of an overseas laboratory being connected to the parent side while preserving a substantial degree of autonomy from the parent.

Soon the role of overseas laboratories turns to that of 'innovators'. Once the local laboratories assume such a role, local autonomy becomes particularly important while excessive internal connectivity becomes harmful. The top management typically gives the overseas laboratories substantial autonomy to encourage their own independent creativity. At this stage, many local laboratories continue to report directly to the top management instead of the corporate R&D headquarters, again to prevent the latter from intruding on the overseas laboratories matters. A substantial degree of autonomy being granted, these overseas laboratories often engage in intensive and extensive knowledge links with the external research community. On the other hand, these units tend to be rather isolated from the corporate networks in terms of information-sharing, especially because the corporate R&D headquarters cannot become too involved in local matters. The positioning of such overseas laboratories can be labeled as *isolated freedom*. Isolated freedom can be defined as a situation in which an overseas laboratory enjoys a substantial amount of autonomy but does not have much connectivity with the parent side in terms of information-sharing.

As the local laboratories begin to assume the role of the 'contributors', they are encouraged to diffuse various knowledge and know-how accumulated during the 'innovator' period to other intra-firm units. Most typically, they are expected by the parent side to reconnect themselves to the intra-firm networks. As a director of a corporate R&D headquarters put it, 'the honeymoon period is over for the overseas laboratories, and we look for concrete output from them'. In many companies, their overseas research laboratories now report to the R&D headquarters rather than to the top management. Enlarging the internal connectivity may facilitate sharing of knowledge and know-how between the local laboratories and the headquarters. However,

such increase in connectivity, in turn, may constrain the local autonomy. Although the local laboratories would strive for preserving their autonomy, it is unlikely that they maintain the same amount of autonomy as what they had under the isolated freedom situation. A local director commented as follows: 'There is a trade-off between autonomy and knowledge linkage with the parent. Therefore we are worried about losing our freedom as we increase our interaction volume with the parent. In the worst case, many local scientists, including myself, might have to leave this laboratory'.[8]

In the worst case, the overseas laboratories might fall into a situation of *connected control*. It can be defined as a situation in which a laboratory is so tightly connected to the parent (or embedded in the intra-firm networks) in terms of information-sharing that the laboratory has lost local autonomy. However, the local laboratories do whatever they can to avoid such a situation, as they usually do not abandon the role as 'innovators' even after assuming the 'contributors' role. A local director expressed his view on this point: 'What we [i.e. the local laboratory] are working on include various stages of research. While some of them are already handed over to the product development side, others are still at the stage of inception. Unless we maintain the current level of freedom, our research productivity on the new research projects should decline'. As for the laboratories playing the contributor's role, therefore, identifying the optimal solution for such tension becomes important.

In sum, a typology can be illustrated as Figure 1. As a 'starter', the laboratory receives the strong support of top management and it enjoys high degree of its autonomy. Here the local laboratory is placed in a favorable position of *connected freedom* (the upper-right corner of Figure 1). As an 'innovator', its priority goes to original research within the laboratory. As local autonomy becomes most important for the local creativity, internal connectivity with the parent side is intentionally cut off. Here the situation of the local laboratory is *isolated freedom* (the upper-left corner of Figure 1). As a 'contributor', its expected role is to

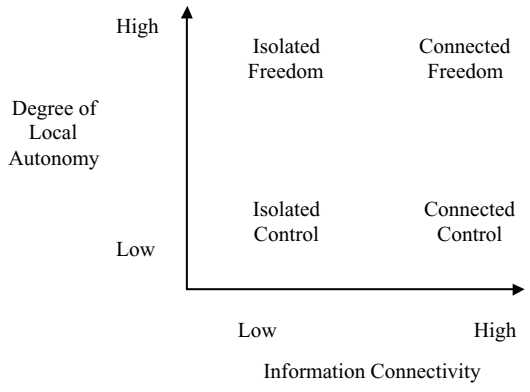

Figure 1. Typology of overseas laboratores by autonomy and information connectivity.

