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Long-Term Partnerships in Japanese Firms' Logistics Outsourcing: From a Sustainable Perspective

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Abstract: This study aimed to reveal the actual state of Japanese firms' logistics outsourcing, and examine their relationship with LSPs. This study addressed the following issues by conducting a case study of six leading manufacturing firms. First, it clarified the characteristics of Japanese-style logistics outsourcing as: the outsourcing of the total activities, the consigning to a single LSP, and the development of advanced information systems. Moreover, it examined the logistics outsourcing performance from a sustainable perspective, and concluded that Japanese-style logistics management enables firms to achieve high performance in all the economic, environmental, and social dimensions. Second, this study confirms that the traditional Japanese business practice of long-term partnerships is still maintained in logistics outsourcing management. Third, this study also explored how long-term partnerships create sustainable competitive advantages. Finally, based on these findings, a theoretical framework illustrating the relationship between Japanese-style logistics outsourcing and firms' sustainable competitive advantage is presented. Our findings may encourage companies to develop a long-term partnership with their logistics service providers, and to put environmental and social indicators into their KPI system to achieve a sustainable competitive advantage by balancing the economy, environment, and society.

Keywords: Japanese-style logistics outsourcing; long-term partnerships; trust-based collaboration; technology-enabled collaboration; sustainable competitive advantage

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1. Introduction

As a traditional business practice, maintaining long-term relationships with partner firms has been rooted in Japanese society for a long time [1,2]. It was regarded as a source of competitiveness for Japanese firms, and a fundamental factor that shaped Japanese-style management in the post-war economic miracle [3]. However, it was questioned recently, and criticized for its closure, rigidity, and low efficiency. There is active discussion of whether or not to maintain this practice in the current turbulent business environment [3–5].

On the other hand, long-term partnership is also a core concept of supply chain management. Many empirical studies demonstrate the substantial benefits and advantages of developing such partnerships with supply chain members [6]. However, most existing studies limit their examination to those with partners with high strategic importance, such as buyer–supplier [7,8]. However, the question remains whether firms are willing to develop long-term partnerships with less strategically essential business partners? With this in mind, this study focused on logistics outsourcing, and examines if Japanese firms develop long-term transactional relationships with their logistics service providers (LSP hereafter).

The selection of logistics outsourcing as the research object is mainly based on the following considerations. First, although prior studies indicate that firms normally enter into long-term contracts with LSPs, as Makukha and Gray point out, most logistics partnerships are still at operational, rather than strategic, levels [9]. Furthermore, recently,

an increasing trend toward short-term logistics contracts was reported, in response to increased uncertainty [10–12]. Therefore, it is necessary to investigate whether the current Japanese manufacturing companies are willing to develop long-term relationships with LSPs of less strategic importance.

Moreover, in today's era, when sustainable development is receiving increasing attention, logistics is seen as a key area for firms to incorporate sustainability into their strategies, due to its significant impact on cost, as well as on environmental and social dimensions [13]. Thus, it is meaningful to examine Japanese firms' logistics outsourcing from a sustainable perspective, and reveal the relationship between long-term partnerships and firms' sustainable competitive advantage.

This study aimed to reveal the actual state of Japanese firms' logistics outsourcing and examine their relationship with LSPs. For this purpose, a case study approach was adopted, and six representative Japanese manufacturing companies were selected as case firms. Based on the data collected through interviews and secondary sources, this study sought to address the following research questions: (1) What is the actual state of Japanese firms' logistics outsourcing? As well, how is their logistics outsourcing performance? (2) Whether or not Japanese firms are still maintaining the traditional long-term partnerships with their LSPs? (3) If so, what kinds of advantages have been achieved? Or, what is the mechanism through which long-term partnerships create sustainable competitive advantage?

2. Literature Review

2.1. Logistics Outsourcing Practice by Country

Logistics penetrated the business sector over the past 30 years, and was widely adopted by firms as a helpful approach in saving costs and achieving a competitive advantage [14–17]. Meanwhile, since the 1990s, logistics outsourcing also emerged as a significant topic in the literature. Among the existing studies, a strand examining logistics outsourcing practice by country was triggered by Lieb, who conducted a survey on logistics outsourcing among large American companies [18]. Similar surveys were since carried out in other countries such as China, the UK, Mexico, Singapore, Malaysia, and Australia [10–12,19–21]. These studies confirm that logistics outsourcing is actively promoted globally across both developing and developed countries. Table 1 compares the findings on logistics outsourcing practice by country; however, only the latest, relevant studies are presented here.

