



LOGISTICS IMAGE OF OUTSOURCING CLIENTS IN THE WIRELESS TELECOMMUNICATIONS INDUSTRY: HOW IS IT RELATED TO THE SERVICE VALUE OF AIR CARGO LOGISTICS PROVIDERS ?

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ABSTRACT

This study explored the relationship between aspects of the logistics image of an outsourcing client and the service value of air cargo logistics providers (ACLPs). Given the range of client groups served by the electronics industry in Taiwan, we focused on telecommunication industries to analyze the correlation between the service value of ACLPs and the logistics image of telecommunication clients. The research subjects in this study were actual outsourcing logistics decision makers in the telecommunications industry of Taiwan, where 197 questionnaires were successfully completed. The research findings were as follows. (1) Logistics image and service value had a significant correlation. (2) The telecommunications industry management patterns differed in terms of the weight given to each service value of ACLP. (3) The telecommunication industry management patterns differed in the level of after-service received from ACLPs, which was affected by the logistics image. According to this empirical study, the logistics image and ACLP service value had a significant correlation. In addition, the different telecommunication industrial patterns in Taiwan were characterized by variations in service value and their relative focus, which affected the logistics image.

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Keywords: Air cargo logistics provider (ACLP), Logistics image, Service value.

Contribution/ Originality

This study evaluated each essential factor related to the logistics image and service value, and the results may provide a reference for ACLP industry strategic planning. It helps in the identification and classification of key service value in logistics outsourcing users in Taiwan, thus this research will help logistics managers to select right criteria for the logistics image of potential ACLP for their logistics service items.

1. INTRODUCTION

An image is a mental representation of the attributes and benefits that a product should possess, which is developed by a client based on certain aspects selected from the overall impression of a product (Reynolds, 1985). Many possible approaches can be used to study image. The formation of an image has many implications for mental responses and it can be studied from the viewpoints of sociology (Meethan, 1996), mental geography (Gould and White, 1992), and marketing (Gunn, 1972) to understand the behavioral intention. The subjective logistics image is the main initial factor that influences client choice. Giving the client a positive logistics image reduces the negative impact associated with the logistics service environment such as service failure.

The service value of air cargo logistics providers (ACLPs) affects the logistics perceptions of outsourcing firms, as well as their subsequent behavior and partnership selection. The importance of these factors has led to a growing body of research, which aims to define the essential characteristics of service value. Many possible approaches can be used to study the service value of logistics providers, which has many implications for the service value of logistics outsourcing. This can be measured in terms of service values such as air cargo transport service quality, value-added processes (Bolumole, 2001), knowledge orientation (Lim, 2000), and the customization of services (Van Hoek, 2000). Thus, in logistics research, service value is more important than tangible logistics facilities because the client's final perceptions, rather than reality, are what motivate companies to collaborate or not collaborate.

In the interdisciplinary study of logistics outsourcing, client image has been the subject of considerable research. Investigations have generally been based on the effective pricing performance image (Razzaque and Sheng, 1998) or the flexibility of a process across the air cargo industry (Leung *et al.*, 2000; Zhang and Zhang, 2002a). There have also been major subjective evaluations of positive image based on factors such as logistics agility (Vastag *et al.*, 1994), as well as opinions of just-in-time (JIT) and logistics customization as they relate to executive planning (Du *et al.*, 2005). Previous empirical studies have indicated that the outsourcing of key logistics activities is one of the most important trends in business (Moberg and Speh, 2004; Ashendbaum *et al.*, 2005). Outsourcing is an increasingly important issue pursued by companies that seek improved efficiency. The outsourcing of logistics activities can help to increase the efficiency and effectiveness of a company's logistics functions and large-scale enterprises are moving toward multinational production to ensure the best allocation of resources, by dividing production and marketing using global logistics and the JIT image. Logistics studies have become a key component of the research agenda, but they have invariably lacked a focus on a client's logistics image. There is a scarcity of in-depth studies, empirical data, and literature addressing service value for the ACLP industry. In order to provide a more comprehensive theoretical framework for service value, the conceptual image from logistics outsourcers has been developed based on previous studies of image behavior. The present study is based on a review and discussion of previous theoretical investigations, expert opinion, and statistical procedures for measurement.

