

# Impact of external integration capabilities of third-party logistics providers on their financial performance

Capabilities  
of 3PLs

263

Chiung-Lin Liu and Pei-Yu Lai

*Department of Shipping and Transportation Management,  
National Taiwan Ocean University, Keelung, Taiwan, ROC*

Received 29 September 2014

Revised 1 February 2015

21 May 2015

Accepted 27 July 2015

## Abstract

**Purpose** – Outsourcing by corporations is increasing the demand for complex services (such as customization) from third-party logistics providers (3PLs). Effective integration between 3PLs and their customers, known as the external integration of 3PLs, not only allows 3PLs to respond rapidly to shippers' needs but also to increase customer satisfaction and the effective allocation of resources while increasing operational efficiency (such as by proposing comprehensive plans for future logistics services to meet shippers' demands). The purpose of this paper is to investigate the causal relationships among the external integration capabilities, cost advantages, and the financial performance of 3PLs.

**Design/methodology/approach** – A survey of 3PLs in Taiwan and China was performed. The research model was tested using a structural equation modeling technique along with the partial least square (PLS-SEM/PLS) approach.

**Findings** – The results herein demonstrated a positive relationship between 3PLs' external integration capabilities and resource efficiency. The results also suggested that cost competitiveness positively affected the financial performance of 3PLs. Although the external integration capabilities of 3PLs were not found to directly affect their financial performance, the results in this study indicated that external integration capabilities enable a firm to improve financial performance by capturing cost advantages.

**Originality/value** – This study provides useful information about the effects of external integration capabilities on the financial performance of 3PLs in a bi-regional context. The sample in this study was drawn from the 3PL industry in Taiwan and China, enabling a comparative analysis of these two countries of similar cultural backgrounds but different degrees of development of their logistics industry and different related demands.

**Keywords** Distribution management, Supply chain management

**Paper type** Research paper

## 1. Introduction

In recent years, many enterprises have begun outsourcing their logistics activities (such as warehousing and distribution) to third-party logistics providers (3PLs). This strategy not only reduces a company's logistics costs (Coyle *et al.*, 2013), but also enables companies to focus their limited resources on their core capabilities, helping them to maintain competitiveness (Porter, 1980). The outsourcing of logistics activities is increasing demand for increasingly complex services (such as customization) from 3PLs (Stefansson, 2006). The effective integration between 3PLs and their customers,



The International Journal of

Logistics Management

Vol. 27 No. 2, 2016

pp. 263-283

© Emerald Group Publishing Limited

0957-4093

DOI 10.1108/IJLM-09-2014-0155

The authors would like to thank the National Science Council of the Republic of China, for financially supporting this study under Contract No. NSC 102-2410-H-019-018. Ted Knoy is appreciated for his editorial assistance.

known as the external integration of 3PLs, allows 3PLs to respond rapidly to shippers' needs, to increase customer satisfaction, and to reduce their operating costs by effectively reallocating resources.

Although companies' logistics integration capabilities are already having important effects on supply chain management systems (Huo, 2012), and previous studies have elucidated the benefits of the integration of companies and 3PLs (Jayaram and Tan, 2010), very few investigations have taken the perspective of 3PLs in studying the relationship between 3PLs' external integration capabilities and their performance. In a supply chain management system, integration capabilities are divided between those inside companies and those outside companies. The latter involves cooperation between companies and other members of the supply chain in the area of operations. For manufacturers, external integration can be simply divided into upstream supplier integration and downstream customer integration (Stank *et al.*, 2001).

Only a limited amount of previous logistics integration research has investigated the topic from the perspective of 3PLs, and most relevant studies have focussed on the merge of each enterprise's internal and external integration capabilities (Shang, 2009). Accordingly, the effect of external integration on the performance of 3PLs has been difficult to elucidate. The crucial issue concerning the sustainable development of 3PLs is the improvement of their external integration capabilities to provide mutual benefits to multiple supply chain members ultimately to improve their performance (Lieb and Lieb, 2012). However, although research has confirmed that the integration capabilities of 3PLs can influence their financial performance by enhancing service performance (Shang, 2009), very few empirical studies have examined the effects of external integration capabilities on financial performance through the provision of cost advantages. 3PLs belong to an industry with low operating profit margins. For example, the operating profit margins of UPS (2014) from 2009 to 2013 ranged from 8.2 to 13.1 percent. If 3PLs have poor resource efficiency, caused by poor management of human resources or poor storage utilization rates, then increasing profits will be difficult for them.

