

Management of Global Innovation

—The Case of Japanese Companies—

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【Abstract】This book examines the strategic processes and organizational mechanisms of global innovation, as well as the globalization of research and development (R&D) activities by Japanese companies, using theoretical studies and empirical research. It contributes to the new development of theories of multinational companies (MNCs), R&D, and strategy. This book is an accumulation of the results of the author's studies on R&D and MNCs. I was presented the Japan Academy of Business Administration Award for a book in 2007, and I appreciate the award committee and referees. I am grateful to the supportive researchers and practitioners. The structure of this book is as follows.

Chapter 1. Introduction, theory, and methods (survey of existing studies, research framework, and data)

Chapter 2. Questionnaire surveys (parent companies and overseas subsidiaries)

Chapter 3. Case study of electric companies (Panasonic, NEC, Toshiba, and Mitsubishi Electric)

Chapter 4. Case study of automobile companies (Toyota, Honda, Nissan, and Mazda)

Chapter 5. Case study of chemical and pharmaceutical companies (Sumitomo Chemical, Eisai, Mitsubishi Chemical, Hitachi Chemical, Otsuka)

Chapter 6. Case study of other companies (Canon and HOYA)

Chapter 7. Discussion (integration of the results of empirical research)

Chapter 8. Conclusion (contributions and implications, limitations, and directions for future research)

1. Chapter 1. Introduction, theory, and methods

The purpose of this book is to examine the strategic processes and organizational mechanisms of global innovation as well as the globalization of research and development (R&D) activities by Japanese companies, using theoretical studies and empirical research. Existing studies have not examined the strategic process and organizational mechanisms that produce global innovation. As such, I surveyed the existing studies and classified them into five categories: (1) comprehensive survey of the globalization of R&D (e.g., Creamer, 1976); (2) typology of overseas R&D activities (e.g., Behrman & Fischer, 1980; Kuemmerle, 1997; Ronstadt, 1977); (3) investigation of factors affecting the globalization of R&D (e.g., Terpstra, 1977); (4) discussion of the management system of overseas R&D activities (e.g., Asakawa, 1996; Bartlett & Ghoshal, 1989); and (5) performance analysis of the globalization of R&D (e.g., Håkanson & Nobel, 2000; Hayashi, 1999). As a result, I found that the studies to analyze the strategic processes and organizational mechanisms that produce global innovation were not sufficiently performed. Therefore, I have insisted that the research be devoted precisely to this point.

Thus, one of the research frameworks is a global synergy of R&D resources between the home country's parent company and overseas subsidiaries, and between foreign subsidiaries. The global synergy of R&D resources implies the strategic process: overseas R&D subsidiaries accumulate R&D resources from the home country's parent company and local R&D environment; assimilate these accumulated R&D resources; generate new R&D resources; and apply generated new R&D resources in the subsidiaries, home country's parent company, and other foreign subsidiaries. Furthermore, I focused on the organizational mechanisms (organizational structure, information exchange, awareness reform, etc.). To analyze these strategic processes and organizational mechanisms, I conducted two questionnaire surveys each on parent companies and R&D subsidiaries, and analyzed the case studies of 25 overseas R&D subsidiaries.

2. Chapter 2. Questionnaire surveys

I conducted two questionnaire surveys on parent companies. The first was sent to 702 parent companies in 1993 and we received 126 valid responses. However, we found that 87 of the respondents were not conducting R&D activities; as a result, 39 samples remained for the analysis. The second questionnaire was sent to 507 parent companies in 1998 and we received 188 valid responses. However, we found that 93 of the respondents were not conducting R&D activities; as a result, 95 samples remained for the analysis. From these questionnaire surveys, I obtained the following results.

The conducting of R&D activities by overseas subsidiaries increased from 35 percent in 1993 to 52 percent in 1998. In addition, the expenditure on overseas R&D, as a percentage of total R&D, increased from 5.5 percent in 1993 to 7.6 percent in 1998. The top global industries that conducted R&D were electric and electronic machinery, chemical/pharmaceutical, machinery, and cars and parts. According to the surveys, the most common three reasons for conducting overseas R&D were "to be able to promptly respond to the needs of the local market," "to apply your parent company's product, equipment, and technology into this country," and "to employ and utilize local researchers and technicians." The average number of researchers/engineers was 98. Moreover, the proportion of R&D subsidiaries that produced results superior to those of the parent companies was 63 percent. Regarding the overall assessment of the performance of the R&D subsidiaries, the proportions of neither successful nor unsuccessful, successful, and unsuccessful R&D subsidiaries were 55, 39, and 7 percent, respectively. Concerning future plans, there were no withdrawals by the subsidiaries.