2. LITERATURE REVIEW

2.1. Definition of ACLPs in Taiwan

In this study, ACLPs are defined as multiple logistics activities served by various external air cargo logistics providers on behalf of a client. These activities are offered in an integrated manner, rather than a stand-alone basis. In the early twentieth century, third party logistics providers could supply analytical and design activities associated with transport and warehousing, such as inventory management and information-related activities, including tracking and tracing, as well as the value-added activities of secondary assembly for product and supply chain management (Laarhobeven *et al.*, 2000). An ACLP industry is a logistics party among “third party logistics providers,” i.e., an entity that receives, holds, or otherwise engages in air cargo transport, which is dedicated to an outsourcing client’s product in the ordinary course of business, but does not take title to the product. An ACLP can be defined as an air cargo services logistics provider that performs all or some parts of the outsourcing client’s logistics (Meng *et al.*, 2010). In practice, the ACLP industry is affiliated with air freight forwarders, customs house brokers, private warehousing, air freight terminals, distribution centers, truck freight and package carriers, experts in dangerous air cargo, and IT information auxiliaries in Taiwan. *In summary, an ACLP provides multiple air cargo transport as well as logistics services for some parts or the whole logistics function for an outsourcing client under mutual agreement during a certain period. In order to facilitate efficient logistics, it is important that logistics outsourcing executives can fully understand the outsourcing client’s logistics image according to the service experienced by the ACLP.*

2.2. Air Cargo Logistics Image from Outsourcing Clients

The concept of image can be applied to a potential product, which includes the individual traits or qualities as well as the overall impression that the entity makes in the minds of others (Dichter, 1985). It comes into being through a creative process where selected impressions are elaborated, embellished, and ordered. Assael (1984) defined overall image as a client’s entire perceptions of a particular product/firm, which is formed by processing information from various sources. The logistics image comprises the ideas or conceptions held by a client individually or collectively of the total logistics image under consideration. Logistics images are more important than tangible logistics resources, because perceptions, rather than reality, are what motivate clients to act or not act (Guthrie and Gale, 1991). This logistics image is then modified according to the service experienced by an outsourcing client from a logistics service provider. The logistics image also serves as the service value to demonstrate the ACLP’s logistics image. Stock *et al.* (1998) noted that speed and reliability are important logistics capabilities with respect to a client’s image. Menon *et al.* (1998) gave examples that included the image of price, financial stability, delivery punctuality, quality requirements and performance standard, the ability to meet the contract, lower error rate, top management commitment, ability to solve unexpected problems, and the innovativeness of management. According to a logistics study by Jenkins (1999), the key aspects of image used to assess logistics providers are the cost and quality of service, capacity, ability to deliver, consultation with current clients, cultural tolerance, financial stability, and the standard of

the information system. Lieb and Bentz (2005) showed that outsourcing decisions consider aspects such as the pre-scheduling of in-house ride services as well as staffing. Daugherty *et al.* (1996) considered the following features of the service image of third-party logistics: dedication to emergency assistance, ability at handling environmental changes, flexibility in meeting external needs, provision of emergency service, problem-solving ability, skill in proposing recommendations to solve a potential problem, help in reducing the supplier's costs, ability to respond to emergencies, ability to anticipate transportation problems, ability to provide alternatives in the event of the inability to offer service, ability to provide a service, and operational status reports. Chang *et al.* (2006) presented an expert survey-based approach based on 17 management issues related to hazardous air freight to explore four important images of air transport-related sectors in Taiwan: importance, urgency, achievability, and effectiveness. Bagchi and Virum (1996) suggested image features related to logistics alliances, such as the pricing and cost, service level, information processing and communication, capacity resources, flexibility, and general information. Logistics providers can supply services including inventory management, tracking and tracing, and value-added services (Berglund *et al.*, 1999). McGinnis and Kohn (1990) and Qureshi *et al.* (2007) indicated that the price, value-added activities, delivery capability, ability to accomplish tasks, error rate, good computer systems, ability to react to problems, number of delivery centers, and management ability are important features of image in logistics evaluations.

