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Firm-level Factor versus National Institutional Difference: Ownership Structure in a Foreign Subsidiary of a Japanese Logistics Firm*

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Contents

Abstract

When a firm undertakes foreign direct investment, it must determine the level of ownership in its foreign subsidiary. This study examines the determinants of the ownership strategy of a Japanese logistics firm from the perspective of international business studies (IB). The study focuses on firm-level factors, including "contributed assets" for shaping firm-specific advantage which a parent firm possesses, "complementary assets" which such firm may need to acquire in a foreign country, and international experience. It also analyzes country-level factors including the institutional difference between a home country and a host country. The study conducts a Tobit regression analysis on the relationship between such factors and the equity ownership level in a foreign subsidiary based on the data-sets of Japanese logistics firms.

Key Words : Ownership Strategy, Foreign Subsidiary, Firm-Specific Advantage, International Experience, Institutional Difference

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I. Introduction

When a firm undertakes foreign direct investment by creating a foreign subsidiary, it must make decisions about its level of ownership in the subsidiary. The ownership strategy is the most important among various strategic decisions regarding foreign subsidiaries because it relates to effective control and governance of the foreign subsidiary and to its subsequent performance.[1] If the firm desires a higher level of ownership, it may create a wholly-owned subsidiary; if it desires a lower level of ownership, it may opt to create a joint venture.

Firms in both the manufacturing and service industries have shown a dramatic increase in their levels of foreign direct investment. Logistics firms are no exception. As Figure 1 shows, Japanese logistics firms that are members of the Japan International Freight Forwarders Association increased their foreign subsidiaries between 1981 and 2011.[2] Furthermore, their ownership strategies are more diversified. Some of these firms pursue a higher level of equity ownership in their foreign subsidiaries, while others opt for joint ventures with a lower level of equity participation. The firms also pursue different strategies according to different countries.

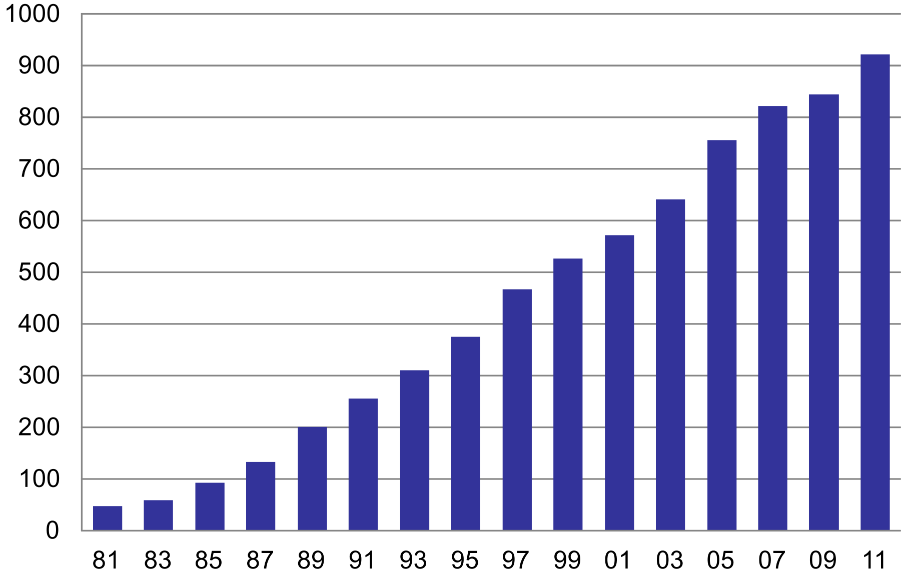
Few studies have explored the international ownership strategies of logistics firms with respect to foreign subsidiaries. Yet, logistics firms have been fast internationalizing themselves along the dramatic development of globalization of business. Their internationalization strategies, and especially their foreign ownership strategies, thus offer an important research opportunity to investigate whether logistics firms exhibit similar or different patterns of international business strategy compared with those of manufacturing firms and other services firms.