Most research on supply chains and logistics integration has focussed on a single country (Halley and Beaulieu, 2010; Huo, 2012; Kim, 2009; Mendes Primo, 2010; Saeed *et al.*, 2011; Springinkle and Wallenburg, 2012; Wei *et al.*, 2012) or provided an overall analysis of samples from dozens of mostly developed countries (Danese and Romano, 2011; So and Sun, 2010; Thun, 2010). Very few comparative studies of two economies with similar cultural backgrounds and different levels of development of, and demand for, their logistics industries, such as Taiwan and China, have been published. In China, logistics costs represent about 18 percent of the GDP, compared to 9.0 percent in Taiwan (Armstrong and Associates Inc., 2014; Bureau of Economic Operations (China), 2013). China's logistics market has recently undergone astounding growth. For instance, the annual growth of China's road and rail freight sector reached 13 percent in 2012, while the corresponding rate in neighboring Taiwan during the same period was only 2 percent (Bureau of Economic Operations (China), 2013; Ministry of Transportation and Communication (Taiwan), 2014). These differences may significantly influence the structures of their logistics sectors.

This study aims to fill several gaps in the relevant literature and provide useful policy-related information regarding the effect of external integration capabilities on the financial performance of 3PLs within a bi-regional context. Here, "external integration capabilities" include the integration of information, tasks, and financial

dealings between 3PLs and shippers. Specifically, this study addresses the following two major research questions:

- RQ1.* Do the external integration capabilities of 3PLs affect their financial performance directly, or indirectly, mediated by cost advantages?
- RQ2.* Do any differences exist between the relationships of the external integration capabilities, cost advantages and financial performance of 3PLs in Taiwan and those in China?

## 2. Review of literature and research hypotheses

### 2.1 Resource-based theory (RBT)

The RBT considers why differences in performance remain between companies, and how companies can employ their “resources” to sustain their competitive advantages (Barney, 2001). “Resources” that can develop a competitive advantage have the following attributes: valuable, rare, imperfectly imitable, and non-substitutable (Barney, 1991). RBT has been widely applied in many logistics studies to evaluate the contributions of various resources to a firm’s performance (e.g. Yang *et al.*, 2009). Resources, according to RBT, can be classified as tangible and intangible resources. Tangible resources of 3PLs include the physical services that they provide, such as transportation and warehousing (Lai, 2004; Liu and Lyons, 2011). Intangible resources include such intangible capabilities as the positioning capability (Shang and Sun, 2004), agility (Goldsby and Stank, 2000), measurement capability (Shang and Marlow, 2005), and external integration capability (Feng and Wang, 2013; Huo, 2012; Zhao *et al.*, 2001). A direct positive relationship between “resources” and the performance of 3PLs may not exist. For instance, Lai (2004) found a positive relationship between them whereas Liu and Lyons (2011) suggested that “resources” indirectly positively affect companies’ financial performance through their effect on operational performance. For this study, the term “resources” is defined as the external integration capabilities of 3PLs. The purpose is to determine whether increasing external integration capabilities can result in the improvement of resource attributes, such as their value or rarity, and ultimately to an increase in a company’s financial performance.

### 2.2 External integration capabilities

Integration is “a process of interaction and collaboration in which manufacturing, purchasing and logistics work together” (Pagell, 2004, p. 460) to generate mutually acceptable outcomes for an organization. In the field of logistics, a company’s integration capabilities involve coordination between its internal departments and its external partners (Bowersox *et al.*, 2010). From the perspective of a manufacturer, Stank *et al.* (2001) classified a company’s logistics integration capabilities into three operational categories – internal integration, customer integration, and material supplier integration. The latter two can be combined in the category of external integration. For 3PLs, external integration consists of integrating shippers and consignees. This study focusses on a 3PL’s external integration capability of integrating shippers, which is addressed in many important studies of logistics integration, such as that published by Jayaram and Tan (2010). Aside from minor differences in semantics, a broad consensus holds that external integration capabilities can be described through a combination of segmental focus (Droge *et al.*, 2012), financial linkage (Halley and Beaulicu, 2010; He and Lai, 2012), connectivity (Lin *et al.*, 2010; Wong and Boon-itt, 2008), information sharing (Flynn *et al.*, 2010; Quesada *et al.*, 2008), and information exchange (Huo, 2012). Segmental focus is

defined as the ability to develop customer-specific services to maximize customer success (Stank *et al.*, 2001). For 3PLs, these services include customized services, such as adjusting a logistics service in response to shippers' future distribution. Financial linkages with customers can help 3PLs to manage operational risks effectively, such as through agreements with customers to share the costs of logistics operations. Connectivity is the ability to integrate logistics operations with shippers in a timely, responsive, and usable way (Bowersox *et al.*, 2010). This capability includes periodically exchanging ideas with shippers, and even sending employees to work at shipping firms to assist them with operational integration. Information sharing refers to a 3PL's providing information about logistics operations to shippers, such as available storage space in the warehouse and real-time storage information. Information exchange initiatives allow all participants in the supply chain to share operational information effectively, enabling the 3PLs and the customers to provide input into each other's information systems (Jayaram and Tan, 2010).