share its own knowledge and research output to the rest of the intra-firm units. Internal connectivity becomes important, and involving the local laboratory into the dense intra-firm linkages could constrain its structural autonomy. Here the extreme situation would be *connected control* (the lower-right corner of Figure 1). However, the local laboratory would strive to preserve their autonomy while strengthening ties with other intra-firm units. An optimal position should be identified to reconcile the two competing forces: need for local autonomy and need for information connectivity.[9]

Such a way of characterizing the headquarters-subsidiary relationship is new in the field of international R&D. Although earlier studies in international R&D management have dealt with the nature of headquarters-subsidiary relationship from various angles, very few of them have paid sufficient attention to the autonomy-control dimension and the information-sharing dimension *simultaneously*. The issue of centralization and decentralization was discussed by Behrman and Fischer (1980) who classified management styles toward the overseas R&D activities into four types (absolute centralization, participative centralization, supervised freedom, and total freedom). But this seminal piece did not associate centralization-decentralization with the amount of information-sharing *per se*, nor did it grasp the transition stage from one category to another. The importance of inter-unit communication in global R&D networks was pointed out by a number of studies (e.g. Hakanson and Zander, 1988; DeMeyer and Mizushima, 1989), but the way the amount of communication is associated with the degree of local autonomy was not central to their arguments. DeMeyer and Mizushima (1989) suggested that local autonomy and information-sharing are two important dimensions of management challenges in international R&D, but they have not provided their view on the association between the two. Ghoshal and Bartlett (1988) associated the amount of local autonomy with the innovation tasks of the overseas subsidiaries (creation, adoption and diffusion), but their argument is not confined with the overseas R&D facilities (Cheng and Bolon, 1993).

In a related context, Chiesa (1996) classified three international R&D structures (isolated specialization, specialized contributors, and integration-based) and identified determinant factors for each structure. While this framework is based on roles played by each intra-firm unit (headquarters and subsidiaries) in terms of R&D and innovation, it does not address patterns of behavioral interaction between the headquarters and subsidiaries. While several leading authors in MNC management touched upon the importance of communication and autonomy in the multinational networks (Nobel and Birkinshaw, 1998; Ghoshal and Bartlett, 1988; Ghoshal, Korine and Szulanski, 1994), no prior

study has explicitly shown the optimal balance between the two, especially in the context of innovation in international R&D.

In contrast, our framework proposed in this paper is focused on the relational dimensions (i.e. autonomy-control and information-sharing) of the headquarters-subsidiary relationship. It also captures the transitory phase of headquarters-subsidiary relationship as the role of overseas laboratories evolves from the 'starter' to the 'innovator', then to the 'contributor'.

Shifting toward semi-connected freedom

Due to short-term financial pressures from the corporate and business divisions reflecting the current recession in Japan, the overseas basic laboratories are expected more and more to contribute to immediate company goals. In this case, it is not desirable for the parent to leave the local laboratory in its isolated freedom. On the other hand, excessive internal linkages between the parent and the local laboratories may force the latter into a situation of connected control. How can the local laboratories become more closely integrated into other intra-firm units without being deprived of their local autonomy?

From the local laboratory's point of view, the ideal state would be to attain a high level of information connectedness to the parent without losing any local autonomy (i.e. to shift from *isolated freedom* to *connected freedom* without falling into *connected control*). However, separated as the laboratory is from the parent's ethnocentric values, it is unlikely that the local director can absorb as much tacit 'organizational knowledge' (Kogut and Zander, 1992) as the expatriates could.[10] The parent may not share as much information with the local director as with expatriates, given the *parent* side's concern about possible opportunism of the local director (Williamson, 1975; Ouchi, 1980). For this reason, it is unlikely that the overseas laboratories would obtain the position of *connected freedom* as other non-R&D subsidiaries headed by the Japanese expatriate managers do. While too little information linkage puts the local laboratory in the situation of *isolated freedom*, too much information linkage puts it in the situation of a *connected control*.

Given these constraints, a realistic solution would be for the R&D subsidiary to increase information connectedness with the parent side while sacrificing some degree of autonomy. While this is a compromise for the local side, the local directors unanimously expressed their willingness to obtain more information connectedness even at the expense of some degree of local autonomy.