In addition, I conducted two questionnaire surveys on overseas R&D subsidiaries. The first was sent to 1091 subsidiaries in 1994 and we received 441 valid responses. However, we found that 191 of the respondents were not conducting R&D activities; as a result, 250 samples remained for the analysis. The second questionnaire was sent to 2155 in 1998 and we received 811 valid responses. However, we found that 422 of the respondents were not conducting R&D activities; as a result, 389 samples remained for the analysis. The distribution areas of these R&D subsidiaries were the US, China, Taiwan, UK, Singapore, Malaysia, and other countries (32, 9, 8, 7, 6, and 33 percent, respectively). I obtained the following facts from the questionnaire survey in 1998.

First, the accumulation of R&D resources was as follows. Seventy-four percent of R&D subsidiaries in Asian countries introduced "Japanese style" and "partly local style, basically Japanese style." On the other hand, about 50 percent of R&D subsidiaries in European countries and the US introduced "local style" and "partly Japanese style, basically local style." Second, the assimilation of R&D resources was as follows. The proportions of R&D subsidiaries in Asian countries that cooperated with parent companies and other foreign subsidiaries were 89 and 44 percent, respectively,

while the proportions of R&D subsidiaries in European countries that cooperated with parent companies and other foreign subsidiaries were 93 and 55 percent, respectively. Furthermore, the proportions of R&D subsidiaries in the US that cooperated with parent companies and other foreign subsidiaries were 89 and 31 percent, respectively. Third, the generation of R&D resources was as follows. The proportions of R&D subsidiaries in Asian countries, European countries, and the US that generated R&D results superior to those of the parent companies were 36, 58, and 67 percent, respectively. However, the proportions of R&D subsidiaries in Asian countries with neither R&D results nor papers and patents as basic research were 90 and 76 percent, respectively. Therefore, the main activity of the R&D subsidiaries in Asian countries was development. Fourth, the application of R&D resources was as follows. The proportions of R&D subsidiaries that transferred R&D results from the R&D subsidiary in Asian countries, European countries, and the US to parent companies were 23, 51, and 54 percent, respectively. Finally, concerning plans for the future, there were few withdrawals of the subsidiaries.

Based on the existing studies and above R&D situations, I propose the following hypotheses.

Hypothesis 1. The higher the accumulation of R&D resources from the parent company in an overseas R&D subsidiary, the higher the generation of R&D resources (performance) in that subsidiary.

Hypothesis 2. The higher the accumulation of R&D resources from the local environment in an overseas R&D subsidiary, the higher the generation of R&D resources (performance) in that subsidiary.

Hypothesis 3. The higher the assimilation of R&D resources in an overseas R&D subsidiary, the higher the generation of R&D resources (performance) in that subsidiary.

Hypothesis 4. The higher the generation of R&D resources in an overseas R&D subsidiary, the higher the application of R&D resources in the parent company.

Hypothesis 5. The higher the generation of R&D resources in an overseas R&D subsidiary, the higher the application of other foreign subsidiaries.

First, to verify Hypotheses 1-3, I conducted a multi-regression analysis using ordinary least squares and covariance structure analysis. The dependent variable was the generation of R&D resources (performance); independent variables were the accumulation of R&D resources from the parent company, accumulation of R&D resources from the local environment, and assimilation of R&D resources in an overseas R&D subsidiary; and control variables were the superiority of the local environment, autonomy, and difficulties in R&D activities. As a result, Hypotheses 2 and 3 are supported, while Hypothesis 1 is not. Second, to verify Hypotheses 4 and 5, I checked the correlation matrix. As a result, Hypothesis 4 is supported, while Hypothesis 5 is not.

3. Chapters 3-6. Case studies

To supplement the results of my questionnaire surveys, I conducted an interview and described the case studies from Chapters 3 to 6, based on the research framework. Chapter 3 contained a case study of electric companies (Panasonic, NEC, Toshiba, and Mitsubishi Electric), Chapter 4 contained a case study of automobile companies (Toyota, Honda, Nissan, and Mazda), Chapter 5 contained a case study of chemical and pharmaceutical companies (Sumitomo Chemical, Eisai, Mitsubishi Chemical, Hitachi Chemical, Otsuka, and others), and Chapter 6 contained a case study of other companies (Canon and HOYA). Consequently, Hypotheses 2, 3, and 4 were supported, while Hypotheses 1 and 5 were not.