Time-consuming customs clearance procedures are a key constraint on the development of freer and more efficient international trade. Vaidyanathan (2005) emphasized the information technology capacity as a long-term factor in reducing cost to suppliers while enhancing profitability. Cho *et al.* (2008) found that a logistics provider's e-commerce capability had an impact on how effectively a company used logistics outsourcing. Leahy *et al.* (1995) and Lieb and Randall (1996) showed that the cost of a service is an important image feature when selecting a logistics provider. Bowersox and Daugherty (1995) recommended image in terms of compatibility and financial stability as vital criteria that may affect the long-term relationship criterion. Freese (1997) recommended quality of management, consistency, and relationships as important values to be considered, whereas they stressed postponing the consideration of price until the final selection. According to Petroni and Braglia (2000), vendor selection is based on a supplier's management capability, production capacity and flexibility, design and technological capability, financial stability, experience, reputation, and geographical location. Table 1 summarizes the features of image with respect to logistics for 20 items utilized when examining logistics outsourcing.

2.3. Logistics Service Value of ACLPs

Zeithaml (1988) identified four definitions of service value based in exploratory research: (1) value is a low price, (2) value is whatever I want in a product, (3) value is the quality I get for the price I pay, and (4) value is what I get for what I give. These four meanings of value only provide a partial explanation due to the difficulties conceptualizing and measuring the value construct in research. Zeithaml (1988) also proposed that value (like quality) is a higher level abstraction in the means-end chain. Thus, Zeithaml (1988) contends that value is more individualistic (personal) whereas value (unlike quality) involves a tradeoff between "give" and "get" components.

Therefore, the definition of value has not reached a consensus yet in the academy. Kotler (2003) thought service value is the overall difference between customer value and customer cost. The overall customer value comprises the product, service, personnel, image values, etc. The overall customer cost includes money, time, efforts, psychological values, etc. Service value boosts customer satisfaction and reduces complaints via the development of a dedicated resource base, but there is also a link to partnering firms (Bowersox and Daugherty, 1995).

Ahmed *et al.* (2006) studied partnerships and showed how an outsourcing company assigned its employees to work with Boeing on various aspects of reconfiguring the supplier network, with the aim of building a long-term partnership. Ensuring the operational quality of the logistics provider at each stage of the customer's process will increase the likelihood of satisfying the end-customer (Jang *et al.*, 2003). Zhang and Zhang (2002a) showed that the JIT production and distribution systems in the air cargo sector use computer technology to reduce inventories and cut down the time to market. Zhang and Zhang (2002b) argued that JIT logistics use electronics and computer firms to reduce inventories at a premium to ensure one- or two-day guaranteed delivery. To satisfy the increasing demand for one-stop services, many logistics providers have significantly broadened their activities to include these and other services value (Murphy and Daley, 2001). Du *et al.* (2005) pointed out that product customization has been recognized as an effective means to meet individual client needs and customers can be actively involved in the product customization process for a telecommunications system. Park *et al.* (2009) explored accuracy and promptness as important factors that influenced the adoption of air express delivery in Korea. Furthermore, virtual warehousing involves keeping goods in transit instead of holding goods in storage (Zhang and Zhang, 2002b). The smartphone industry has become the mainstream of the Taiwanese wireless telecommunication trade since 2005. The wireless telecommunications industry is a uniquely dynamic and fast-paced environment where a short product life cycle results in time sensitivity, thus the wireless telecommunications industry was selected as the research target of this study. Under globalization pressure, appropriate logistics outsourcing provides a solution to obtain improved efficiency and to deliver core competencies. Logistical issues are now being incorporated into the strategic agenda of electronics companies. The inclusion of logistics in strategic management has been found to have a positive influence on company performance (Tracey, 2006).

