An Evaluation of Logistics Services' Requirements of International Distribution Centers in Taiwan

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**Abstract**

Due to the rapid development of international logistics, the role of international distribution centers has become increasingly important. This study examines the logistics services' requirements of international distribution centers from both shippers' and freight forwarders' perspectives. The paper's findings suggest that cargo safety is perceived as the most important service attribute, followed by cargo tracing and tracking service, customs clearance, inland transportation, and electronic transmission. The results indicated that four service factors were found to significantly differ between shippers and freight forwarders, namely, value-added services, consolidation services, distribution services, and support services.

The globalization of business has had a tremendous impact on the way companies operate today. The scope of globalization runs the gamut from foreign purchasing...
of raw materials and supplies and selective sales in international markets with extensive use of intermediaries, to multifaceted international manufacturing and marketing strategies encompassing international production sites, multiple staging of inventory, and counter-trading product sales. The growing international dimension of both the inbound and outbound portions of supply chains has had, and will continue to have, a major impact upon the logistics system and transportation requirements of companies (Coyle, Bardi, and Langley 1996). In particular, transport demand requires efficient integrated moves, premium package services, and making the best use of available modal transport operations and international distribution centers. Thus, the role of international distribution centers as home bases for merchandise transportation and distribution has become increasingly important (UNCTAD 1995).

A distribution center has been defined as "a warehouse of finished goods; also applied to the facility from which wholesale and retail orders may be filled; a materials warehouse would also be a distribution center for buyers of its stock" (Cavinato 1989). It provides a number of service attributes to shippers, such as storage, cargo tracking, inland transport service, customs clearance service, consolidation, packaging, labeling, assembly, and documentation services. Some of these attributes can be expected to be more important than others to customers, and not all customers will attach the same importance to any particular attribute. To develop a distribution center service responsive to customer needs, it is necessary to determine the individual importance of service attributes.

This article presents the primary objective for evaluating the importance of international distribution centers in relation to major users' (shippers' and freight forwarders') requirements. The research was limited to examining the service requirements of international distribution centers in Taiwan, the Republic of China. The second section discusses the definition of international distribution centers. The third section details the research methodology, and the fourth section presents an empirical analysis. Conclusions drawn from the analyses and marketing implications for international distribution center operators are outlined in the final section.

LITERATURE REVIEW

Definition of International Distribution Center

The distribution center is virtually synonymous with the warehouse since most goods in a warehouse are in somebody's distribution system. In distribution channels, warehouses are intermediate storage points between the manufacturer and retailers. A distribution center is a warehouse that emphasizes the rapid movement of goods (Johnson and Wood 1996).

In this study, an international distribution center is defined as a place that integrates the operations of manufacturing with land, sea, air transportation, storage, port, and customs operations in order to achieve the efficient distribution of commodities (International Maritime Organization 1991). This integration will enable a streamlined management operation to reliably and punctually deliver raw materials from manufacturing facilities to the consumer market. Such management practice
will eliminate production and distribution bottlenecks, reduce merchandise flow time, decrease product cost, provide dynamic commodity flow information, and maintain an efficient logistics distribution system of commodity flows. Utilizing a composite warehouse operation, the commodity will be distributed just-in-time on demand, thereby reducing the overall transportation cost and ultimately benefiting consumers.

From a seaport operator's perspective, international distribution centers provide several value-added activities in an integrated logistics system, e.g., consolidation, packaging, labeling, assembly, economic processing, bar coding, bonded storage, and distribution. International distribution centers at major Asian airports and seaports, include, for example, Kepple Distripark (Singapore), Alexandra Distripark (Singapore), Pasir Panjan Distripark (Singapore), Hong Kong International Distribution Center (Hong Kong), Yokohama Port Cargo Center (Yokohama), and Yes Logistics DistriPark (Kaohsiung).

A body of literature has developed that investigates third-party providers' perceptions of logistics service offerings and attempts to provide some managerial recommendations to meet customers' requirements (lieb and Randall 1999; Murphy and Porst 1998; Leahy, Murphy, and Poist 1995; Langley, Alien, and Tyndall 2002). This study specifically examines the service attributes of for-hire international distribution centers closed to seaports from both freight forwarders' and shippers' perspectives. Warehouses or distribution centers closed to seaports are considered in this research, including container freight station warehouses, processing zones, and inland container depots. Private distribution centers or warehouses are not considered in this study.