Through the comparisons, some similarities in logistics outsourcing shared by each country are revealed. First, most respondent firms only outsource basic logistics operations, such as transport and warehouse management, and intentionally maintain value-added logistics activities in-house, including distribution processing, information systems, 4PL, and manufacturing-related services. The extant research proposes two reasons for this. One reason is that the value-added activities are perceived by most user firms as too important to outsource [22]. The other reason may be LSP firms' lack of capability. As revealed by Rahman, most LSP firms in Australia specialize in only one or two basic logistics functions, and cannot offer the value-added or integrated services that user firms demand [10].

Second, another distinctive shared characteristic common to logistics outsourcing across countries is that most firms use multiple LSPs simultaneously. For example, in the UK, about 75% of companies use multiple LSPs, and the proportion of companies dealing with three or more LSPs is as high as 55% [11]. A similar trend is also observed in other countries such as China, Australia, and Mexico [10,19,21].

LSP firms' lack of capabilities, as mentioned above, is considered to be the primary reason for this. From the user firm's perspective, they have to employ multiple LSPs simultaneously to meet their logistical needs. Besides this, some other reasons are also suggested by the extant studies. For example, fear of risk due to a reliance on one particular partner, or the wish to increase operational flexibility might also be reasons for firms to intentionally use multiple LSPs [11].

Table 1. Comparisons of existing studies on logistics outsourcing practice in each country.

Research		Lieb & Bentz (2005) [12]	Jaafa & Rafio (2005) [11]	Rahman (2011) [10]	Sohail et al. (2006) [20]		Hong et al. (2004) [19]	Arroyo et al. (2006) [21]
Target Country		**US**	**UK**	**Australia**	**Singapore**	**Malaysia**	**China**	**Mexico**
Time		**2004**	**2003–2004**	**N.A.**	**1998**	**2000**	**2002**	**N.A.**
Over-view of the survey	Respondents	500 major American manufacturing companies	1258 logistics-related managers, selected from the Institute of Logistics and Transport Members' Directory 2000	216 companies from Australia's top 500 excluding banks, finance, insurance, and real estate companies	1000 randomly selected companies from Singapore	800 randomly selected companies from Malaysia	1010 randomly selected manufacturing companies from China	243 companies in various sectors (mainly medium to large companies)
	Valid samples	65	336	36	126	124	192	94
Percentage of firms using logistics outsourcing		80%	81.7%	66%	60.3%	67.7%	59.4%	78.7%
Percentage of firms using multiple 3PL companies		60%	75% (55% of respondents use three or more LSPs)	74%	73.7%	63%	89% (31% of respondents deal with five or more LSPs)	
Most-often outsourced logistics activities		Transport, customs clearance, freight payment, inventory control, shipping, tracking, and tracing	Warehouse management, inventory management, handling of raw materials and parts, and order processing	Warehouse management, order processing, vehicle/operation control, and shipment	Selection of shipping and transportation companies, order processing, and freight payment	Shipping, vehicle/operation management, freight payment, carrier selection, and inventory management	Freight forwarding, transport, and inventory management	Custom clearance, product delivery, fleet management and operations, supplier payment and auditing, shipment planning and consolidation
Motivations for, or benefits of, logistics outsourcing		Improved service, cost (the service factor exceeded the cost factor for the first time and became the most motivating factor)	Cost reduction, reduction of capital investment, focus on core business	Cost reduction, capital investment reduction, increased operational flexibility, new technologies, new skills and expertise, access to new markets, focus on core businesses	Increased flexibility, reduction of fixed investment	Saving time, improved customer service, payment and credit benefits	N.A.	Increased flexibility, focus on core business, customer service improvement
Outsourcing contract duration		Relatively long-term	Relatively long-term; however, a recent downward trend in long-term contracts of more than 5 years	Relatively long-term, however, significant increase in short-term contracts	N.A.	N.A.	Relatively short-term, more than 60% are temporary or contracts less than six month	N.A.

Source: Summarized by the authors based on Lieb & Bentz (2005) [12], Jaafa & Rafio (2005) [11], Rahman (2011) [10], Sohail et al. (2006) [20], Hong et al. (2004) [19], and Arroyo et al. (2006) [21].