4. Chapter 7. Discussion

In this chapter, I integrate the results of the empirical research (questionnaire surveys and case studies). The organizational structures conducting overseas R&D activities were the R&D departments within manufacturing subsidiaries (90%); these subsidiaries conducted development / applied research (93%). Therefore, although existing studies have focused on basic research, they have not captured the R&D activities.

I found two types of R&D activities, based on the reasons for conducting R&D. The first type is local synergy, based on less R&D environmental superiority in other countries (“to be able to promptly respond to the needs of the local market,” “to establish an integrated system ranging from R&D to production and sales,” and “to apply your parent company’s product, equipment, and technology into this country”). The second type is global synergy, based on more R&D environmental superiority in other countries (“to employ and utilize local researchers and technicians,” “to realize a global synergetic effect of R&D by exchanging R&D results with the parent company and other foreign subsidiaries,” and “to strengthen your R&D capabilities by conducting R&D in this country where some areas of R&D are advanced”). Therefore, there are many local-synergy-type subsidiaries in Asia, while there are many global-synergy-type subsidiaries in Europe and the US.

Regarding the accumulation, assimilation, generation, and application of R&D resources in strategic processes, my results indicated the following, based on a more detailed analysis. The proportion of local researchers/engineers in the overseas R&D subsidiaries was about 90 percent, while the proportion of local/national heads of the R&D department was about one third. Moreover, “local style” in R&D activities was introduced by about one third of these subsidiaries. About 50 percent of these R&D subsidiaries were those in which the mixture of information (knowledge) of local and Japanese R&D personnel has produced either synergetic effects or any new R&D results. Moreover, the proportions of R&D subsidiaries that frequently cooperate with parent companies and other foreign subsidiaries were about 50 and 10 percent, respectively, while the proportions of R&D subsidiaries that generate new products, patents, and papers were about 70, 30, and 60 percent, respectively. In addition, the proportions of R&D subsidiaries that have transferred R&D results to parent companies and other foreign R&D subsidiaries were about 40 and 30 percent, respectively. Therefore, there were many local-synergy-type R&D subsidiaries as a whole. Further, there were more global-synergy-type R&D subsidiaries in the electric and electronic machinery, chemical/pharmaceutical, and machinery industries, as well as in European countries and the US, than there were in other industries and Asian countries, respectively.

My results also indicated that global-synergy-type R&D subsidiaries had high levels of performance, as well as the organizational mechanisms for it. For instance, R&D subsidiaries had to employ excellent heads of the R&D departments because of their recruitment of excellent engineers and researchers. The requirements for these department heads were R&D ability and management capabilities. After recruiting employees, the department heads of the R&D subsidiaries were given the autonomy to reduce the turnover of core human resources. Further, a liaison organization was required to link the parent companies and R&D subsidiaries for global innovation.

5. Chapter 8. Conclusion

This research contributes to the new development of theories of MNCs, R&D, and strategy. My theoretical contribution to the study of MNCs is to substantiate global innovation management using

empirical studies. Existing studies, such as those of Dunning (1979), Hymer (1976), Rugman (1981), and Vernon (1966), have not discussed that the R&D resources of overseas subsidiaries are used in the parent companies. On the other hand, my study points out the importance of using the R&D resources of overseas subsidiaries in the parent company. This shows a change in focus from the theory of the utilization of firm-specific advantages to that of the completion of firm-relative inferiorities. From my results, I have also pointed out the effectiveness of the “metanational” theory (Doz, Santos & Williamson, 2001). My theoretical implication of the study of the knowledge-based view is to expand the global socialization, externalization, combination, and internalization (SECI) process. Previous research on the SECI process focused on the domestic side (Nonaka & Takeuchi, 1995), while my study indicates the importance of expanding the process globally. Furthermore, I show that these new theoretical contributions might be useful for practitioners.

Finally, the findings in this book have the following limitations. First, I studied Japanese overseas R&D subsidiaries, which do not necessarily represent those of other countries. Second, I did not focus on Japanese overseas R&D subsidiaries in developing countries, such as China and India, when choosing my case studies. Accordingly, the investigation of the overseas R&D subsidiaries of countries other than Japan, as well as Japanese overseas R&D subsidiaries in developing countries, is needed to broaden our understanding of this subject.

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