Service Attributes of International Distribution Centers

A number of previous studies have addressed the issue of the importance of service attributes of distribution centers or warehouses (Johnson and Wood 1996; Bowersox and Closs 1996; Lambert and Stock 1993). Johnson and Wood (1996) provided a list of services attributes of public warehouses consisting of bonded storage, office and display space, integrated data-processing equipment, inventory level maintenance, local delivery or tendering outgoing movements to carriers, unpacking, testing, assembling, repacking, price marking, and securing collateral goods for loans. Distribution centers in the supply chain perform sorting and storage functions, indicating they are points where goods are concentrated, and from this concentration a new and different assortment of goods is selected and is moved forward to be dispersed to the next level.

Lambert and Stock (1993) explored distribution centers and found three basic functions: movement, storage, and information transfer. A distribution center will perform the following activities: receiving and unloading trailers or box cars, put-away, storage, replenishment of order-picking locations, order selection (picking), checking, packaging and marking, staging and consolidation, loading and shipping, clerical/administrative, housekeeping, and maintenance of material handling equipment. Bowersox and Closs (1996) examined the function of warehouses on the basis of economic and service benefits. Four basic economic benefits were consolidation, break bulk and cross-dock, processing/postponement, and
stockpiling. Five basic service benefits were achieved through warehousing, namely, spot stock, assortment, mixing, product support, and market presence.

In Coyle, Bardi, and Langley's (1996) study, a public warehouse was found to provide such services as testing, assembly, price marking and lot number marking, packaging, order picking, stretch wrapping, order fulfillment, and EDI transmissions. In addition, a public warehouse offered traditional public warehousing services such as a bonding service and field warehousing.

Through an Internet search, an evaluation of the service attributes of international distribution centers in main ports was undertaken. These included Kepple Distripark (Singapore), Alexandra Distripark (Singapore), Pasir Panjan Distripark (Singapore), Hong Kong International Distribution Center (Hong Kong), and Yokohama Port Cargo Center (Yokohama). In an appraisal of previous studies and related Internet information regarding international distribution centers, service attributes were perceived to be related significantly to distribution, storage, and information activities. Many were associated with goods' safety, storage, cargo tracing, arrangement of inland transportation, customs service, consolidation, electronic documentation, and sorting, etc. This suggested that service dimensions, such as information service, storage service, consolidation, and distribution service had become extremely important in international distribution center services, consistent with findings in third-party logistics studies (Lieb and Randall 1999; Murphy and Poist 1998; Leahy, Murphy, and Poist 1995; Langley, Alien, and Tyndall 2002).

Another important point derived from previous studies is that shippers not only require one service dimension (storage) but also need other service dimensions, such as information service, consolidation, distribution, etc. This article therefore contends that shippers and freight forwarders might have differing service needs, which can be used to segment markets and target marketing strategy. From a thorough literature review of both academic and practitioner journals, thirty service attributes were selected for use in the questionnaire survey in the present study. They are listed below:

* Cargo handling
* Cargo reverse
* Cargo inspection
* Goods' safety
* Bonded service
* Special cargo storage
* Import unpacking
* Export stuffing
* Multiple countries consolidation
* Inland transportation
* Import distribution
* Export distribution
* Multiple countries distribution
* Bar code recognition
* Electronic transmission
* Cargo tracing and tracking
* Electronic commerce
* Assembly
* Stripping
* Packaging
* Kitting
* Labeling
* Cargo processing
* Bar coding operation
* Customs clearance
* Insurance service
* Financial service
* Exhibition
* Provision of market information
* Multi-function meeting room

**METHODOLOGY**

The questionnaire survey was employed in this study. The questionnaire design stages followed the seven stages outlined by Churchill (1991). A content validity was tested through a theoretical review and pilot test, i.e., questions in the questionnaire were based on previous studies and discussions with a number of
logistics executives and experts. The questionnaire items were viewed as relevant by logistics executives and accepted as possessing content validity.