The third characteristic indicated by the above table is that most respondent firms, except those from China, normally enter into long-term contracts with LSPs. For example, in the UK, long-term (2–4 years) contracts are most common, and more than half of respondent firms maintain their relationship with their LSPs for longer than five years [11]. Similarly, in Australia, more than 60% of contracts are long-term, lasting more than three years [10].

However, it should be noted that there is an increasing trend towards shorter contracts. Taking Australia for an example, compared to the previous studies, a recent study records a significantly larger percentage of respondents using 3PL contacts of less than one-year duration [10]. A similar trend is also reported in the UK and the US contexts [11,12]. Finally, another characteristic revealed by previous studies is that in most countries, the outsourcing decisions tend to rely more on economic factors than service, and cost is ranked as the top criterion in the choice of logistics outsourcing [10,19,21].

In summary, the extant studies provide a complete picture of logistics outsourcing from the perspective of different countries, and through cross-comparisons, the similarities in logistics outsourcing practices shared by each country are highlighted. However, it is worth noting that these survey studies have some problems. One problem is that their samples are relatively small. In other words, it is questionable whether looking at a small number of companies accurately captures the actual status of logistics outsourcing in each country. Second, the data are relatively old. Even the latest data listed here are over ten years old. As is well known, logistics is a dynamic industry in which market conditions change dynamically, and it seems that data from more than a decade ago alone cannot fully represent the current situation.

2.2. Long-Term Partnership as a Traditional Japanese Business Practice

As a traditional business practice, maintaining long-term relationships with partner firms is an approach that has long existed in Japanese society. Long-term corporate relationships usually have two typical forms [3,5]. One is called "*Zaibatsu*", referring to a group of companies in which numerous firms from diverse industries gather around the major bank, represented by Mitsui, Mitsubishi, and Sumitomo; and the other is called "*Keiretsu*", in which finished goods manufacturers are at the top, and relatively few subcontractors are hierarchically connected with them. *Keiretsu* is common in the automotive and electronics industries, with representative companies including Toyota, Honda, Toshiba, and Hitachi.

Against the backdrop of the post-war economic miracle of the Japanese economy, the long-term transactions attracted worldwide attention since the 1980s [1,2]. It regarded as one of the characteristics of Japanese management, and a source of the uniqueness and competitiveness of Japanese companies [23,24].

The establishment of this business tradition is largely due to cultural factors in Japanese society, in which the trust mechanism is of high importance. In such a context, both a firm and its partner have a strong willingness to commit to each other, based on mutual trust [23,25,26].

A series of empirical studies demonstrate that developing such partnerships with business partners brings firms substantial benefits and advantages over spot transactions. For example, firms enjoy significant economic benefits, because long-term transactions can save transaction costs regarding information collecting, negotiation, and monitoring [27–29]. Moreover, as some empirical studies reveal, long-term transactions also help firms improve productivity, capability, and competitive advantage over time. According to Umeki, the establishment of lean manufacturing systems largely relies on long-term transactions among Toyota and its suppliers [5]. Furthermore, as Fujimoto and Park reveal, long-term partnerships also mitigate risk, and help firms recover from the supply chains disruption [30].

However, with the increased uncertainty in the business environment, caused by the acceleration of globalization, IT diffusion, and the modularization of product, the practice of long-term partnership recently faced serious challenges in Japan. It was criticized as an old-fashioned business practice, due to its closure, rigidity, and low efficiency [2,5], and

there is active discussion of whether or not to maintain it in the current turbulent business environment [3,5]. In fact, over the past three decades, the business world witnessed the collapse of the traditional long-term transactions: *zaibatsu* undertook a series of mergers, and as a result, only three large financial groups remain; while *keiretsu* streamlined their relations with the suppliers [3]. Both of these changes imply that trust-based long-term relationships are no longer suitable for the current dynamic business environment [3].

2.3. Supply Chain Collaboration, Resilience and Sustainability

Another strand of research related to this study is the discussion of collaboration, resilience, and sustainability, from the perspective of supply chain management.

In today's complex and turbulent business environment, companies are exposed to numerous risks that may cause supply chain disruptions, represented by the current COVID-19 pandemic. Therefore, enhancing resilience, a capability that enables the supply chain to prepare for unexpected events, respond to disruptions, and recover from them, has become an urgent issue [7,31–35].