Sharp's SLE, for instance, has been significantly more independent of the company than other local subsidiaries in Europe, and it is one of the few overseas subsidiaries whose head is non-Japanese. While it has many advantages in being local, internal communication, especially at the informal level, may not always be that easy. Particularly, SLE needs to keep abreast of the company's product planning in more detail. According to the local director, 'SLE has to know a good deal more about the firm's product strategy. What SLE needs is not only the unilateral information flow from the headquarters but also increasing collaboration with the Japanese side, including its R&D strategy. At this stage, excessive independence does not mean much'.

Canon has also taken a delegation policy vis-à-vis its overseas laboratories. The headquarters shows basic direction and guidance, mainly through a three-year rolling plan and such key concepts as 'kyosei' (symbiosis with the environment) or 'Environment > *QCD* (meaning environmental responsibility is more important than quality, cost and delivery). While initially no clear tying up of the laboratories' activities was achieved with Japan nor among laboratories, recently more emphasis has been placed on coordination among them. The proportion of work done overseas for Japanese R&D headquarters has gradually increased. Top management emphasized the importance of sharing information both ways. The level of perceived internal rivalry between CRE and other laboratories in Japan decreased as the information flow and personal interaction increased and its independence from other intra-firm units has declined accordingly.

Yamanouchi's Littlemore Hospital Laboratory also followed a similar transition path from independence toward an increasing internal connectivity. For the purpose of making the laboratory different from those in Japan, the laboratory reported directly to the corporate instead of the Tsukuba R&D center. It does not actively receive Japanese expatriate scientists to maintain the local practices. Over time, the local laboratory began to recognize a sense of rivalry with other laboratories in Japan and tried to achieve a more trusting relationship to overcome such internal rivalry. As the laboratory expanded its responsibility to engage in more applied research as well, synergy in research became the laboratory's priority, and the director of the local laboratory stressed the importance of information-sharing with the headquarters to achieve such a synergy. According to him, 'we (the local laboratory) have already obtained a substantial degree of independence from the headquarters, but we have to connect ourselves with other R&D units if we aim at becoming a true center of excellence so as to influence other section within the company'.

Since its inception, Kobe Steel's Surrey Laboratory in the UK has been recognized as the center of excellence in polymer research. The company created a very strong polymer chemistry group in its Surrey laboratory, and did a good job in accessing European knowledge in this area. While polymer technology is said to be superior in the UK, the markets lie in Japan

and the US. The company recently introduced a new 'tripolar general management' system to facilitate more regio-centric innovation initiatives. The Surrey laboratory is willing to assume leadership in polymer technology by connecting itself with the Japanese side not only in research but also in new product development. As the former Japanese director of the laboratory returned to Japan, the laboratory strengthened the informal communication ties with the Japanese side. Again, the Surrey laboratory's ultimate goal is not to maintain its high level of autonomy but to exercise leadership in the firm in its superior polymer research by enhancing internal communication and human interaction.

Since these laboratories had initially been granted substantial independence by top management, the local laboratory's interest has shifted toward developing greater internal linkages, sensing that autonomy alone does not mean much in organizational isolation. Such an optimal position pursued above may be termed *semi-connected freedom*, as illustrated in Figure 2.

Semi-connected freedom is the optimal position held by the typical overseas laboratories, especially in basic research, when they try to increase connectivity in information with the headquarters side while trying to keep as much autonomy as possible. The more emphasis is put on information-sharing than on autonomy, since many overseas laboratories in the *isolated freedom* position are not satisfied with their freedom alone and often attempt to increase information connectivity even at the expense of their current degree of autonomy to some extent. This position does not fall into any of the four categories: *isolated freedom*, *connected freedom*, *isolated control*, nor connected control. Nevertheless, it is an optimal position for the local laboratories striving for the ideal position of connected freedom, since the autonomy-information trade-off prevents them from attaining it.[11]

Then how can such a position be attained? How do the companies studied manage such a challenge? Such questions will be explored below.