Previous studies have revealed a causal relationship between companies' external integration capabilities and their performance (Huo, 2012; Sanders, 2005). Stank *et al.* (2009) argued that, integration among companies can increase customer satisfaction and lower the cost of effective use of equipment. Although some studies have touched on the topic of 3PLs' external integration, they have been performed from the perspective of a shipper. For example, Mortensen and Lemoine (2008) employed a case study to examine the logistical integration between manufacturers and 3PLs. Jayaram and Tan (2010) surveyed US suppliers, manufactures, wholesalers, and resellers to analyze the relationship between those companies' performance and their integration with their 3PLs. The results demonstrated that the integration of information systems positively affected the shippers' performance.

### 2.3 Cost advantages

Costs have long been a significant issue for logistics managers (Fawcett *et al.*, 2000). Research has presented different opinions concerning the indices that logistics providers can use to evaluate their cost advantages, but as shown in Table I, almost all of these indices fall into two categories – resource efficiency and cost competitiveness (Brah and Lim, 2006; Lai and Cheng, 2003; Liu and Lyons, 2011; Yeung *et al.*, 2006). "Resource efficiency" refers mainly to the effective use of logistics facilities and the effective use of human resources for logistics purpose (Lai and Cheng, 2003).

Title/item	Lai and Cheng (2003)	Yeung <i>et al.</i> (2006)	Brah and Lim (2006)	Liu and Lyons (2011)
<i>Resource efficiency</i>				
Improve rate of utilization of facilities/equipment/manpower in providing services	★			★
<i>Cost competitiveness</i>				
Low inventory cost as a percentage of sales	★		★	
Low labor cost as a percentage of sales	★		★	
Low transportation cost as a percentage of sales	★		★	
Low equipment and facility cost as a percentage of sales	★		★	
Low overall operating cost as a percentage of sales		★	★	★

**Table I.**  
Key sources of  
cost advantages

The former includes the effective use of warehousing and transportation facilities, such as by effective storage planning and merge-in-transit strategies (Jacobs and Chase, 2014). The latter involves management strategies and enhances personnel productivity, such as by simplification of the warehousing picking (Frazelle, 2002).

*2.4 Linking external integration capabilities with cost advantages and financial performance*

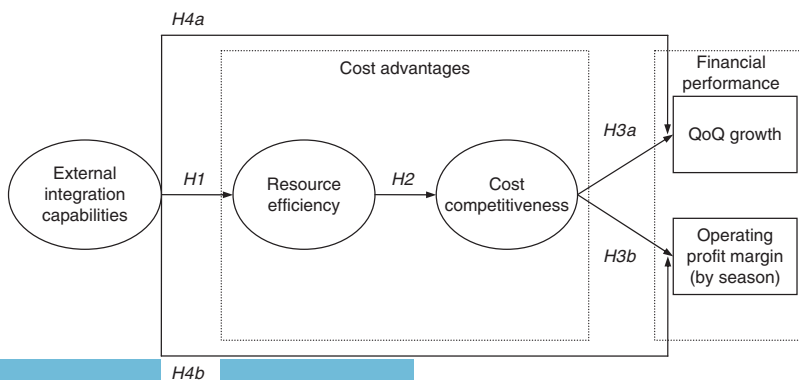
In terms of the literature review, a conceptual model was developed (see Figure 1). It suggests that external integration capabilities of a 3PL may have impact on its financial performance through cost advantages. A 3PL’s external integration capability may lead to resource efficiency which affects the 3PL’s cost competitiveness and ultimately improves its financial performance. Accordingly, this study generated four hypotheses to be tested.