This study examines the ownership strategy of foreign subsidiaries of Japanese logistics firms from the perspective of international business studies (IB). The study focuses on both firm-level and host-country-level factors as determinants of the ownership strategy. The study conducts a Tobit regression analysis regarding the relationship between firm-level and host-country-level factors, on the one hand, and equity ownership levels of

1) Delios and Beamish(1999)
2) Japan International Freight Forwarders Association(2012)

foreign subsidiaries, on the other, based on data from more than 20 Japanese logistics firms and approximately 300 foreign subsidiaries.

<Figure 1> The number of foreign subsidiaries established by Japanese logistics firms that are members of Japan international freight forwarders association between 1981 and 2011



Source: Japan International Freight Forwarders Association (2012)

II. Contributed Assets

According to Buckley[3] and Peng[4], the main research themes in IB are "explaining the flows of foreign direct investment (FDI), explaining the existence, strategy and organization of multinational enterprises (MNEs), and understanding and predicting the development of the internationalization of firms and the new development of globalization."[5] The decisions regarding firms' foreign market entry mode strategies and their ownership strategies in foreign subsidiaries constitute one of the popular subjects in IB. Many theoretical and empirical studies have

3) Buckley(2002)
4) Peng(2004)
5) Buckley(2002), p.365.

illustrated significant implications for corporate managers who develop and implement international strategy. Certain studies have identified the following three firm-level factors with respect to the ownership level in a foreign subsidiary as important: contributed assets, complementary assets, and international experience.[6)]

Contributed assets are firm-specific assets and resources that a parent firm considers critical to the success of its foreign subsidiary because they are the source of competitive advantages according to the resource-based view, and these assets are transferred to the subsidiary.[7)] Contributed assets may range from a strong global brand and technology to general management capabilities, enterprise IT infrastructure, and human resources.[8)]

There are three core contributed assets that are considered to be specific to a logistics firm. First is information-related resource enabling a logistics firm to track and trace shipment information that may be integrated into a customer's information system.[9)] Many prior studies have noted that information-related resources exert the most significant impact on the strategic decisions of firms.[10)] Shang and Marlow[11)] note that "IT capability is viewed as a catalyst to avoid supply chain management failure. It can improve services and reduce costs simultaneously, and significantly influences overall logistics competency." Second is human resource that consists of highly skilled and motivated people.[12)] "Human resources (HR) are critical logistics resources since the logistics service is a "people" oriented business."[13)] Such resource gives significant impact on the quality and responsiveness of service and client satisfaction.[14)] Moreover, highly skilled and motivated people contribute to the development of trust and confidence in an organization.[15)] Third is knowledge that consists of technical expertise, market knowledge, and

6) Lu(2002); Delios and Beamish(1999); Anderson and Gatignon(1986); Bouquet et al.(2004); Chen and Hennart(2002); Gomes-Casseres(1990); Makino and Neupert(2000); Hennart(1991); Dikova and Witteloostuijn(2007); Chan and Makino(2007); Hennart and Larimo(1998)
7) Lu(2002); Delios and Beamish(1999); Peteraf(1993); Barney(1991)
8) Lu(2002); Delios and Beamish(1999)
9) Wong and Karia(2010)
10) Wong and Karia(2010); Myers et al.(2004); Bienstock et al.(2008); Shang and Marlow(2005); Karia and Wong(2013); Persson and Virum(2001)
11) Shang and Marlow(2005), p.219.
12) Wong and Karia(2010); Myers et al.(2004)
13) Wong and Karia(2010), p.54.
14) Wong and Karia(2010); Myers et al.(2004); Barney(1991)
15) Wong and Karia(2010)

managerial experience.[16] Knowledge is highly firm-specific because it encompasses human capital and organizational routine.[17] Knowledge can integrate corporate technologies and skills and develop inimitable capabilities.[18]