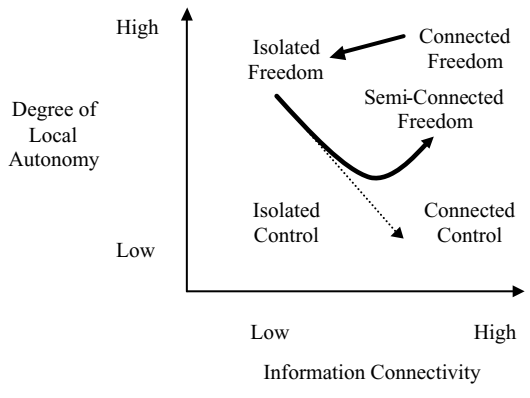

Figure 2. Path toward the semi-connected freedom position

5. Strategic linkages for attaining semi-connected freedom

A road to the optimal position: managerial mechanisms

If the local laboratories need to be more attuned to the parent company's information while not losing autonomy, what reasonable solution should they aim at? While *connected freedom* would be the ideal condition for the local laboratories trying to serve as the 'contributors', excessive connectivity in information could easily lead them to the connected control circumstance. If '*semi-connected freedom*' is the optimal solution as discussed above, how can they move from isolated freedom to a position of *semi-connected freedom*? This section tries to explore this issue.

In the situation of *semi-connected freedom*, the local side increases internal linkages with the parent by activating both active broker linkage (i.e. influencer) and socialization linkage, while retaining its own distinctive character. In other words, the local laboratory increases its process linkage with the parent without becoming totally immersed into it. Data revealed that the following approaches are taken by the firms and are recognized as effective by them.

Increase in process linkage

One way of escaping from the *isolated freedom* situation is for the laboratory to increase its interaction with the parent.

In many companies the *gradual shift* (or at least expansion) from output linkage to process linkage was observed. *Output linkage* is defined as information transfer through standardized media, i.e. the sender unit standardizes its knowledge (translates locally specific knowledge into a standard form) within the unit and transfers this standardized, explicit knowledge to the recipient unit. For example, when the local laboratory tries to translate a locally-specific knowledge into a standard form (e.g. mathematical formula; written documents, figures, products) within the local laboratory so that the research output can be transferred in a universal way, this is a form of output linkage.

Process linkage is defined as information transfer through organizational processes, e.g. the sender unit 'carries' local knowledge to the recipient unit without standardizing it. Or the recipient unit may send its staff to the sender unit to help it acquire this knowledge. Or staff members from the sender unit and the recipient unit meet or visit each other frequently to share their knowledge. In either case, knowledge transfer takes place via the *movement of people* who possess this knowledge. For example, when the local laboratory sends its staff to the parent in order to transfer its knowledge, the local and parent staff jointly interact

with each other at headquarters and articulate the knowledge there. This is a form of process linkage.

For example, while Canon headquarters wanted CRE to transfer knowledge in standardized form to the parent recently, a new direction began to emerge in CRE: In one project, the local laboratory considers more process linkage to be necessary so that the parent can get more out of it. The local director said that 'the parent won't exploit it unless they understand it through interaction with the CRE people'. The same was said about another project which should have more process linkages than at present, although serious tensions exist in the form of an NIH syndrome.

A telecommunication-related project at CRE France, on the contrary, has a strong process linkage with the parent laboratory in Japan in the form of concurrent joint research in France and Japan, thanks to the complementarity of competence between France and Japan: i.e. Japan's hardware technology and France's software technology in telecommunication. On top of that, both sides had been looking for a similar project. The French side at the time had only long-term projects, and this project was well received by them for its concreteness.

The same trend was observed repeatedly in many companies' overseas laboratories.

In Sharp's SRE (Oxford), the current linkage with the parent has been output-based, with its local director and several Japanese expatriates playing a mediating role. However, more process linkage is gradually needed as the research projects move to the stage of product development. As the project increases its coordination needs, more process linkage is required. Such a shift reflects the laboratory's expansion since its foundation.

In Eisai, output linkage has been prevalent between the parent and the local laboratories, especially in the London laboratory. Here diversity is maintained between London and Tsukuba, and the use of expatriate scientists was discouraged in principle, except for a few young expatriate chemists who collaborate with British biologists in a complementary way. For future direction, Eisai seems to increase its process linkages between London and Tsukuba by gradually using Japanese chemists to diffuse a business mind-set among the local British biologists. On the other hand, the process linkage has already increased between the Boston laboratory and the Tsukuba laboratory (Japan), as Boston is slightly more clinical than London. The process of drug development involves intense interaction between Boston and Tsukuba: typically they form a project team of four or five scientists coming from Boston and Tsukuba, and they have frequent meetings in both locations. Concepts developed in Boston are clinically tested in Tsukuba and results are swiftly reported back to Boston, normally within a week. In many cases, the Tsukuba laboratory sends its empowered staff scientists to Boston to accelerate the process of interaction. Nevertheless, the Boston and Tsukuba facilities maintain their own unique environment, and they do not overly socialize with each other. While they interact with each other in research projects, they do not socialize beyond that.