To ensure business success, global operations require the integration of global manufacturing with logistics capabilities and efficient transport support (Bowersox and Closs, 1996). Boyson *et al.* (1999) demonstrated that firms prefer providers with proven outstanding levels of customer service who charge low prices for services. The service value of logistics firms is viewed as a function of the perceived performance and expectations after experiencing ACLP services. In the past decade, Taiwan's electronics industry has experienced incredible growth and it is expected to increase its competitive advantages and profits via increased production. Farrington (2001) described an incident at LAX airport where lithium cells were abused in transit and this caused a fire, where this accident is now cited by some regulators as proof that safety testing is required. Bottani and Rizzi (2006) stated that suppliers prefer a wider range of services to traditional arm's length outsourcing for a single activity. In summary, the various advantages obtained by a firm as a result of the integration of logistics service value from ACLP include decreasing the firm's logistics expense,

eliminating set-up cost for logistics facilities, the provision of dynamic commodity flow information, and maintaining an efficient logistics system for commodity flows. Thus, a single ACLP firm may be able to meet the supplier's needs as a geographical partner to propagate the geographical spread and range of service value. Accordingly, the measure of service value employed in the present study refers to the overall judgment of a match with the client's image. It should be noted that the evaluation of service value in this study is based on the client's image after their experience of ACLP service value. The perception of service value is the trade-off relationship between perceived benefits and monetary and non-monetary sacrifices, a highly personalized involvement, and abstract level activities. This application to the ACLP industry aims to evaluate service value but this is not limited to monetary aspects and it may be more important to consider non-monetary aspects such as reduced risk, customization of service, and range of service attributes. Table 1 shows the 20 service value items used to examine logistics outsourcing.

Table-1. Measurements of logistics image and service value

Measurements of logistics image	Measurements of service value
1. Prompt delivery and processing	1. Quality of service
2. E-commerce capability	2. Good service value performance
3. Cargo visibility	3. JIT production and distribution systems
4. Global network	4. Integrated to reduce inventories
5. Customs clearance	5. Real time to market
6. Convenient warehouse location	6. Speed
7. IT capabilities	7. Integrated warehousing
8. Customization	8. Reverse logistics
9. Good pricing and cost	9. Strategic management of ability
10. Good skills in managing hazardous freight	10. Eliminate logistics facilities set-up cost
11. Value added activities	11. Global logistics capabilities
12. Management capability	12. Low-cost provider
13. Financial stability	13. Range of service attributes
14. Experience with consultant	14. Geographical spread service
15. Dealing with emergencies	15. Capability of handling hazardous E products
16. Partnership	16. Strategic alliance
17. Reliability	17. Reduced risk
18. Reputation	18. One-stop service
19. Low error rate	19. Customization service
20. Inventory management	20. Inbound and outbound transport ability

3. RESEARCH METHODOLOGY

3.1. Questionnaire Design

The data used in this study were collected from a survey questionnaire. During the process employed to determine the questionnaire items, it was crucial to ensure the validity of the content and that the survey instrument reflected this accurately. First, the content of the questionnaire used in this study was established based on literature review and interviews with several related researchers and specialists. In total, 23 logistics image items and 22 service value items were generated. The content validity of each item was assessed by a panel of five expert judges, including three academic professors and four executives from ACLP, e.g., UPS and DHL. Three professors were assessed based on their research specializations and four executives were drawn

from consulting businesses in the ACLP arena. The judges were asked to edit and improve the items to enhance their clarity, readability, and content validity, and to identify any items that could be objectionable to respondents. The measurements obtained during the discussions resulted in the following minor modifications to the questionnaire: (1) some of the original image aspects, such as cultural tolerance, professional competence, and value-added activities, in three unnecessary items were deleted from the questionnaire because they were not popular issues in terms of the outsourcing client's logistics image; (2) the service value item process was similar to the service criteria so two unnecessary items were deleted, i.e., high delivery performance and joint reconfiguration. The remaining 20 items related to service value were used given their importance to the participants, who came from well-known companies in the wireless telecommunications industry. Finally, the 40 items shown in Table 1 were used to design the official questionnaire. Attitudes to each of the items were assessed using a five-point Likert scale based on the level of logistics image and service value, which ranged from 1 = very unimportant (very unsatisfied) to 5 = very important (very satisfied). The 40 items were pre-tested by 20 outsourcing executive managers who were members of the Taiwan wireless communications union. After pretesting, item analysis was performed. The analytical results showed that the item validity of all 40 items was very good.