*2.4.1 Impact of external integration capabilities on resource efficiency.* A company’s external integration capability is a resource as defined in RBT (Huo, 2012). For instance, connectivity requires companies to build trust, facilitating the sharing of operational and strategic information (Stank *et al.*, 2001). This external integration is imperfectly imitable. Also, the information integration, which is a form of external integration, can increase the efficacy of supply chains by enabling information sharing (Wong and Karia, 2010) and is a valuable attribute. According to RBT, effective integration between 3PLs and shippers allows 3PLs provide quicker response to customers, increase customer satisfaction, and improve resource reallocation by increasing operational efficiency (such as by developing comprehensive plans for logistics service that meet shippers’ future needs). These considerations lead to the following hypothesis:

*H1.* The external integration capabilities of 3PLs positively affect their efficiency of resource utilization.

*2.4.2 Impact of resource efficiency on cost competitiveness.* Since facility operations and human resources are the main sources of operating costs for 3PLs (Brah and Lim, 2006), the effective use of resources can significantly reduce operating costs as a proportion of revenue, enhancing a 3PL’s cost competitiveness. Hence, the second hypothesis is as follows:

*H2.* The resource efficiency of 3PLs positively affects their cost competitiveness.



**Figure 1.**  
The conceptual model

*2.4.3 Impact of cost competitiveness on financial performance.* Based on the RBT and a review of the literature, cost competitiveness can also be regarded as a critical source of superior financial performance. For instance, an effective logistics network design can reduce a company's operating costs and thereby increase its profitability (Coyle *et al.*, 2013). Some empirical studies have also found that cost competitiveness positively affects the financial performance of 3PLs (Yeung *et al.*, 2006). When 3PLs achieve cost competitiveness, they are more likely to invest their limited resources in the development of their core competences, generating an even greater competitive advantage and eventually increasing revenues and profits. Therefore, the following additional hypotheses are proposed:

*H3.* The cost competitiveness of a 3PL positively affects its financial performance.

*H3a.* The cost competitiveness of a 3PL positively affects its quarter on quarter (QoQ) growth.

*H3b.* The cost competitiveness of a 3PL positively affects its operating profit margin.

*2.4.4 Impact of external integration capabilities on financial performance.* Previous studies have demonstrated that the external integration capabilities of a shipping firm positively influence its financial performance (Vickery *et al.*, 2003). For instance, Frohlich and Westbrook (2001) reported that increasing operational integration between a company and its customers can increase its market share and profitability. Rosenzweig *et al.* (2003) argued that effective integration with external suppliers can generate a company's profitability. 3PLs with better external integration capabilities may be better able to meet their customers' needs, so they can achieve better financial performance in the form of higher revenue growth or a higher operating profit margin. This discussion suggests the following hypotheses:

*H4.* The external integration capabilities of a 3PL positively affect its financial performance.

*H4a.* The external integration capabilities of a 3PL positively affect its QoQ growth.

*H4b.* The external integration capabilities of a 3PL positively affect its operating profit margin.

### 3. Method

#### 3.1 Sample selection

A total of 289 3PLs in Taiwan were targeted based on the database of the Logistics Information Network (Ministry of Economic Affairs (Taiwan), 2007) and that of the China Credit Information Service (China Credit Information Service Ltd, 2007). All contact information was confirmed in September 2013 online. With respect to the Chinese samples, a total of 415 3PLs based in Shanghai, Guangdong, and Fujian were selected from the logistics database of the China Federation of Logistics and Purchasing (2013b). Shanghai and Guangdong are the regions in China with the most sophisticated logistics development; they are located in the center of the Yangtze River Delta Economic Zone and the center of the Pearl River Delta Economic Zone, respectively. They both contain a complete logistics infrastructure with strong demands for logistics services, favoring the establishment of foreign 3PLs (China Federation of Logistics and Purchasing, 2013a). Additionally, as the political tension



between Taiwan and China is reduced, China's province of Fujian, which used to be the center of battle operations against Taiwan, due to their close proximity, has become one of the areas along the coast of China with the most rapid economic development. With the capital injection by the Chinese government into the local logistics infrastructure and the increasing demand for logistics services following industrial development, Fujian offers investment value that is attracting foreign capital in the logistics services sector (Bureau of Economic Operations (China), 2013).

### 3.2 Survey measures and items

The questionnaire design procedure suggested by Dillman (2007) was adopted in this study. A preliminary survey was pre-tested in both Taiwan and China by interviewing experts in the 3PL industry. The questionnaire covered four sections – external integration capabilities, cost advantages, financial performance, and business profile. The Appendix presents the final metrics of performance and external integration capabilities. In total, 17 metrics of external integration capabilities of 3PLs were taken from the literature (Huo, 2012; Stank *et al.*, 2001). Respondents rated the strength of their agreement with statements about their firms' external integration capabilities on a seven-point Likert scale, ranging from 1 for "strongly disagree" to 7 for "strongly agree."