Collaboration, defined as two or more autonomous firms working jointly to plan and execute supply chain operations [36], is considered one of the most crucial factors in enhancing supply chain resilience [37]. In their pioneering work, Christopher and Peck identify collaboration, along with agility, visibility and velocity, and risk management culture as fundamental principles for improving resilience [7]. The importance of supply chain collaboration is further underscored by subsequent studies [8,38–40]. Meanwhile, the mechanism of how supply chain collaboration enhances resilience is also explored in some studies. For example, Cao et al. conceptualize supply chain collaboration as seven interconnecting elements: information sharing, goal congruence, decision synchronization, incentive alignment, resource sharing, collaborative communication, and joint knowledge creation [41]. Following this, Scholten and Schilder further identify the mechanisms as information-sharing, collaborative communication, joint relationship efforts, mutual dependency, and joint knowledge creation, and point out that collaboration is an antecedent of visibility, velocity, and flexibility [38].

More recently, with the increasing awareness of environmental and social issues, sustainability also emerged as a crucial issue in supply chain management [42], which calls companies to incorporate all the economic, environmental, and social objectives into their strategies to achieve sustainability [42–45]. Empirical evidence shows that sustainability and resilience are interrelated [43,46]. Thus, several studies attempt to integrate the two issues into the supply chains [42,43,45,47], and conceptual frameworks to achieve resilience and sustainability simultaneously are proposed [48].

Furthermore, the existing research proves the relationship between information technology and resilient supply chain sustainability [49]. For example, the research by Wang et al. found technological integration as a tool for resilient supply chain sustainability during COVID-19 [46]. Similarly, the study by Kayikci also shows that digitization has a massive impact on sustainability [50]. Moreover, Manavalan and Jayakrishna explore the potential opportunities in IoT-embedded sustainable supply chain for Industry 4.0 transformation [48].

3. Methodology

Most of the existing empirical research is based on surveys [22]. Although this approach is particularly useful in identifying trends and practices in logistics outsourcing, it appears to be less effective for in-depth and multi-perspective analysis [39]. Thus, many scholars advocate that more qualitative research, including group interviews with senior management, in-depth case studies, or longitudinal research, is needed to address the entire process [22,51,52].

In light of this, this study conducted a case study approach. Specifically, six manufacturing firms (from Company A to Company F) were selected as case firms, based on the following considerations: (1) They are all representative Japanese firms with relatively

large-scale, high-brand recognition, and advanced manufacturing systems. (2) They are all multinational enterprises running businesses on a global scale, which means their logistics management issues are complex. (3) All the firms are developing broad product portfolios, implying that they have various logistical demands.

We conducted multiple semi-structured interviews with senior managers responsible for logistics management at the case firms. The interviews were undertaken from 2020 to 2021, and lasted 45 to 120 min (Table 2).

Table 2. Case and interview details.

		Company A	**Company B**	**Company C**	**Company D**	**Company E**	**Company F**
Over-view of the company	Description of the company	Japanese subsidiary of a global healthcare equipment manufacturing company	A global company with main products including chemical materials, medical devices, and cameras	A global company with main products including turbines, rotary machines, inverters, and semiconductors	A global car audio manufacturer	A global company with main products including power cables, automotive parts, and electronic components	A global company providing a wide range of factory-automation-related products
	Sales (FY2021, consolidated, approximate number, JPY)	100 billion	2000 billion	800 billion	250 billion	800 billion	600 billion
	Employees (FY2021, consolidated, approximate number)	1700	70,000	25,000	10,000	48,000	28,000
Position of the interviewee		Logistics manager	Corporate planning manager	Procurement and production manager	Supply chain manager	Production planning manager	Supply chain manager
Inter-view	Date	27 August 2020 18 February 2021	15 October 2020 18 February 2021	13 November 2020 18 February 2021	13 November 2020 18 February 2021	13 November 2020 18 February 2021	15 October 2020 18 February 2021
	Length	120 min	80 min	100 min	60 min	45 min	120 min

4. Case Analysis and Findings

4.1. Japanese-Style Logistics Outsourcing

It is worth noting that Japan has an advanced third-party logistics industry, and it is listed in the top five, according to the latest World Bank Logistics Performance Index ranking [53]. Japanese firms also show strong performances, as illustrated by their average logistics cost, as low as 4.9 percent, accounting for sales [54]. Among Japanese companies, our case firms were particularly outstanding in logistics management. Table 3 depicts the case firms' logistics outsourcing revealed by the interviews. These detailed data help develop a complete picture of Japanese companies' current state of logistics outsourcing. We further compared these findings with the practices in other countries revealed by prior studies, and concluded the following characteristics that belong to Japanese firms.