Activating the broker's role as 'influencer'

Another step toward semi-connected freedom is to facilitate an active broker's role between the headquarters and local laboratories. The broker's role involves information transfer through a small number of liaison persons who send and receive information to and from each other. Here the majority of members on each side do not interact with one another. It becomes important for the local directors to yield *influence*s over information flow between the headquarters and local laboratories. For example, in Yamanouchi, the local director and a small number of Japanese expatriate managers have been playing the role of *passive* brokers (i.e. the *translator*'s role rather than the influencer's role).[12] Since its foundation, the main role of the Oxford laboratory had been to foster locally creative research by taking advantage of its strong ties to the external research community. The laboratory director who was a professor at the University of Glasgow played a prominent role in that respect. Over time, however, as the role of the laboratory gradually expanded to include more applied research, the broker's role shifted as well. He has lately become keener on internal linkages with the corporate R&D headquarters, so as to become an *active* broker playing the role of the *influencer*.[13] While diversity was encouraged from the beginning, excessive diversity needs to be contained. He lately wants to ensure that the local laboratory retains its separate character while not drifting too far from the parent.

In a situation of pure output linkage, liaison persons normally play a very passive role as *translators* who merely convey the information from the sender to the receiver without adding any value or legitimacy to it. Since fully articulated information flows without any difficulty across borders, a passive broker role suffices. However, if the local director only plays the role of translator, the Japanese expatriate manager (his subordinate) will soon usurp the director's role by becoming an active broker. The local director is liable to become just a figurehead, with all the major information bypassing him or her via the Japanese expatriate manager. Therefore, local directors should do their best to increase their role as an influencer on both sides.

The risk for the local director becoming a figurehead is particularly great when the Japanese expatriate director returns back to Japan. While the Japanese director runs the local laboratory, he generally is very well connected to the parent. After a local scientist or manager takes over the directorship, he or she often

has to establish bonds with the parent from scratch. If successful, he or she tends to make formerly tacit rules and practices explicit so as to establish a new route of communication with the parent side. Such efforts help stabilize parent-local communication without relying on ethnocentric methods. The local director at CRE was successful in establishing himself as an influencer between the parent and the local laboratory after he succeeded as director after his Japanese predecessor.

- The former Japanese director of CRE spent nearly fifteen years in Europe, and he was extremely well connected to both the external research community and the internal corporate network. After four years of directorship at CRE, his position was taken over by a British scientist who was formerly a faculty member of UCL. Although his external linkages with the research community are extremely strong, his internal linkage with the Canon parent was not so strong when he assumed the position. Nevertheless, he has gained a reputation as being an effective director of the laboratory. He has been studying Japanese, and his understanding of Japanese culture and society improves accordingly. Since he is not fluent in Japanese, he tries to make matters explicit by confirming the impressions expressed by Japanese MNC colleagues. After a year, he has developed a method for maintaining internal communication with the parent, without falling into the trap of becoming a figurehead.

The opposite case was registered in an anonymous company laboratory whose former Japanese director was replaced by a British director. The problem here was that because of his passive style, he did not try to change the communication flow between the parent and the local to suit his own purposes. The consequence was that the Japanese number two expatriate started playing a substantial broker role by communicating directly with the parent, and the local director was cut out of the corporate network. Being a figurehead, he received only formal information (e.g., written documents translated into English) from the parent. The Japanese number two expatriate monopolized information sent from the parent, and he often conveys the information only after interpreting it to his local director. The local director only receives information distorted by his Japanese subordinate, hence the isolated freedom situation. This is the consequence of remaining a translator rather than an influencer.