3.2. Sampling Process

The sample population who participated in the study comprised organizers who represented a wide variety of entities. After eliminating double listings, 410 wireless communication-related companies were generated to form the sampling frame for the study. The main method used to collect data was direct mailing of questionnaires, which was supplemented with personal contact, fax, e-mail, etc. We surveyed members listed in the Taiwan wireless communications union and some extant clients of ACLP. The survey was distributed to 410 member firms and 210 questionnaires were returned. Thirteen of the 210 returned questionnaires were discarded because of incomplete information. Thus, there were 197 usable responses in total.

3.3. Reliability and Validity of the Empirical Study

SPSS 11.0 for Windows was used to perform the statistical analysis and factor analysis. First, factor analysis was used to investigate any separate underlying factors and to reduce redundancy. Next, Pearson's correlation correlations were used to assess bivariate relationships.

Cronbach's α values were calculated to provide a summary measure of inter-correlations among a set of items. The Cronbach's α values are shown in Tables 3 and 4 for all of the factor dimension attributes related to logistics image and service value degree, which show that all of the values were ≥ 0.6 , thereby indicating the reliability of each dimension. The content of this questionnaire was established based on literature reviews and interviews with several researchers and specialists, as well as assessments by a panel of five expert judges, including three academic professors and four executives from ACLP, e.g., UPS and DHL. In addition, a pretest was carried out. Therefore, the content validity of this questionnaire was very good.

4. RESULTS

4.1. Characteristics of Respondents and their Organizations

In this study, we surveyed members listed in the Taiwan wireless communication, electrics, and electronics union, and 197 sets of basic information are presented in Table 2, which represent 62 (31.5%) WLAN manufacturers. The average level of logistics expense was below ten million New Taiwan dollars each year. Half of the companies had operated for more than five years. With respect to the numbers of employees, 138 companies (or 70%) had less than 500 employees and 33 (or 16.8%) had over 1000 employees. In addition, 2% of the companies reported collaboration with ACLP for less than one year, but most of the companies reported collaborations of two to three years. Finally the majority of companies reported that they collaborated with two ACLP firms (31%).

Table-2. Statistics for the wireless communications industry in Taiwan

Variable	Category	Frequency	Percentage (%)
Type of business	Smartphone manufacturers	20	10.1
	Cell phone manufacturers	54	27.4
	GPS manufacturers	26	13.2
	WiMAX manufacturers	35	17.8
	WLAN Manufacturers	62	31.5
Expense (paid to ACLP/per year)	Below 10 million*	118	60
	10 million to 100 million*	62	31.4
	100 million*	17	8.6
Length of time in business	Under 5 years	66	33.5
	5–10 years	42	21.3
	>10 years	89	45.2
Number of employees	Under 500	138	70
	500–1000	26	13.2
	>1000	33	16.8
Duration of collaboration with ACLP	Under 1 year	4	2
	2–3	118	60
	4–5	54	27.4
	6–7	16	8.1
	≥8	5	2.5
Number of ACLP collaborators	1	6	3
	2	61	31
	3	53	27
	4	34	17.2
	≥5	43	21.8

*denotes New Taiwan Dollar

4.2. Logistics Image and Service Value Factors

To simplify the analysis of the structure, we performed a factor analysis using all 40 logistics image and service value items. We used principal components analysis to extract the factors with eigenvalues > 1 and we used VARIMAX with orthogonal rotation to obtain the rotated coefficients. Finally, factors four and five were extracted, which explained 79.83% of the overall variance in the logistics image and 77.70% in the service value. The results of the analysis of the individual logistics image and service value factors are shown in Table 3 and Table 4.