First, in contrast to foreign firms, which usually outsource only basic operations of transport and warehouse management and intentionally maintain value-added logistics activities in-house, Japanese firms are more likely to outsource all their logistics operations, ranging from basic operations to value-added activities, such as manufacturing-related logistics, distribution processing, and information management. In addition, as shown in the cases of Company A and Company B, some customized logistics services, such as installation and repair, are also outsourced.

Second, in terms of the number of LSPs, unlike most firms in other countries that normally use multiple partners simultaneously, Japanese firms are more likely to restrict their transactions to a single LSP. Although, in some cases, multiple LSPs are involved in the operations, these subcontracting LSPs are hierarchically connected to the key LSP, and the key LSP takes all responsibility for the logistics operations.

Table 3. Logistics outsourcing of the case firms.

		Company A	Company B	Company C	Company D	Company E	Company F
Outsourced logistics activities		Transport, warehouse management, manufacturing logistics, information management, installation of the finished products	Transport, warehouse management, manufacturing logistics, information management, forwarding, repair	Transport, warehouse management, manufacturing logistics, information management, forwarding, distribution processing	Transport, warehouse management, manufacturing logistics, information management, forwarding, distribution processing	Transport, warehouse management, manufacturing logistics, information management, forwarding, distribution processing	Transport, warehouse management, manufacturing logistics, information management, forwarding, distribution processing
Outsourced company		3PL	Logistics subsidiary, 3PL	3PL (used to be the subsidiary belonging to the same group)	3PL	Logistics subsidiary, 3PL	Logistics subsidiary, 3PL
Outsourced companyselection method		Bid	Consigning to the logistics subsidiary	Consigning to the former logistics subsidiary	Bid	Consigning to the logistics subsidiary	Consigning to the logistics subsidiary; bid for 3PL
Logistics contract type/duration		Long-term	Long-term, including some short-term contracts for global logistics	Long-term	Long-term	Long-term	Long-term
Ware-house management system	Have WMS or not	No	Yes	Yes	Yes	No	Yes
	Introduction of the system	There is a warehouse management module in the system, but it is currently unused	Both the company and the LSP have the system. Through the system, operations such as giving commands, placing orders, payment, and cost analysis are performed	Both the company and the LSP have the system. The warehouse-related operations are dealt with by the LSP's system, while the manufacturing-related operations are dealt with by the company's own WMS.	The system was introduced and is managed by the LSP firm.		The system was introduced by the LSP
System integration	Have EDI or not	Yes	Yes	Yes	Yes	Yes	Yes
	Over-view of system integration	The system is partly open to LSPs.	Through the EDI, LSPs access the company's ERP data.	Through the EDI, the company shares manufacturing, warehousing, and sales data with LSPs, which report shipment data to the company through it.	The warehouse system is integrated to the company's system.	The systems for plants and warehouses are integrated into the systems of the headquarters and LSPs.	The LSP's systems are linked to the company's ERP system.
Performance metric indica-tors	Economic	Lead-time, rate of on-time delivery	Ratio of logistics cost for sales, cost analysis, lead time, service quality, customer satisfaction	Ratio of logistics cost for sales, analysis of logistics costs, service quality, individual operation efficiency	Lead time compliance rate, logistics cost, rate of joint delivery	No clear criteria	Ratio of logistics cost for sales, lead time, compliance rate, logistics quality, cost analysis
	Environmental	No clear criteria	Co_2 reduction, use of green energy	Co_2 reduction, use of green energy	Co_2 reduction, ratio of joint delivery	No clear criteria	Co_2 reduction
	Social	No clear criteria	CSR, SDGs	Human rights of workers	No clear criteria	SDGs	CRS, SDGs

Source: Summarized by the authors based on the interviews carried out for this study.

Furthermore, a profound finding from our case study is that Japanese companies prefer logistics subsidiaries belonging to the same group as their logistics partner. In fact, among the six companies studied, four outsource to a logistics subsidiary. It is quite different from the practice in other countries, especially in Europe, where companies usually seek a logistics partner in the marketplace through bids. Regarding the reasons for consigning a logistic subsidiary, Company B explains that Japanese companies normally enter into contracts by assuming a long-term relationship from the beginning. Therefore, they prefer to select reliable companies with which they can easily establish partnerships. Meanwhile, Company D provides another explanation that the subsidiary company has a better understanding of their logistics demand, so a better logistics service is expected.