Thus far we have looked at a success case and a failure case. What differentiated the former from the latter is that the local director at CRE managed to play an active broker role of influencer by establishing and institutionalizing his own manner of communication, i.e. to make things explicit so as not to rely on informal communication as had been prevalent under the MNC's clan mode of operation.

Fostering communication through short-term socialization

Another important option is to foster more interaction between the parent and the local laboratory through socialization. Socialization involves a large number of members who interact between units. As a result, diversity between them is liable to decline. For example, if a local laboratory accepts many expatriates or visitors from Japan, frequent interaction among them may enhance shared values and mutual understanding. This type of linkage is suitable for transferring tacit knowledge to as many organizational members as possible, but it also takes significant time and expense (see Van Maanen and Schein, 1979). To move from isolated freedom to semi-connected freedom, *short-term socialization* is preferred to long-term socialization.[14] As defined above, the former takes the form of frequent *visits* by members to the other side, while the latter takes the form of stationing the expatriates there for an extended period of time. Rather than overly socializing to the point of resemblance, short-term frequent visits by different knowledge holders is a better way of avoiding the connected control situation. Excessive use of expatriates would endanger the uniqueness of the local laboratory and erode locally specific assets through excessive interaction between expatriates and local staff. While the expatriate solution (i.e. long-term socialization) works perfectly fine under a clan mode of international MNC operations, it does not necessarily work well in the R&D context, due to the high sensitivity of R&D creativity to links with the local environment.

In reality, many companies prefer the visiting solution to the expatriate solution so as to avoid excessive influence of the corporate upon the laboratories. For example;

- Eisai's London and Boston laboratories do not have many expatriates but do exchange quite a few staff with Tsukuba. The rationale is that it is sufficient to exchange staff for occasional visits so that both sides can bring their own expertise and institutional background to bear. Long-term socialization by the expatriates was considered rather risky in terms of the unnecessary harmonization and alignment between the two units.
- Canon also has a policy of not sending too many expatriates to the local laboratory. For example, Canon CRE France's telecommunication project featured frequent visits by the scientific and engineering staff to the other site regularly, with each visit taking two to three weeks on average. By keeping up this system of mutual visits, both sides can learn from each other's strength's (i.e. Japan's hardware technology; France's software technology in telecommunication).
- Sharp's SRE (Oxford) also prefers visits to expatriates. At the stage of start-up, R&D directors at both

the headquarters and local laboratory envisioned a highly locally-driven knowledge creating laboratory, so sending many expatriate scientists there was not considered essential. Today, some of the initial projects are entering a mature stage of product development, and frequent visits to each other are encouraged so that the local side is better informed of market conditions. Research exchanges and exchanges of business information are facilitated by frequent visits rather than by stationing expatriates there for a long period of time.

Fostering communication through project-level socialization

Similarly, *project-level socialization* is preferred to laboratory-level socialization.[15] Overly-extensive socialization may dilute the other's uniqueness. If the local laboratory discloses too much information to the parent side, it runs the risk of losing its added value and also the legitimacy to maintain its autonomy. The parent side also loses the opportunity to learn from its heterogeneous local laboratory because of its over-involvement in local affairs.

Intense interaction at the project level, on the other hand, is more issue-specific and can be more rewarding to both sides. The degree of local autonomy and information sharing actually varies across different projects. Even if both sides socialize heavily on a particular project, it may not affect overall relations between the parent and the local laboratory. This partial, project-level interaction will protect the local laboratory from falling victim to the connected control syndrome associated with excessive socialization with the parent.

Besides such considerations, project-level socialization is more effective for information transfer than laboratory-level socialization. If information is shared among all the members on each side, specialized knowledge and points of view may easily be diluted, and information which requires specialization may not be conveyed accurately. In terms of information flow, project-specific transfers are more efficient because they do not entail the usual coordination across different projects (Allen and Hauptman, 1987).

6. Conclusions

Internationalization of R&D has recently attracted the attention of scholars as well as practitioners in international management. Although the topic remains underexplored, a body of literature focusing on the distinct features of managing international R&D has been growing. However, what's missing in the extant literature is a close investigation of the most appropriate management mechanism in managing international R&D. The literature focusing on the internationalization process of R&D is particulary sparse. It is probably because many studies on this issue have focused on the Western multinationals which internationalized their R&D units several decades ago. As a result, management of the already internationalized R&D activities has been the main focus of the literature.