Table-3. Logistics image factor analysis

Logistics image dimension	factor	Factor loading	Cronbach's α	Eigen value	Variation explained (accumulated)
Selection Image			0.77	3.72	25.42% (25.42%)
- E-commerce capability		0.61			
- Global network		0.72			
- Good pricing and cost		0.59			
-Partnership		0.62			
Impression Image			0.71	2.96	17.3% (42.72%)
- Cargo visibility		0.62			
- IT capabilities		0.53			
- Customization		0.78			
- Value-added activities		0.74			
- Dealing with emergencies		0.56			
- Reputation		0.59			
Particular Image			0.68	2.84	16.54% (59.26%)
-Convenient warehouse location		0.55			
- Good skills in managing hazardous freight		0.71			
- Experience with consultant		0.59			
-Inventory management		0.53	0.53	2.93	11.12% (70.38%)
Emotional Image		0.75			
- Management capability		0.67			
- Financial stability			0.71	2.93	9.45% (79.83%)
Functional Image		0.71			
- Prompt delivery and processing		0.52			
- Customs clearance		0.58			
- Reliability		0.78			
- Low error rate					

Factor analysis was performed to classify the client logistics image and service value of the ACLP indicators into several critical dimensions. The results showed that selection image was the most important logistics image aspect for the client, whereas transport value was the most important service value among the service value dimension.

Table-4. Factor analysis of service value for ACLP

Service value dimension	factor	Factor loading	Cronbach's α	Eigen value	Variation explained (accumulated)
Transport Value			0.85	8.22	39.66% (39.66%)
- JIT production and distribution systems		0.75			
- Real time to market		0.81			
- Speed		0.68			
- Geographical spread service		0.71			
- Inbound and outbound transport ability			0.75	2.86	17.65% (57.31%)
Product Value		0.62			
- Quality of reverse logistics		0.59			
- Reverse service		0.74			

- Eliminate logistics facilities set-up cost	0.69				
- Low-cost provider	0.62	0.91	1.99	11.90%	(69.21%)
- Reduced risk					
Customization Value	0.71				
- Integrated to reduce inventories	0.62				
- Integrated warehousing	0.59				
- Global logistics capabilities	0.63				
- Capability of handling hazardous E products	0.71	0.66	1.76	8.49%	(77.70%)
- One-stop service					
- Customization service	0.61				
Non-Monetary Value					
- Good service value performance	0.62				
- Strategic management of ability	0.71				
- Range of service attributes	0.62				
- Strategic alliance					

4.3. Correlation Analysis of Logistics Image and Service Value

Understanding how logistics image is related to service value in ACLP is important for allowing ACLP to design logistics services that meet market demand. In particular, ACLP in Taiwan is characterized as a fragmented market, which is small to medium in size, in an environment with rapid change. In order to understand the relationships between the factors of logistics image and service value indicators, we used Pearson’s correlation coefficient to test the results shown in Table 5.

Table-5. Pearson’s correlation coefficients for the logistics image and service value factors

		Logistics image				
Service Value	Factors	Selection image	Impression image	Particular image	Emotional image	Functional image
		Transport Value	0.21**	0.29**	0.62**	0.32**
	Product Value	0.12	0.25**	0.58**	0.32*	0.08
	Customization value	0.07	0.39**	0.48**	0.44**	0.37*
	Non-monetary value	0.47**	0.52**	0.51**	0.27**	0.28**

** Significance level $p < 0.01$; Significance level * $p < 0.05$

The empirical results showed that there were significant relationships between the client logistics image and service value factors for ACLP. The detailed analyses and corresponding relationships are described below.

1. There were significant relationships between “Selection image” and “Transport value,” and between “Selection image” and “Non-monetary value.”
2. There were significant relationships among “Impression image,” “Particular image,” “Emotion image,” and among “Transport value,” “Product value,” “Customization value,” and “Non-monetary value.” There were also significant relationships between “Function image,” and

“Transport value,” and between “Customization value,” and “Non-monetary value.”

Impression image, particular image, and emotional image in operations were potential aspects of logistics image that were connected with service value. The results showed that logistics image had a significant relationship with service value.