These contributed assets in the context of the logistics firm are unique and proprietary in nature.[19] A parent firm may face difficulty in transferring these assets beyond the organization itself.[20] Attempting to transfer contributed assets to foreign operations may accompany hazard.[21] Such assets may not be easily exploited in other contexts.[22] A logistics firm may also encounter difficulty in pricing these types of assets in a joint venture not only because of their proprietary and asset-specific characteristics but also because of difficulty in disclosing information for fear of losing trade secrets when a joint venture fails.[23] Consequently, a logistics firm possessing more contributed assets has a substantial incentive to choose a higher level of ownership and control in a foreign subsidiary. Accordingly, we set up the following hypothesis:

Hypothesis 1: A logistics firm with a higher level of contributed assets tends to choose a higher level of ownership in its foreign subsidiary.

III. Complementary Assets

The second firm-level factor is the complementary assets. When a firm enters a foreign market and transfers firm-specific assets and resources to an overseas subsidiary, the subsidiary may need host-country-related new assets that a locally operating firm could provide, such as local knowledge and a particular set of capabilities that are specific to the targeted host-country market.[24] These new assets that “complement” contributed assets are indispensable to gain the benefits which have relation with

16) Wong and Karia(2010)
17) Wong and Karia(2010); Bouquet et al.(2004)
18) Wong and Karia(2010); Yang et al.(2009); Olavarrieta and Ellinger (1997); Lai(2004)
19) Peteraf(1993); Anderson and Gatignon(1986); Wong and Karia(2010)
20) Anderson and Gatignon(1986); Barney(1991)
21) Bouquet et al.(2004); Brouthers and Brouthers(2003)
22) Erramilli and Rao(1993)
23) Grant(1987); Lu and Beamish(2004); Endo and Ozaki(2011)
24) Delios and Beamish(1999)

strategy, technology, and innovation.[25)] Complementary assets include local market intelligence, distribution channels, and insight into local cultural aspects of business practices.[26)] These new complementary assets are usually location- and function-specific.[27)] As such, they may not be efficiently traded in the market.[28)] Therefore, it may be difficult for a firm to acquire complementary assets. A higher level of transaction cost in procuring complementary assets in the market encourages firms to acquire such assets by choosing a lower level of ownership and forming joint ventures.[29)] Alternatively, a firm may wish to acquire complementary assets by establishing a wholly-owned subsidiary through the full-acquisition or replication of an existing firm.[30)]

The previous studies suggest that a joint venture may be more appropriate than full-acquisition or replication for the following three reasons. First, complementary assets tend to be location−specific and culturally sensitive.[31)] Consequently, if a firm pursues a high level of ownership, it may be faced with difficulties in managing the acquired firm.[32)] Accordingly, a firm may prefer to choose a joint venture rather than a wholly-owned subsidiary, particularly a replicated one, even if it may gradually increase the ownership level as the subsidiary has matured.[33)] Second, a firm may be able to reduce its risk and launch a large investment by forming a joint venture.[34)] Third, management and employee morale may not be weakened in the case of joint venture compared with full-acquisition.[35)] Accordingly, we set up the following hypothesis:

Hypothesis 2: A logistics firm that must acquire more complementary assets tends to choose a lower level of ownership in its foreign subsidiary.

25) Teece(1986); Lu(2002); Makino and Neupert(2000)
26) Lu(2002); Chen and Hennart(2002); Delios and Beamish(1999); Endo and Ozaki(2009)
27) Lu(2002)
28) Lu(2002)
29) Lu and Beamish(2004); Delios and Beamish(1999); Endo and Ozaki(2009)
30) Hennart(1991); Makino and Neupert(2000); Endo and Ozaki(2009)
31) Hennart and Larimo (1998); Endo and Ozaki(2009); Lu and Beamish(2004)
32) Hennart and Larimo (1998); Endo and Ozaki(2009)
33) Hennart and Larimo(1998); Hennart(1991); Endo and Ozaki(2009)
34) Meyer(2001); Endo and Ozaki(2009)
35) Hennart(1991); Endo and Ozaki(2009)