On the other hand, R&D internationalization is a more recent phenomenon for many Japanese multinationals, many of which are still in a process of internationalizing their R&D units. These companies are exploring the best way of managing such a process. Because of the real-time nature of the phenomenon, it provides us with the opportunity to identify its evolving process of R&D internationalization.

The purpose of this paper was to identify the evolving nature of headquarters-subsidiary relationship during the entire process of R&D internationalization. In-depth data on five Japanese multinationals revealed that the role of overseas laboratories actually evolved over time. It generally shifted from the 'starter' of the newly-established laboratory, to the 'innovator' in charge of creative research within the overseas laboratory, and then to the 'contributor' in charge of diffusing knowledge and technology developed within the laboratory to the rest of the company.

And such a shift in role of overseas laboratories affected the nature of headquarters-subsidiary relationship accordingly. As a 'starter', the laboratory receives the strong support of top management and it enjoys high degree of its autonomy. Here the local laboratory is placed in a favorable position of *connected freedom*. As an 'innovator', its priority goes to original research within the laboratory. As local autonomy becomes most important for the local creativity, internal connectivity with the parent side is intentionally cut off. Here the situation of the local laboratory is *isolated freedom*. As a 'contributor', its expected role is to share its own knowledge and research output to the rest of the intra-firm units. Internal connectivity becomes important, and involving the local laboratory in the dense intra-firm linkages could constrain its structural autonomy. Here the extreme situation would be *connected control*. However, the local laboratory would strive for preserving their autonomy while strengthening ties with other intra-firm units.

An optimal position, *semi-connected freedom*, was identified as reconciling the two competing forces: need for local autonomy and need for information connectivity. It is the optimal position held by the typical overseas laboratories, especially in basic research, when they try to increase connectivity in information with the headquarters side while trying to keep as much autonomy as possible. In reality, more emphasis is put on information-sharing than on autonomy, since many overseas laboratories in the *isolated freedom* position are not satisfied with their freedom alone and

often attempt to increase information connectivity even at the expense of their current degree of autonomy to some extent.

To reach the state of *semi-connected freedom*, the local side increases process linkages with the parent, but without becoming totally immersed into it. To facilitate process linkage, an active broker's role (i.e. influencer) was frequently used. Socialization was also used but with some reservation. *Short-term socialization* (i.e. frequent visits to each other) was preferred to long-term socialization (i.e. expatriation). Rather than overly socializing to the point of resemblance, short-term frequent visits by different knowledge holders is a better way of avoiding the connected control situation. Similarly, *project-level socialization* was preferred to laboratory-level socialization, for over-extensive socialization may dilute the other's uniqueness. In sum, the advantages associated with the following managerial options were discussed: increases in process linkage, positive broker linkage via 'influencers', fostering communication through short-term socialization, and through project-level socialization.

Practical implications drawn from this research should be applicable for non-Japanese multinationals as well. The evolving nature of headquarters-subsidiary relationship during the internationalization process of basic research laboratories was identified as the shift from connected freedom to isolated freedom then to semi-connected freedom. It is likely that such a path is followed by the non-Japanese firms as well which install their basic research laboratories abroad mainly to compensate for what they do not have at home. For the late-internationalizers of basic research function, this study could serve as a reference for designing the appropriate headquarters-subsidiary relationship according to the differing stage of R&D internationlization. Most importantly, semi-connected freedom was identified as an optimal condition of overseas laboratories trying to reconcile the two competing pressures for local autonomy and need for information-sharing. Again, such an insight should be applicable for non-Japanese firms trying to internationalize their basic research units abroad to enhance their capability, because optimizing these pressures becomes unavoidable for them.

This study could offer some implications for several research fields. First, it adds value to the field of international R&D management by shedding light on the R&D (especially basic research) internationalization process of the Japanese firms, instead of the management of already established global R&D networks of the Western firms. Second, the study adds value to the field of international R&D management by identifying a particular coordination mechanism suitable for each differing stage of R&D internationalization. Third, it adds value to the field of multinational management by offering some new evidence on the emerging pattern of subsidiary-driven innovation to the new multinational models such as transnational (Bartlett and Ghoshal, 1989), multifocal (Prahalad and Doz, 1987) and heterarchy (Hedlund, 1986). And lastly, the study adds value to the field of Japanese headquarters-subsidiary relations by challenging the stereotype view of Japanese multinationals being ethnocentric and totally center-driven.