Defining the Population and Sample Selection

The sample of customers of international distribution centers in this study specifically focused on shippers and freight forwarders. Freight forwarders arrange movement for the shipper. They act as agents for shippers by applying familiarity and expertise with ocean shipping to facilitate through movement. They represent the shipper in arranging such activities as inland transportation, packaging, documentation, booking, consolidation, insurance, warehousing, and customs clearance. Freight forwarders are, therefore, a critical strategic decision for shippers involved in the utilization of international distribution centers. Hence, freight forwarders were included in this study.

The shippers' sample was selected from the List of Leading Firms in 2000 With Good Export & Import Performance, published by the Board of Foreign Trade of the Ministry of Economic Affairs in Taiwan. Due to limitations of finance and time, only the top 500 export firms (shippers) were selected for the questionnaire survey. The population of freight forwarders was drawn from Members of the International Ocean Freight Forwarders Association, Republic of China, in 2000.

The five-page questionnaire survey was sent to managers and executives of 723 ocean freight forwarders and the top 500 export firms (shippers) in Taiwan, in May 2001. The potentially effective population size of 1,223 was reduced to 1,208 because fifteen managers had left companies or businesses that were no longer in existence. Ultimately, the total useable responses were 204 out of 1,208, of which 110 were from ocean freight forwarders, and 94 from shippers. The overall response rate for this study was therefore 16.89 percent (see Table 1). Attitudes about each of the service attributes used in the questionnaire were assessed using a seven-point Likert scale where 1 = very unimportant and 7 = very important. Several statistical techniques, including factor analysis and analysis of variance (ANOVA), were used in this study.

RESULTS OF THE EMPIRICAL ANALYSES

Characteristics of Responses

This section presents demographic characteristics of responses according to type of firm: shippers and freight forwarders. All analyses were carried out using the SPSS 8.0 for Windows package.

Profile of Shipper Respondents

As shown in Table 2, 35.1 percent of shipper survey participants were sales representatives, 31 percent were directors/vice directors, 14.9 percent and 13.8 percent were clerks and others, respectively, and 2 percent were either vice presidents or above or managers/assistant managers. Generally, in Taiwan, the shipping division is in charge of a company's logistics activities; therefore, this division's managers' or employees' views on international distribution centers'
service requirements are more useful than those of personnel in other divisions. However, in many firms the shipping division is low in the organizational hierarchy and oversight of shipping or logistics activities is transferred to persons in the business division. This explains why very few vice presidents or above or managers/assistant managers participated in the survey. The vast majority of shippers were manufacturers (69.2 percent). Remaining shippers were trading companies (28.7 percent) or involved in other types of business (2.1 percent).

Table 2 shows the main cargo items of responding firms from among shippers. Metal products were indicated as a major cargo item by 17.0 percent of respondents, 12.8 percent referred to machinery as their primary cargo item, while for less than 10 percent main cargo items were textile products, chemical products, rubber and plastic products, paper products, cars and parts, processed food, shoes, and electrical machinery and apparatus. Wooden products were not considered a main cargo item by any responding firms.

The survey also explored shippers' main overseas markets. As can be seen in Table 2, North America was the major overseas market for 31 percent of responding firms, 20 percent focused on the European market, while 16 percent concentrated on Mainland China. For 10.6 percent and 11.7 percent of responding firms, main overseas markets were North Eastern Asia and Hong Kong, respectively. Finally, South East Asia, Australia, South America, and the Middle East were main overseas markets for 5.3 percent, 3.2 percent, 1.1 percent, and 1.1 percent of respondents, respectively.

Table 2 also shows the average monthly cargo volume of shippers in terms of TEUs. Well over half of shippers (61 percent) of responding firms' average monthly cargo was below 20 TEUs. Twenty-four responding firms (22.3 percent) had an average monthly cargo volume between 21 and 100 TEUs, while 16 respondents (or 14.8 percent) had between 101 and 1,000 TEUs. In contrast, only two (or 1.9 percent) had an average monthly cargo volume of over 1,000 TEUs.