Third, this study reveals for the first time that Japanese firms successfully developed sophisticated information systems with their LSPs. Specifically, five of the six companies implemented a warehouse management system (WMS), and all the case firms introduced electronic data interchange (EDI), which is an integrated system with their LSPs that enables real-time information sharing. Implementing such an information system requires a vast dedicated investment, which also means the partnership between users and LSPs must be maintained over a long time.

Fourth, Japanese firms realize cost reduction through a mechanism primarily based on the collaboration of users and LSPs. This is quite different from their foreign counterparts that save costs by selecting the firm offering the lowest bid price as their logistics partner. As revealed by Company B and Company F, they normally set a cost reduction goal with their logistics partner every year. To achieve that, they work together closely to conduct *kaizen* (continuous improvement) and rationalization. As these efforts accumulate, a significant cost reduction effect is achieved. Furthermore, Company C also mentions that they do not just focus on the logistics cost itself. Instead, they try to optimize the entire supply chain, and minimize the total cost, by working closely with their logistics partner to carry out lean production. As the total cost decreases, the logistics cost is also reduced.

Based on the above findings, it is confirmed that the traditional Japanese business practice of long-term partnership still exists in logistics outsourcing management. Furthermore, the partnership between Japanese firms and their LSPs is so close that it has reached the "strategic partnership" level advocated by Makukha and Gray [9].

Next, we examined the performance of the case firms by conducting Japanese-style strategic logistics outsourcing. First of all, it is confirmed from the interviews that significant economic performance is achieved. Taking the vital indicator used to measure logistics cost, 'the percentage of logistics cost accounting for sales' as an example, according to JILS, the average for Japanese manufacturing firms in 2020 is 4.94%, which is relatively low compared to the rest of the world. However, all the case firms, except for Company A, which deals with health equipment, a sector where logistics costs typically account for a higher proportion, are lower than that; some leading firms, such as Company B, Company D, and Company F even succeed in keeping it below 4%, which is an extremely low figure for manufacturing firms. Besides the cost, the case firms also perform well in other economic KPIs, such as lead time compliance rate and customer satisfaction. More notably, even during the current COVID-19 pandemic that caused severe logistics delays globally, the on-time compliance rate of the case firms remains high.

In addition to the economic dimension, the case firms also achieve great performance in environmental and social dimensions. Five of the six case companies put environmental and (or) social indicators into their KPIs. For example, Company B, Company C, and Company F actively promote the reduction of CO_2 emissions and the use of green energy. They regularly formulate their energy conservation plans, and report the progress to the Japanese government. Company D is actively carrying out joint delivery with regard to environmental considerations. For another example, three case companies set specific SDG goals, and are proactively dedicated to improving human rights and the working environment. In conclusion, the case firms are highly concerned about environmental and social issues, and actively incorporate sustainable objectives into their logistics outsourcing strategy.

Based on the above discussion, we confirm that Japanese firms still maintain the traditional business practice of long-term transactions in their logistics management, and tend to develop long-term partnerships with their LSPs. The long-term partnerships provide Japanese firms with significant management effects, helping them achieve high performance in all the economic, environmental, and social dimensions. In other words, long-term partnership is a fundamental factor that enables Japanese firms to carry out a sustainable supply chain.

4.2. Mechanisms by Which Long-Term Transactions Create Sustainable Competitive Advantage

In the following, we explore the mechanisms by which long-term partnerships create a sustainable competitive advantage for Japanese firms. To address this issue, we take further analysis of the interviews, following the three steps of data reduction, data display, and conclusion, suggested by Miles and Huberman [55].

We started to reduce the data to quotes and sentences in relation to collaboration with logistics partners (first-order codes) (Table 4). Afterward, we examined the data from two different perspectives. First, following the frameworks proposed by prior studies [38–40], we coded all first-codes into descriptive second-order categories, such as 'cost reduction', 'information sharing and visibility', 'flexibility and agility', or 'innovations'. This allowed us to develop a full picture of the management effects brought by long-term partnership-based collaboration. Therefore, we conclude that collaboration has significant management effects on promoting Japanese firms' cost reduction and innovation, as well as improving visibility, flexibility, and agility in their supply chains.