Although this is one of the first studies to focus on the evolving nature of headquarters-subsidiary relationship as the Japanese firms internationalize their R&D in Europe, it had the following limitations. First, the study focused only on the Japanese multinationals localizing their R&D in Europe. Therefore, conclusions drawn from this study reflect the Japanese and European nature. Second, the sample size is small while the study was in-depth. Third, while various efforts were made to triangulate findings, the research method was fundamentally exploratory. For these reasons, we cannot entirely claim generalizability of our findings.

Therefore, future research is suggested in the following directions. First, our future study could improve external validity by widening the geographical scope to conduct multiple regional analysis. The most natural extension of this research would be to include Japanese firms' overseas laboratories in the US. Second, we could consider taking other foreign owned laboratories in Europe other than Japanese firms, particularly to supply comparative information about non-Japanese R&D laboratories in Europe. This could also help to increase the sample size and to enhance external validity. Third, at some point, testing our argument by means of a large-sample questionnaire should be a meaningful step toward the development of a more general theoretical framework on international R&D connectivity. This present study represents our first step in that direction.

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Notes

1. 'R&D units established to help certain foreign subsidiaries transfer manufacturing technology from the U.S. parent while also providing related technical services for foreign customers' (Ronstadt, 1978, p. 8).
2. 'R&D units established to develop new and improved products expressly for foreign markets. These products were not the direct result of new technology supplied by the parent organizations' (Ronstadt, 1978, p. 9).
3. 'R&D units established to develop new products and processes for simultaneous – or new simultaneous – application in major world markets of the multinational organizations'. (Ronstadt, 1978, p. 9).
4. 'R&D units established to generate new technology of a long-term or exploratory nature expressly for the corporate parent'. (Ronstadt, 1978, p. 9).
5. In the original study, five more companies were included in the sample: Kao, Shiseido, Asahi Glass, Hitachi and NEC. However, the data on these companies are not explicitly referred to in this paper.
6. Our concepts of 'innovator' and 'contributor' refer to the role of overseas research laboratories and are independent of Ghoshal's (1986) earlier study of multinational innovation.
7. It is important to note that many of these labs studied have only recently reached this stage, and no overseas lab in our sample falls under this category in a true sense yet.
8. He has a point, because such a trade-off is consistent with the insight of network analysis on structural autonomy and constraint (Burt, 1992).
9. As for the phenomenon dealt with in this paper, the situation of *isolated control* (the lower-left corner of Figure 1) was not relevant.
10. In the most traditional case of internationalization by the Japanese firms, the expatriates usually enjoy substantial autonomy and information from the parent (i.e.*connected freedom*). In this case, extensive *socialization* (long-term/lab-level) takes place between the expatriates and the parent company. Shared values, beliefs, and a strong corporate culture help reinforce the ties between the expatriates and the parent. Tacit communication is prevalent among the Japanese managers. Since there is no need to articulate things which are already shared among them, knowledge conversion doesn't take place so frequently. On the other hand, the local staff (e.g. office clerks) are not members of the ethnocentric clan, and therefore they are not granted autonomy and information from the parent (i.e. *isolated control*).
11. While many pieces of evidence for the state of *semi-connected freedom* were identified, as presented above, I have not encountered any example of total connected freedom as for the overseas research labs of Japanese firms.
12. *Passive* broker linkage is a form of broker linkage played by the *translator*, who is defined as a mere conveyer of knowledge/information from the sender unit to the recipient unit without adding any interpretation or value.
13. *Active* broker linkage is a form of broker linkage played by the *influencer*, who is defined as someone capable of adding value and legitimacy to the knowledge transferred.
14. *Short-term* socialization includes frequent *visits* by each side. *Long-term* socialization includes the use of *expatriates* who stay on the other side for a significant period of time.
15. *Lab-level* socialization refers to a form of socialization among *all or most members* of the labs. *Project-level* socialization refers to a form of socialization among *project team members* on both sides.