IV. International Experience

The third firm-level factor is international experience. Certain firms are able to accumulate significant internationalization experience, whereas others do not have such opportunities. Scholars have empirically examined the relationship between international experience and international strategy. Anderson and Gatignon point out that firms with limited international experience tend to be cautious with respect to foreign investment.[36)] Past studies also reveal that such firms are unable to accurately anticipate and evaluate the difficulty, uncertainty, and risk associated with internationalization.[37)] Moreover, a firm that has gained experience and accumulated capabilities and confidence in international business operations may have an incentive to more actively engage in international business and may desire tighter control of its foreign subsidiary.[38)] These empirical findings contribute to efforts to theorize international experiences that parallel the development of the concept of the liability of foreignness.[39)] An internationally experienced firm overcomes the additional costs typically encountered by foreign firms, known as the liability of foreignness, and manages its business as effectively as local competitors.[40)] Accordingly, a firm with extensive international experience may not need to form a joint venture with a local firm to overcome its liability of foreignness. Although international experience is an intangible asset of a firm, establishing the concept of the liability of foreignness helped separate international experience theoretically from other contributed assets. It is tempting to include international experience as an important contributed asset. However, the liability of foreignness shows that contributed assets are core competencies of a firm that are involved in both domestic and international operations, whereas international experience involves competencies that are specific only to a firm's internationalization.[41)] Therefore, distinguishing international experience

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36) Anderson and Gatignon(1986)
37) Anderson and Gatignon(1986); Delios and Beamish(1999 and 2001); Agarwal and Ramaswami(1992); Ando(2012); Endo and Ozaki(2009); Contractor and Kundu(1998)
38) Anderson and Gatignon(1986); Delios and Beamish(1999); Agarwal and Ramaswami(1992)
39) Eden and Miller(2004); Nachum(2003)
40) Dikova and Witteloostuijn(2007); Ando(2012)
41) Nachum(2003)

from contributed assets is important. In summary, international experience provides a firm with a competitive advantage similar to that of a first mover. The sooner that internationalization occurs, the more competitive the firm may be because of its ability to cope with the liability of foreignness in successfully integrating and mobilizing contributed and complementary assets. Thus, a logistics firm with extensive international experience would be less likely to form a joint venture with a local firm to overcome the liability of foreignness. Accordingly, we set up the following hypothesis:

Hypothesis 3: A logistics firm with more international experience tends to choose a higher level of ownership in its foreign subsidiary.

V. Institutional Difference

Firm-level factors, however, may not be the only factors that impact the decision of a firm to enter into a foreign market. The extent of a firm's exposure to the differences between the home- and the host-country business environments (i.e., national differences) will reveal the firm's challenges, difficulties and opportunities with respect to engagement in international business.[42] Thus, management must understand the differences between the home and host countries and prepare appropriate strategies to cope with these differences.

Institutional difference has become an increasingly important measure in capturing the differences in dimensions between two countries.[43] Institutions are composed of formal rules, laws and regulations that define a firm's market and also the broad spectrum of a firm's business activities, which includes relationships such as involvement in capital markets, labor relations, and other stakeholder relations. Institutions are also composed of informal rules, including social norms and cultures that affect the behaviors and expectations of customers, competitors, suppliers, employees and other stakeholders.[44]

Institutional difference between a home and a host country may affect

42) Dunning(1988 and 2000); North(1990)
43) Ando(2012); Eden and Miller(2004); Jackson and Deeg(2008)
44) Endo et al.(2011); Ando(2012); Delios and Beamish(1999); Gaur and Lu(2007); Kostova and Zaheer(1999)

the costs of conducting business in a host country.[45] The result of institutional difference might be additional costs, i.e., the liability of foreignness, which foreign firms encounter but local ones do not, discussed in the above. “Foreign firms may encounter unfamiliar institutional settings in a host country, which may raise transaction costs and impede their business activities.”[46]