4.4. ANOVA Analysis

Table 6 shows the results of the ANOVA analysis, which suggests that there were significant differences between wireless communication business modes and logistics image. The same results are shown in Table 7, which suggests that there are significant differences between wireless communication business modes and service value. In addition to the business modes, we also performed an ANOVA analysis of “Expense,” “Age,” “Employees,” “Duration of collaboration,” “No. of ACLPs,” etc., which also detected significant differences.

Table-6. ANOVA-Logistics image

Logistics image Business Profiles	Selection image (F value)	Impression image (F value)	Particular image (F value)	Emotional image (F value)	Functional image (F value)
Business mode	69.128 ^{***}	32.134 ^{***}	16.028 ^{***}	28.735 ^{***}	6.261 ^{**}
Expense (paid to ACLP per yr)	11.021 ^{***}	16.185 ^{***}	6.657 ^{**}	21.176 ^{***}	13.285 ^{***}
Age	95.415 ^{***}	36.187 ^{***}	5.327 [*]	44.136 ^{***}	2.127
Employees	17.778 ^{***}	11.125 ^{**}	7.102 ^{***}	16.858 ^{***}	15.877 ^{***}
Duration of collaborate with ACLP	0.21	6.417 ^{**}	9.125 ^{***}	18.857 ^{***}	14.332 ^{***}
No. of ACLPs collaborated with	7.258 ^{**}	9.685 ^{***}	6.336 ^{**}	5.174 ^{**}	0.858

Note : ^{***} $p < 0.001$; ^{**} $p < 0.05$; ^{*} $p < 0.1$

Table-7. ANOVA-Service value

Service Value Business Profiles	Transport value (F value)	Product value (F value)	Customization value (F value)	Non-monetary value (F value)
Business mode	99.512 ^{***}	25.185 ^{***}	21.52 ^{***}	39.56 ^{***}
Expense (paid to ACLP per yr)	6.135 ^{**}	7.856 ^{***}	11.258 ^{**}	4.332 [*]
Age	48.152 ^{***}	19.887 ^{***}	15.365 ^{***}	49.158 ^{***}
Employees	0.877	7.856 ^{**}	4.412 [*]	29.445 ^{***}
Duration of collaborate with ACLP	31.657 ^{***}	7.714 ^{**}	39.666 ^{***}	11.574 ^{***}
No. of ACLPs collaborated with	11.515 ^{***}	12.385 ^{***}	4.445 [*]	7.413 ^{***}

Note : ^{***} $p < 0.001$; ^{**} $p < 0.05$; ^{*} $p < 0.1$

5. CONCLUSIONS

5.1. Interpretations of the Findings

The aim of this study was to explore the relationships between the service value provided by ACLP and client logistics image in the wireless communications industry. Using a variety of statistical analysis methods, we aimed to support ACLPs in the planning and design of more valuable and satisfying services packages. In particular, the ACLP industry in Taiwan is

characterized as a fragmented market, which comprises small to medium size suppliers, in a rapidly changing environment. Logistics outsourcing involves the use of external companies to perform some or all of the firm's logistics activities (Isiklara *et al.*, 2007). In recent years, due to economic restructuring and client demand, logistics patterns have been transformed from traditional air transport services and they have evolved gradually into tailor-made business structures to meet the diversified needs of clients.

Our ANOVA analysis illustrates the service value portfolios of different business profiles in the wireless communications industry. For example, in terms of the business mode, there were significant differences in logistics image among smartphone manufacturers, cell phone manufacturers, GPS manufacturers, WiMAX manufacturers, and WLAN manufacturers. In particular, over half of Taiwanese manufacturers are OEM or ODM, where decisions conform to the requirements of foreign buyers. By contrast, the outsourcing client has the full decision-making rights when selecting an ACLP. WiMAX and WLAN manufacturers are focus on local logistics distribution and they rarely cross borders, thus they have very different requirements in terms of logistics image. Similarly, our ANOVA analysis demonstrated the differences in service value of ACLPs with respect to different business profiles. In terms of limited and financial capacity, most ACLPs are key cargo agents that act on behalf of air freight carriers and they also re-subcontract to other transport parties, which have their own logistics infrastructure, in order to serve different logistics outsourcing users. In particular, wireless communications clusters can select their own ACLP partners. Thus, different industry clusters will have different logistics image and service value requirements. We also detected differences in the logistics image results for different service value levels. The results of this study may provide a reference to facilitate the construction of an effective service chain to increase the service value for ACLPs.