Table 4. Data analysis of interviews.

Data Reduction: Quotes and Sentences in Relation to Collaboration with Logistics Partners	**Coding: Management Effects of Collaboration**	**Re-Coding: Classifying the Types of Collaboration**
"*We work closely with our logistics partner and set a cost reduction goal every year. To achieve that, we conduct Kaizen. As continuous improvement is accumulated, significant cost reduction can be achieved... I think it is a better way (to realize cost reduction) compared to the traditional way of just asking the partner for a lower price.*" (Company B).	Cost reduction	Trust-based collaboration
"*We don't just focus on the logistics cost itself. Rather, we try to realize the optimization of the whole process and minimization of total cost by implementing JIT production system...As the total cost decreases, the logistics cost is also reduced.*" (Company C).		Trust-based collaboration
"*We implement joint deliveries as a means of reducing costs.*" (Company D).		Technology-enabled collaboration
"*The sophisticated information system we have put in place is very helpful in reducing costs.*" (Company F).		Technology-enabled collaboration
"*Almost all the logistics-related data are available in the system, so we can grasp the whole flow and almost every detail.*" (Company F).	Information sharing and visibility	Technology-enabled collaboration
"*We adopt Activity-based costing, named the ABC approach, that divides the cost into activity units and calculates the cost for each activity, which enables us to negotiate the cost with the LSP.*" (Company B).		Technology-enabled and trust-based collaboration
"*The information system is quite helpful in preventing the logistics process from being a black-box.*" (Company D).		Technology-enabled collaboration
"*We entrust the logistics management to our logistics subsidiary, a non-asset 4PL specializing in management. I think it [putting it in charge of logistics outsourcing] is an efficient way to keep the operations under control.*" (Company B).		Trust-based collaboration

Table 4. *Cont.*

Data Reduction: Quotes and Sentences in Relation to Collaboration with Logistics Partners	**Coding: Management Effects of Collaboration**	**Re-Coding: Classifying the Types of Collaboration**
"*Sometimes they [the LSP firm] offer extra services for us, and it really helps.*" (Company A)	Flexibility and Agility	Trust-based collaboration
"*...when changes occur on our side, they [the LSP [can always modify the logistics service in a quick manner accordingly.*" (Company B).		Trust-based collaboration
"*The logistics partner with [which we have] a long relationship responds to us very kindly. They are quite flexible.*" (Company D).		Trust-based collaboration
"*Their [the LSP firms'] biggest advantage is flexibility.*" (Company E).		Trust-based collaboration
"*Amid the Corona disaster, freight rates have skyrocketed and flights have been difficult to obtain, but we have maintained our current logistics service level by utilizing our information system and working with LSPs.*" (Company F).		Technology-enabled and trust-based collaboration
"*We work closely with them (the LSP firm) to conduct* kaizen *and rationalization. Such efforts lasting over the long term have a significant effect on cost reduction and competence enhancement.*" (Company C).	Innovations	Trust-based collaboration
"*We send technical staff to the LSP firm. By working with people from a different point of view, we get more opportunities to generate innovations.*" (Company C).		Trust-based collaboration

Next, we re-coded the data in terms of the types of collaboration, and found that, in addition to the traditional trust-based collaboration, there is another type of collaboration based on technology, named 'technology-enabled collaboration' (Table 4). Based on this finding, we conclude that, besides a commitment to mutual trust, a successful collaborative relationship also requires information systems that make collaboration technically possible. As shown in the interviews, IoT technology helps the case firms keep logistics management under control, prevents the operations from being a black box, and can be used as a tool to support firms' decision-making, especially in the current dynamic business environment. This finding is also consistent with the conclusions of other studies [48,56] that emphasize the essential role IoT technology plays in the current era.

5. Conclusions and Discussion

This study addressed the following issues by conducting a case study on the logistics outsourcing management by six leading Japanese manufacturing firms. First, it reveals the actual status of logistics outsourcing in Japan, which remains an under-explored research topic. By comparing our findings with the practices in other countries reported by prior studies, the characteristics of Japanese logistics outsourcing are distinguished as the outsourcing of the total activities, the consigning to a single LSP, and the development of advanced information systems, which is named as a Japanese-style long-term partnership. Meanwhile, we also examined the logistics performance of the case firms from a sustainability perspective, and found that all the case firms achieve a good performance in all the economic, environmental, and social dimensions. Based on these, we conclude that long-term partnerships significantly contribute to Japanese firms' sustainable competitive advantage.