Institutional difference may affect ownership strategy with respect to a subsidiary.[47] “Institutions, such as legal restrictions on foreign equity ownership, may affect timing, location, or entry mode decisions in different ways.”[48] Institutional difference affects the “comparative efficiency of governance structure.”[49] Because institutional difference may pose risk and uncertainty, such difference may impact on the level of a firm’s commitment to a foreign subsidiary.[50] By opting for a low ownership level in a foreign subsidiary, a firm may be able to pursue a flexible strategy in an uncertain environment.[51] Moreover, in a host country in which the institutional framework is substantially different from that of the home country, a firm may find it difficult to achieve external legitimacy and successfully transfer the assets and resources that form the basis of its competitive advantage.[52] Accordingly, we set up the following hypothesis:

Hypothesis 4: When institutional difference between a home country and a host country is greater, a logistics firm tends to choose a lower level of ownership in its foreign subsidiary.

VI. Method and Variables

The data are derived from the observations of a foreign subsidiary owned by a Japanese logistics firm during the 2007 fiscal year. The data

45) Henisz(2004); Ando(2012)
46) Ando(2012), p.260.
47) Eden and Miller(2004); Nachum(2003); Gaur and Lu(2007); Jackson and Deeg(2008); Brouthers(2002); Meyer(2001); Xu and Shenkar(2002)
48) Jackson and Deeg(2008), p.542.
49) Delios and Beamish(1999), p.917.
50) Jackson and Deeg(2008); Brouthers(2002); Meyer(2001); Ando(2012)
51) Anderson Gatingno(1986); Delios and Beamish(1999)
52) Eden and Miller(2004); Gaur and Lu(2007); Xu and Shenkar(2002)

are collected from the CD-ROM and print versions of the 2008 Handbook of Japanese Overseas Investments (Kaigai Shinshutsu Kigyo Soran), published by Toyo Keizai Shimposha. The sampling process consists of the following: First, we collected data from firms that were categorized into the following industry sectors: cargo transport, shipping, and warehousing/logistics. Second, we picked up the firms disclosing information with respect to the variables described below. The total number of observations is 296, collected from 36 Japanese logistics firms.

The dependent variable is the share of equity ownership of a Japanese logistics firm in the foreign subsidiary, which is determined from the CD-ROM version of the 2008 Handbook. Since the dependent variable is truncated at the values of 0.05 and 1, we conduct a Tobit regression analysis. The mean value of equity ownership share is 0.77. With respect to the independent variables, we operationalize contributed assets by using the percentage ratio of intangible fixed assets to total assets in a parent logistics firm, following Nachum.[53)] The expected sign of the coefficient for the ratio is positive. The data source for these two sets of assets is the annual financial reports of each firm. Scholars who focus on the strategies of foreign subsidiary ownership use different measures to evaluate assets and resources. Several studies have collected data for these measures through surveys that are distributed to a relatively limited number of logistics firms. Our study uses a ratio for which data are widely available that allows us to include a greater number of Japanese logistics firms and their foreign subsidiaries.

With respect to complementary assets, following Delios and Beamish and Hennart,[54)] we use the percentage ratio of subsidiary size to its parent logistics firm size in terms of employment as a proxy. If the parent firm engages in substantial foreign investment relative to its size, it may be forced to acquire more complementary assets from the local market. The expected sign of the coefficient for the relative size variable is negative. Data with respect to complementary assets are gathered from the CD-ROM version of the 2008 Handbook and Nikkei NEEDS database.

We operationalize international experience using two measures. First, we use the natural logarithm of the sum of years of operation for each foreign subsidiary of a parent logistics firm in the world (international measure).

53) Nachum(2003)

54) Delios and Beamish(1999); Hennart(1991)

Second, we use the natural logarithm of the sum of years since the date each foreign subsidiary was established in the host country (host country measure). The data source is the CD-ROM version of the 2008 Handbook. The expected sign of the coefficient for international experience is positive.