Cost advantages and financial performance were measured using a seven-item (five concerning cost advantages and two concerning financial performance) scale that is used in the logistics literature (Lai *et al.*, 2007; Liu and Lyons, 2011). Financial performance was measured on a two-item scale that covered QoQ growth and operating profit margin (by season). The QoQ growth index has been utilized in most studies of the financial performance of 3PLs (Lai *et al.*, 2007; Liu and Lyons, 2011; Panayides, 2007; Wang *et al.*, 2008; Yang *et al.*, 2009). The operating profit margin is a relative index that eliminates bias in financial comparisons that is caused by variations in the sizes of companies (Ross *et al.*, 2010). Respondents were asked to rate their company's performance relative to the industry average using a seven-point Likert scale where 1 = "much worse" and 7 = "much better."

### 3.3 Analytical methods

A partial least squares structural equation modeling (PLS-SEM/PLS) approach was used to test the research hypotheses. PLS was selected for the following reasons: PLS "works efficiently with small sample sizes" and "makes practically no (distribution) assumptions about the underlying data" (Hair *et al.*, 2014, p. 15); PLS can handle single-item constructs (Hair *et al.*, 2014). Since this study used only samples from Taiwan and from one municipality (Shanghai) and two provinces (Guangdong, Fujian) along China's southeast coast, the number of samples was less than those in other studies. QoQ growth and operating profit margin (by season) were used as separate metrics of the financial performance of 3PLs. These two indices differ in a way that makes them not ideal for combination (as in an unweighted linear average of item mean scores). Hence, PLS was the analysis method used. All analyses herein were performed using SPSS version 12.0, AMOS version 19, and the SmartPLS version 2.0.M3 (Ringle *et al.*, 2005).

## 4. Analysis results

### 4.1 Response rate and respondents profile

Survey questionnaires were mailed to all targeted 3PLs in Taiwan and China along with a covering letter and a return envelope with pre-paid postage. To increase the response rate, convenience store gift certificates worth US\$3 and Taiwan's

festival-themed postage stamps worth US\$1 were sent with the questionnaires in Taiwan and China, respectively (Dillman, 2007). Data collection began in early November 2013 and ended in late March 2014. Only responses from 3PLs that provided both transportation and warehousing services were analyzed, consistent with the scope of 3PL services that was defined by Langley *et al.* (1999). In Taiwan, the effective sample size was 232, as 14 respondents stated that their companies provided services only for internal users, and 43 service providers did not provide transportation and warehousing services. The total number of usable responses was 80. Accordingly, the overall response rate was 34.5 percent (80/232). In China, the effective sample size was 412, as three respondents indicated that their companies provided services only for internal users. The total number of usable responses was 46. Hence, the overall response rate was 11.2 percent (46/412). The profiles of the respondents in both Taiwan and China revealed that more than 60 percent (52/80 in Taiwan and 30/46 in China) of the respondents were managers, vice-presidents, or holders of higher positions in their firms. Thus, the survey findings were reliable. Table II provides the profiles of the responding firms.

#### 4.2 No-response bias

A two-stage analysis was used to perform a non-response bias test to check the representativeness of the final sample. First, an independent-sample *t*-test was conducted to determine the age of the firms whose employees responded to the survey and those whose employees did not. (The other characteristics of the firms were not considered due to only 10 percent of the data being available). In the second stage, the non-response bias was tested by comparing the responses that were received during

Characteristics	Taiwan (%)	China (%)
<i>Respondents' position</i>		
Manager and higher than manager level	65.0	65.2
Other	35.0	34.8
<i>Age of firm</i>		
Less than 5 years	1.3	4.3
5-10 years	2.5	30.4
11-15 years	15.0	23.9
16-20 years	26.3	23.9
More than 20 years	55.0	17.4
<i>Total sales volume (million USD)</i>		
Less than 2	48.8	2.2
2-20	32.5	34.8
20-200	13.8	54.3
Above 200	5.0	8.7
<i>Full-time employees</i>		
Less than 51	55.0	4.3
51-500	36.3	63.0
Above 500	8.8	32.6
<i>Ownership pattern</i>		
Local company	86.3	80.4
Foreign company	2.5	2.2
Foreign-local venture	11.3	17.4

**Table II.**  
Profile of  
responding firms



the first 3/4 and during the final 1/4 of the questionnaire response period. The returned surveys were compared based on the firms' total sales volume, number of full-time employees, and levels of all Likert ratings, using an independent-sample *t*-test (Armstrong and Overton, 1977). Most items were not statistically significant at the 0.05 level, with the exception of one external integration capability for the Chinese sample (fl2). The findings, therefore, suggested that non-response bias could not be a problem both in Taiwan and China.