Second, our study confirms the ongoing existence of the traditional Japanese business practice of long-term transactions in logistics outsourcing management. More importantly, besides the traditional trust-based collaboration, which is well recognized by the extant research, this study identifies another type of collaboration characterized by being enabled by IoT technology, named 'technology-enabled collaboration'. It is an important finding that well explains why nowadays, long-term partnerships are maintained in some cases and not in others. Long-term partnerships that only rely on trust are difficult to adapt to the current complex and rapidly changing environment. Companies need to invest more in information systems and enhance cooperation with business partners on information sharing.

Third, this study also reveals how long-term partnerships create a sustainable competitive advantage for Japanese firms. On one hand, long-term partnerships with LSPs create collaboration based on mutual trust; on the other hand, these partnerships facilitate the dedicated investment in IoT systems, and create technology-based collaboration. Both of these have significant effects on reducing costs, improving visibility, flexibility, agility, and facilitating innovation. Consequently, all these managerial effects contribute to a firms' sustainable competitive advantage.

Based on these findings, we present a theoretical framework illustrating the relationship between Japanese-style logistics outsourcing and firms' sustainable competitive advantage (Figure 1).

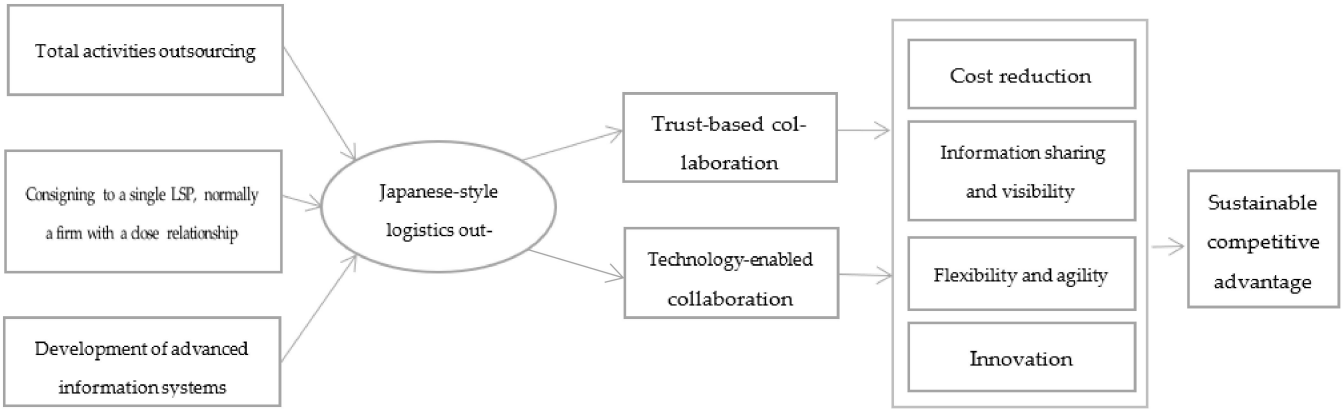

Figure 1. Theoretical framework illustrating the relationship between Japanese-style logistics outsourcing and firms' sustainable competitive advantage.

Our study is of high importance for practitioners as well. First, it shows that developing a long-term partnership with their LSPs is a good option for companies, because the collaborative relationship can bring them significant economic benefits. More importantly, in the case of crises, such as the current COVID-19 epidemic, it helps companies quickly recover from supply chain disruption and maintain a high level of logistics services.

Second, another important implication of this study is that companies should invest more in information systems. In the current volatile environment, mutual trust alone is not enough for a successful collaboration. It is essential to develop a sophisticated information system to enable data sharing among the supply chain members in a real-time and fully transparent manner.

Third, our research also shows that in the selection and evaluation of LSPs, companies need to put more environmental and social indicators into their KPI system, in order to achieve a sustainable competitive advantage by balancing the economy, environment, and society.

Lastly, two future research agendas are suggested. First, given that this study restricted its research scope to large manufacturing firms, future studies should include more small and medium-sized enterprises, and compare their practices with those of large firms, to provide more valuable insights into Japanese firms' logistics outsourcing. Second, we recommend for future research to empirically test our propositions with quantitative data, so that generalizability and validity of our findings are increased.

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