We evaluate institutional difference based on the World Bank's Governance Indicators, which form comprehensive institutional measurement framework.[55] The indicators are calculated within a range of 2.5 to -2.5 for six elements that include the following: voice and accountability, political instability and violence, government effectiveness, regulatory burden, rule of law, and corruption control. The higher the country score, the more transparent and accountable its institution. Several studies employ these indicators.[56] To evaluate the institutional difference between two countries, we use the Kogut and Singh's formula[57] which is designed to measure cultural distance scores:

$$\text{Institutional difference}_j = \frac{1}{6}\sum_{i=1}^{6}\left\{\frac{\left(I_{ij}-I_{ih}\right)^2}{\sigma_i^2}\right\}$$

where Institutional difference$_j$ is such difference between host country j and Japan, I_{ij} is country j's score of the ith institutional element, I_{ih} is Japan's score of the ith institutional element, and σ_i^2 is the variance of the ith institutional element.[58] The expected sign of the institutional difference variable is negative, as Hypothesis 4 predicts.

We control for several variables that might affect ownership level with respect to a foreign subsidiary. Subsidiary age is measured by the natural logarithm of total years since the subsidiary was established, of which information is collected from the CD-ROM version of 2008 Handbook. The size of a parent firm is operationalized by the natural logarithm of total number of employees based on information from the Nikkei NEEDS database. We include a dummy variable with a value of 1 for foreign subsidiaries that are owned by shipping firms to control for the impact of disproportionately larger asset ownership. We incorporate economic factors in the host country, measured by inflation ratio, the natural logarithm of GDP, and the natural logarithm of the total number of foreign subsidiaries, engaging in

55) Kaufmann et al.(2005)
56) Dikova and Witteloostuijn(2007); Dikova(2009); Ando(2012).
57) Kogut and Singh(1988)
58) Ando(2012); Ando and Endo(2013)

manufacturing sector in such country, established by Japanese firms. The data source for the total number of foreign subsidiaries is the print version of the 2008 Handbook. The information for inflation ratio and GDP is collected from United Nations database, IMF Economic Outlook, and government documents of each country.

VII. Estimation Results

Table 1 represents the means and standard deviations of the variables employed in this study. Table 2 represents the results of the estimates. The coefficient of the intangible fixed assets ratio served as the proxy for contributed assets is positive. This variable takes the expected sign and the result is statistically significant ($p<0.01$), which supports Hypothesis 1. The results also imply that Hypothesis 2 is supported. The relative size of a subsidiary to a parent firm with respect to employees, which measures complementary assets, carries the expected negative sign in its coefficient ($p<0.01$). The coefficients of international and host country measures that evaluate international experience demonstrate mixed results. The host country measurement has the expected positive sign in its coefficient. However, the international measurement unexpectedly has a negative sign. The institutional difference variable has the expected negative sign in its coefficient that is statistically significant ($p<0.01$). The result demonstrates a negative relationship between institutional difference and ownership level in a foreign subsidiary and provides support for Hypothesis 4.

<Table 1> Correlation coefficients and descriptive statistics

	Mean	S.D.	2	3	4	5	6	7	8	9	10	11	12
1.Equity ownership	0.77	0.28	0.05	-0.26	0.01	0.07	-0.25	0.08	0.06	-0.09	0.15	-0.12	0.08
2.Contributed assets	2.43	1.51		0.03	0.05	0.04	0.05	0.04	-0.15	-0.03	-0.08	0.08	-0.24
3.Complementary assets	2.91	5.09			-0.22	0.09	0.15	0.07	-0.30	0.18	0.04	0.08	-0.17
4.International experience: international measure	5.51	1.14				0.37	-0.17	0.18	0.64	-0.31	-0.11	-0.13	0.49
5.International experience: host country measure	3.06	0.91					-0.10	0.35	0.25	0.34	0.23	-0.12	0.10
6.Institutional difference	1.36	1.22						-0.41	-0.06	0.40	0.02	0.77	-0.16
7.Subsidiary age	2.66	0.89							0.10	-0.01	-0.08	-0.39	0.05
8.Parent firm size	8.69	1.40								-0.17	-0.08	-0.05	0.21
9.Japanese subsidiaries in host country	6.37	1.52									0.50	0.14	-0.20
10. GDP in host country	27.50	1.53										-0.04	-0.04
11.Inflation rate in host country	5.04	2.80											-0.13
12.Shipping firm dummy	0.23	0.42											