Shippers' main carrier selection is also presented in Table 2. The results shows that 42.6 percent of responding firms selected freight forwarders as their main carriers, while 32.9 percent and 24.5 percent of firms referred to ocean shipping companies (ocean carriers) and shipping agencies as their main carriers, respectively. This is not surprising since most companies in Taiwan are small and mediumsized firms that lack in-house staff with international logistics expertise and thus must outsource the management of their international freight flows.

Profile of Freight Forwarder Respondents

As can be seen in Table 3, more than 90 percent of respondents from freight forwarders were vice president or above or manager/assistant manager. Relatively
few respondents were director/vice director, sales representative, or "other" (2 percent, 1 percent, and 7 percent, respectively). Table 3 also shows the number of years freight forwarders had been operating. Just over a quarter (30.9 percent) had been in operation for more than 20 years, while 29.1 percent had been operating between 11 and 20 years. A similar percentage (29.1 percent) was less than 5 years old, while (10.9 percent) was between 6 and 10 years old.

The ownership pattern of freight forwarder respondents is also shown in Table 3. Well over half (66.7 percent) of freight forwarder respondents were local companies, while 25 percent and 8.3 percent were joint venture with local and foreign companies, and foreign companies, respectively. Table 3 also provides details of the sales growth rate of responding firms. Over 13 percent had a sales growth rate of more than 20 percent. In contrast, 9.6 percent had a negative sales growth rate. More than half (60.6 percent) had a sales growth rate between 0 and 10 per cent, while 16.3 percent had a sales growth rate between 11 and 20 percent.

Respondents were asked to provide information concerning their firms' annual revenues. The results in Table 3 indicate that while just over half of respondents (56.2 percent) reported annual revenues of under NT$49 million, 17.1 percent revealed annual revenues of NT$400 million or more, and 26.7 percent had annual revenues between NT$100 million and NT$399 million.

The Use Intention of For-Hire International Distribution Centers

According to the author's in-depth interviews with international distribution center operators, the current operations of international distribution centers in Taiwan are located mainly at container freight station (CFS) warehouses inside container terminals and inland container depots outside the port. At Kaohsiung Port there is a dedicated container terminal system. Most container terminals are leased to major shipping lines. It should be noted that only freight forwarders or logistics companies, subsidiaries of shipping carrier-based companies, can operate logistics services in CFS warehouses. For example, Yes Logistics Corporate (which is also a freight forwarder) is a subsidiary of Yang Ming Line, while Maersk Logistics and APL Logistics are subsidiaries of the Maersk Sealand Shipping Line and the America President Line (NOL group), respectively. They provide logistics services to shippers and freight forwarders.

With the development of international logistics, a for-hire international distribution center has been developed at major Asian seaports, for example, Kepple Distripark (Singapore), Alexandra Distripark (Singapore), Pasir Panjan Distripark (Singapore), Hong Kong International Distribution Center (Hong Kong), and Yokohama Port Cargo Center (Yokohama). In Taiwan, there are no concentrated, high floor buildings designed as for-hire international distribution centers, as in Singapore and Hong Kong. This research, therefore, sought to examine the use intention of a for-hire international distribution center if one were to be developed in Taiwan.
A comparison of the level of agreement with use intention between shippers and freight forwarders is shown in Table 4. In general, the level of agreement accorded to use intention by freight forwarders was higher than that indicated by shippers. Shippers showed a low use intention of a for-hire international distribution center (below 4.0 on the 7-point scale), while freight forwarders indicated a high use intention (over 4.0 on the 7-point scale). This is not surprising because this kind of international distribution center is close to a seaport. A warehousing service is an important consideration for freight forwarders. Most shippers are likely to have their own private warehouses. Thus, the use intention of shippers was lower than that of freight forwarders. Nevertheless, both shippers and freight forwarders expressed a preference for transferring current warehousing operations into an international distribution center rather than leasing or investing in it.