Traditional clients and carriers have focused their attention on controlling their own costs to increase profitability, particularly improving the business processes that the organization controls independently (Ergun *et al.*, 2007). However, logistics outsourcing has now become a more common strategy in the wireless communications industry as they aim to control costs, but they also use logistics services as a means of differentiation. This trend presents many opportunities to professional air cargo logistics providers. By utilizing composite logistics operations from ACLP, the wireless products will be handled in a JIT manner by coordinating with contract air carriers, thereby reducing the overall logistics facilities and purchase expenditure, which ultimately benefits the client. Customization value is a key factor that attracts clients and enriches the value of services. The emphasis on core competencies of logistics outsourcing clients has steadily increased the demand for logistics providers (Langley *et al.*, 2004; Moberg and Speh, 2004; Lieb and Bentz, 2005). Logistics image will lead to client loyalty and it will also have an impact on repeated willingness to collaborate with ACLPs. Thus, it is imperative to gain increased service value to achieve a competitive advantage for ACLPs. Thus, this study tested the existing relationships between logistics image and service value to provide some guidance to ACLP operations.

5.2. Managerial Implications

Based on previous research, we conceptually defined the domain construct of logistics image, operationally designed the service value item, and empirically validated our generic scale. [Fugate et al. \(2006\)](#) stated that the effective management of a supply chain flow requires the creation of synergistic relationships between the supply and distribution partners with the objective of maximizing service value and providing a profit for each supply chain member. To provide researchers with a deeper understanding of the client's logistics image and the meaning of ACLP service value in Taiwan, we obtained some insights into image, which are useful for conducting further successful strategic planning for ACLPs, as well as aiding the evaluation of air logistics image facilities as part of an extended strategy. The results showed that the two proposed constructs had desirable psychometric properties for the implementation and promotion of theories that explain the individual psychological responses of client.

The international division of production methods has changed dramatically and Taiwan's wireless industry has undergone a structural shift, including relocating their production lines to low-cost production countries, which has forced ACLPs to rethink the international configuration of service value to meet client's demands. In order to handle logistics activities effectively and efficiently, companies generally have the choices of keeping logistics functions in-house, setting up or buying a logistics firm, or outsourcing to logistics companies ([Razzaque and Sheng, 1998](#)). After experiencing the 2008 financial crisis and the outward migration of industry, increasingly competitive pressures have forced ACLPs to transform their capabilities to meet a client's logistics image. To achieve effective improvements in the aspects of logistics image considered in this study, it will be necessary to address the client's lead-time for air cargo, production abroad, global distribution, and the role of international logistics. In addition to facilitating the outsourcing of a client's global marketing and cargo logistics system, a distribution center adds value by providing a number of service attributes to shippers, such as storage, cargo tracking, inland transport service, customs clearance service, consolidation, packing, labeling, assembly, documentation service, and the overall service value from ACLPs ([Lu, 2003](#)).

A consideration of these findings regarding logistics image and service value might be useful in providing ACLP executives with an understanding of clients in the electronics sector. In addition, the value-added service and knowledge innovation value of ACLPs should be focused on strengthening licensed skill connections with dangerous goods according to IATA regulations, thereby concentrating the level of air safety transportation. Improvements in the information required in terms of a client's logistics image are crucial for sharing consultant capacities among partners. Finally, we suggest that ACLPs should place greater emphasis on the psychological responses of clients in terms of selection image, impression image, particular image, emotional image, and functional image. The results of this study suggest that impression image is the most important aspect of client image and ACLP firms should consider this when making decisions. Ultimately, this study will facilitate the provision of strategic management suggestions for ACLPs to enhance service value in terms of transport value, product value, customization value, and non-monetary value.

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