<Table 2> Estimation results

Variable	
Contributed assets	0.058**
	(0.023)
Complementary assets	-0.021**
	(0.006)
International experience: international measure	-0.142**
	(0.045)
International experience: host country measure	0.082
	(0.042)
Institutional difference	-0.133**
	(0.044)
Subsidiary age	0.038
	(0.039)
Parent firm size	0.049
	(0.030)
Japanese subsidiaries in host country	-0.063*
	(0.031)
GDP in host country	0.087**
	(0.023)
Inflation rate in host country	0.026
	(0.016)
Shipping firm dummy	0.193*
	(0.088)
Constant	-1.090
	(0.645)
log likelihood	-175.42
Chi-square	75.02
n	296

Standard errors in parentheses
**p<0.01, *p<0.05

VIII. Discussion and Conclusion

This study examined the determinants of the ownership strategy with respect to foreign subsidiaries that belong to Japanese logistics firms from the perspective of IB. The study focuses on firm-level factors that include contributed assets, complementary assets, and international experience. The study does not argue that these are the sole factors affecting ownership strategy. Instead, the study examines whether these three core factors, which are well documented in IB research, are important determinants of the ownership strategy for a foreign subsidiary of a Japanese logistics firm. The results that are based on the Tobit analysis demonstrate, as predicted, that contributed assets represent a positive impact at the ownership level, whereas complementary assets are associated with a negative impact.

Our analysis addresses the general relevance of the resource-based view of foreign subsidiary ownership strategy to a Japanese logistics firm. The study highlights the importance of assets and resources in the context of firm internationalization. Assets and resources provide the basis for competitiveness that allows firms to operate in foreign markets. These intangible assets lead to considerable variations in international strategy and subsequent performance even when a firm faces external challenges.

International experience, however, showed mixed results. Our initial hypothesis stipulated that international experience might indicate that a firm had accumulated capabilities and confidence in international business operations and, therefore, that a Japanese logistics firm with more international experience would prefer to enter into a foreign market independently and not to rely on the support of others. However, the results do not support this hypothesis.

The study also examined the impact of institutional difference between a host country and a home country at the ownership level. Institutional difference may affect the ownership decisions of a Japanese logistics firm and discourage a more significant commitment to a foreign subsidiary. Such a firm may choose optimal ownership levels in a foreign subsidiary by recognizing institutional difference and the value of its assets and resources.

The overall results suggest that Japanese logistics firms demonstrate patterns of entry mode decisions and foreign subsidiary ownership strategies that are similar to manufacturing firms and other service firms that have been examined in past studies. Japanese logistics firm behavior seems to offer evidence to support the observations with respect to the ownership strategy of foreign subsidiaries.

The limitations of this study and areas for future research may be as follows: First, we chose data that were derived from the observations of Japanese logistics firms and their foreign subsidiaries. This sample thus forms a single-country study, which limits the validity of the findings about the determinants. An expansion of the sample to include logistics firms from other countries would be beneficial in future studies. Second, it is necessary to improve the operationalization of contributed assets inherent in logistics firms. We employed the ratio of intangible fixed assets to total assets as a proxy for contributed assets. Future research may need to develop another metric that directly reflects the nature of contributed assets in a logistics firm and that includes human resources, knowledge, and competence. This might be undertaken by integrating qualitative methods that analyze contributed assets, such as conducting interviews and distributing questionnaires, with quantitative methods.*

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