Importance of International Distribution Centers’ Service Attributes According to Shippers and Freight Forwarders

This survey also sought to identify the most important service attributes of international distribution centers. Results indicated that the ranking of distribution centers’ service attributes differed between shippers and freight forwarders, as shown in Table 5. Four service attributes stood out as being very important to shippers (their mean scores were over 6): cargo safety, cargo tracing and tracking, inland transportation, and customs clearance. In contrast, the least important service attributes to shippers were bar coding, stripping, exhibition, cargo processing, and provision of a multi-function meeting room (their mean scores were below 5). For freight forwarders, the five most important service attributes were cargo safety, cargo tracing and tracking, multiple countries consolidation, export
stuffing, and bonded storage. The five least important service attributes for freight forwarders were cargo processing, provision of market information, financial service, exhibition, and multi-function meeting room. These five least important service attributes were support-related services.

Overall, the level of importance accorded to service attributes by shippers was lower than that accorded by freight forwarders. The means for shippers' ranking of cargo safety and cargo tracing and tracking service were 6.26 and 6.22, respectively, compared to 6.56 and 6.52, respectively, for freight forwarders' ranking. The provision of a multi-function meeting room was rated the least important item by both shippers and freight forwarders; mean scores were 4.42 and 5.06, respectively.

With the exception of inland transportation, customs clearance, insurance service, financial service, import distribution, export distribution, and provision of market information, twenty-three service attributes differed significantly in terms of importance at the 0.05 statistical level. Notably, the largest mean difference between shippers and freight forwarders was related to multiple countries consolidation (MCC) (5.21 and 6.46, respectively). Freight forwarders rated MCC service as the third most important service item, whereas shippers rated it as twenty-fourth (see Table 5). MCC is one kind of less-than-containerload (LCL) cargo, which is insufficient to fill a shipping container. It is grouped with other consignments from foreign countries for the same overseas destinations in a container at a container freight station or distribution center (Lu 2000). The result was not surprising because the MCC service is one of the major requirements for freight forwarders, but is not required by most shippers. In general, the result showed that the importance of most service attributes of international distribution centers differed significantly between shippers and freight forwarders.
Analysis of Services Requirements of International Distribution Centers

To distinguish the service requirements of international distribution centers from shippers' and freight forwarders' perspectives, analysis of variance (ANOVA) and factor analyses were used in this research. Factor analysis was used to address whether the original variables' correlation could be explained by the existence of a small number of hypothetical variables (Kim and Muller 1978). Miller (1978), Hair, Anderson, Tatham, and Black (1995), Churchill (1991), and Cooper and Emory (1995) have defined factor analysis as a data reduction technique to summarize a larger number of variables with a smaller number of underlying dimensions called factors. Individual variables that measure the same construct or dimension will load on the same factor. These loadings can be interpreted as the correlation between that individual variable and all other variables loaded on a particular factor.

Factor analysis with VARIMAX rotation was employed to identify key service factors as shown in Table 6. Only variables with a factor loading greater than 0.5 were extracted based on Hair, Anderson, Tatham, and Black (1995). Seven factors were found to underlie the various sets of service attributes of international distribution centers in Taiwan. They were labeled and are described below:

(1) Factor 1 is a value-added services factor comprising seven items, namely, assembly, stripping, packaging, kitting, labeling, cargo processing, and bar coding. These are all value-added related activities. This factor accounted for 43.3 percent of the total variance. Further, kitting and packaging services had the highest factor loadings on this factor.

(2) Factor 2 is a cargo-related services factor. This factor comprised four items,
namely, cargo handling, cargo reverse, cargo inspection, and cargo safety. These four service items are related to cargo services; therefore, the factor was identified as a cargo services factor. Cargo reverse service had the highest factor loading on this factor, followed by cargo handling, cargo safety, and cargo inspection. Factor 2 accounted for 6.71 percent of the total variance.

(3) Factor 3, a consolidation services factor, comprised three items, namely, import unpacking, export stuffing, and multiple countries consolidation. These three service items were associated with consolidation activities; therefore, this factor was identified as a consolidation services factor. Factor 3 accounted for 6.68 percent of the total variance.

(4) Factor 4 is a special services factor. It consisted of four items, namely, special cargo storage, exhibition, provision of market information, and a multi-function meeting room. Provision of a multifunction meeting room had the highest factor loading on this factor. Factor 4 accounted for 5.18 percent of the total variance.

(5) Factor 5 is a distribution services factor consisting of three items: import distribution, export distribution, and multiple countries distribution. These are distribution-related activities. Multi-countries consolidation had the highest factor loading on this factor. Factor 5 accounted for 4.76 percent of the total variance, slightly less than factor 4.

(6) Factor 6 is an information services factor consisting of four items: Bar code recognition, electronic transmission, cargo tracing and tracking, and electronic commerce are related to information services activities, and consequently perceived as an independent dimension. Cargo tracing and tracking had the highest factor loading on this factor, followed by electronic transmission, electronic commerce, and bar code recognition. Factor 6 accounted for 4.38 percent of the total variance.

(7) Factor 7, a support services factor, consisted of three items, namely, customs clearance, insurance service, and financial service. These items are supportrelated activities in international distribution centers. Insurance service had the highest factor loading on this factor. Factor 7 accounted for 3.45 percent of the total variance.
A reliability test based on a Cronbach Alpha statistic was used to test whether these factors were consistent and reliable. Cronbach Alpha values for each factor are shown in Table 4. The reliability value of each factor was well above a value of 0.80, considered adequate for a satisfactory level of reliability in basic research (Nunnally 1978; Sekaran 1992; Churchill 1991; Litwin 1995).

As can be seen in Table 7, the result of ANOVA analysis indicated that four service factors were found to significantly differ between shippers and freight forwarders, i.e., factor 1 (value-added services), factor 3 (consolidation services), factor 5 (distribution services), and factor 7 (support services). Factor 2 (cargo-related services), factor 4 (special services), and factor 6 (information services) did not significantly differ between these two segments.

A comparison of the factor scores shows that shippers had positive centroid scores on factor 4 (special services) and factor 7 (support services), but had negative scores on factor 1 (value-added services), factor 2 (cargo-related services), factor 3 (consolidation services), factor 5 (distribution services), and factor 6 (information services). Conversely, freight forwarders had its highest positive centroid scores on factor 3 (consolidation services), followed by factor 1 (value-added services), factor 5 (distribution services), factor 6 (information services), and factor 2 (cargo-related services). Freight forwarders had negative scores on factor 4 (special services) and factor 7 (support services), indicating that shipper respondents particularly emphasized special services and support services, while freight forwarder specifically focused on value-added services, consolidation services, and distribution services.

CONCLUSIONS AND DISCUSSION

With international logistics continuing to develop rapidly in recent years, the role of the international distribution center has become increasingly important. While there have been several empirical studies of the logistics services of third-party providers, research on logistics services' requirements of international distribution centers has been minimal. This study has therefore sought to investigate the logistics services' requirements of for-hire international distribution centers from major customers' perspectives, i.e., shippers and freight forwarders. Major emphasis has been placed on the crucial service attributes of international distribution centers and assessing the differences in logistics services' requirements between shippers and freight forwarders.

The results indicate that the majority of responding shippers were manufacturers. Major cargo items were metal products and machinery, followed by textile products, chemical products, rubber and plastic products, and paper products, indicative of traditional industries. Only 2.1 percent of shipper respondents indicated their main cargo item was electrical machinery and apparatus.

The results also revealed that major overseas markets of international distribution centers were Asia, North America, Europe, and others. The most commonly served areas in Asia were Mainland China, North Eastern Asia, Hong Kong, and South Eastern Asia. Notably, over 43 percent of responding shippers indicated the intra-Asian market was their main overseas market. Due to rapid development in
economic growth in recent years, many Taiwanese firms have expanded their markets into Mainland China. However, with the exception of the ports of Fuzhou and Xiamen (PRC), direct shipping between Taiwan and the PRC is not allowed in the current political situation. Nevertheless, growth opportunities for the international distribution center market looks promising if the prohibition is ultimately removed.

With respect to the size of responding firms, results indicated typical Taiwanese shippers are relatively small; over 60 percent of them had an average monthly cargo volume of less than 20 TEUs. The results indicated that most shippers use freight forwarders as their main carriers. International logistics companies are continuing to develop in Taiwan in recent years from a basis of freight forwarders. The results suggest that third-party logistics services providers should continue to grow and that most current shippers plan to increase their use of third-party services.

Table 7. ANOVA Analysis of Service Factors' Differences between Shippers and Freight Forwarders

The results also revealed the characteristics of freight forwarder firms. Nearly 60 percent of them had been in operation for more than ten years, implying they had acquired maritime and logistics-related expertise to enable themselves to provide the logistics services' requirements of international distribution centers. Most were local companies. Moreover, due to Taiwan's enrollment in the World Trade Organization since 2002, the number of joint ventures with local and foreign companies is likely to increase in future years. Freight forwarders' revenues varied substantially, ranging from less than NT$50 million to more than NT$400 million. Sales growth rate also varied significantly, ranging from less than 10 percent to more than 20 percent. The market has continued to expand as sales revenue has grown.

Of particular note, the results indicate that cargo safety was viewed as the most important service attribute, followed by cargo tracing and tracking service, customs clearance, inland transportation, and electronic transmission by both shippers and freight forwarders. In contrast, the provision of a multi-function meeting room, exhibition, cargo processing, and stripping were rated the least four important items. The research showed significant differences in logistics services' requirements between shippers and freight forwarders, particularly with respect to multiple countries consolidation, followed by bar coding, cargo processing, export stuffing, and assembly.

Seven logistics services factors were extracted from the thirty service attributes by means of factor analysis. These seven services factors were identified as value-added services, cargo-related services, consolidation services, special services, distribution services, information services, and support services. Respondents from
shippers paid particular attention to the special services and support services factors, while freight forwarders specifically focused on value-added services, consolidation services, and distribution services factors. The latter is not surprising because value-added, consolidation, and distribution services are logistics-related services and perceived as core services for freight forwarders. Conversely, shippers' use intention of international distribution centers was lower than that of freight forwarders.

The study findings have implications for a number of parties. They offer a current profile of shippers' and freight forwarders' logistics services' requirements of international distribution centers. Distribution center operators can use the study results to modify their current services to more accurately meet customers' needs. More importantly, insights into shippers' and freight forwarders' perceived differences about the importance of service attributes of international distribution centers may also be of interest to distribution center operators by providing a useful approach for more effectively evaluating/modifying/amending their marketing strategies and target markets. The study results may also be of value to current and potential international distribution center customers. The list of thirty services attributes of international distribution centers may help users identify and assess what they are really seeking from logistical outsourcing.

The research contributes to distribution center demand studies by investigating logistics service requirements from both shippers' and freight forwarders' perspectives. Although numerous studies have investigated the determinants of third-party logistics services' provision, few have examined specifically the level of importance of logistics services in international distribution centers. Due to time and cost constraints, the study has provided only a preliminary framework for understanding the services requirements of international distribution centers from a shipper's perspective. Future research could identify crucial logistics services from an operator's viewpoint since distribution centers operators' and shipper demands in this context may differ. Moreover, since the results indicated shippers' low use intention of international distribution centers, further research could examine the factors influencing actual use of these centers.

The development of international distribution centers requires a fuller understanding of the relationships and interactions among distribution center operators, shippers, and freight forwarders. Leahy, Murphy, and Poist's (1995) study pointed to the relationship between thirdparly logistics providers and shippers, demonstrating a dramatic shift from a short-term "traditional transaction" relationship to a longer-term "partnership" relationship. It therefore appears worthwhile to examine (1) the various dimensions of partnering between distribution center operators and customers in future research (these dimensions include market exchange relationships, joint ventures, vertical or horizontal strategic alliances, leasing arrangements or long-term contracts, and the logistics power between suppliers and demanders); and (2) the various important determinants of a partnering relationship, such as trust, commitment, communication, and relative dependence, and how these are interrelated over time.

Finally, this research was limited to examining the requirements of international distribution centers within a particular national area. However, distribution centers

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are international businesses and their customers come from different countries around the world. Thus, future research could examine the same sets of service attributes and related conditions within the expanded framework of a multi-national comparison.

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