#### 4.3 Missing data analysis and imputation

For both Taiwan and China, less than 3 percent of the data for each variable was missing, so the missing data were not a serious threat to validity (Roth, 1994). A model-based method, known as the Bayesian method, suggested by Buhi *et al.* (2008), was used to impute missing values of all of the variables, except for the demographic ones.

#### 4.4 Measurement model

Tables III-VI present the results of the PLS analysis. The loadings and cross-loadings of the indicators in Tables III and IV were examined to establish the convergent and discriminant validity of the measurement model. From the responses from Taiwan, two variables (sf4 and cn3) were eliminated because they had factor loadings of less than 0.7 (Marcoulides and Saunders, 2006). With respect to responses from both Taiwan and China, all of the items in Tables III and IV loaded higher on the construct of interest than on any other construct, confirming discriminant validity (Hair *et al.*, 2014). With the exception of one external integration capability in China (cn3), all of the individual loadings exceeded 0.707 (Hair *et al.*, 2014), providing evidence of the constructs' convergent validity.

Tables V and VI present the results concerning reliability. The composite reliabilities of the various measures ranged from 0.909 to 1.000, which exceeded the recommended threshold value of 0.700 (Fornell and Larcker, 1981). Tables V and VI also present the average variance extracted (AVE) as well as correlations between constructs. With the exception of one measure in Taiwan (external integration capabilities), the AVE of all measures exceeded the acceptable value of 0.5, specified by Fornell and Larcker (1981). These results support the convergent validity of the measures that were used in this study. The correlation matrix indicated that the square root of AVE for each measure exceeded the corresponding correlation values of that measure in all cases, establishing discriminant validity (Hair *et al.*, 2014). In summary, the results in Tables III-VI support the reliability and validity of the measures used herein.

#### 4.5 Structural model

Figures 2 and 3 present the results of the PLS analysis of the research model with significant standardized coefficients at the 0.05 significance level. In this study, bootstrapping (Hair *et al.*, 2014) was used to evaluate the significance of path coefficients. The findings for Taiwan and China appeared to be similar. The results obtained demonstrated that the external integration capabilities of 3PLs had a direct and statistically significant relationship with resource efficiency (path coefficient = 0.594,  $p < 0.001$ , for Taiwan; path coefficient = 0.712,  $p < 0.001$ , for China). These results support *H1*. The resource efficiency had a direct and statistically significant relationship with the cost competitiveness of a 3PL, supporting *H2* (path coefficient = 0.205,  $p < 0.05$ , for Taiwan; path coefficient = 0.562,  $p < 0.001$ , for China). The cost competitiveness had

**Table III.**  
Factor loadings  
(italic) and cross-  
loadings in Taiwan

Segmental focus	External integration capabilities				Cost advantages			Financial performance	
	Financial linkage	Connectivity	Information sharing	Information exchange	Resource efficiency	Facilities	Labor	QoQ growth	Operating profit margin (by season)
sf1	0.831	0.346	0.307	0.348	0.348	0.115	0.162	0.038	0.042
sf2	0.832	0.391	0.341	0.430	0.391	0.190	0.147	0.204	0.199
sf3	0.866	0.638	0.440	0.434	0.501	0.145	0.164	0.200	0.244
sf5	0.809	0.401	0.249	0.355	0.273	0.001	-0.056	0.082	0.055
fl1	0.428	0.674	0.490	0.541	0.415	0.224	0.133	0.167	0.145
fl2	0.326	0.692	0.437	0.391	0.282	0.231	0.188	0.120	0.154
cn1	0.456	0.734	0.538	0.600	0.328	0.208	0.170	0.115	0.174
cn2	0.549	0.683	0.500	0.494	0.392	0.251	0.244	0.054	0.105
is1	0.392	0.419	0.774	0.407	0.411	0.049	0.116	0.098	0.064
is2	0.349	0.518	0.787	0.415	0.420	0.162	0.149	0.329	0.337
is3	0.230	0.261	0.801	0.394	0.526	0.242	0.303	0.209	0.245
is4	0.272	0.392	0.735	0.500	0.494	0.307	0.354	0.126	0.208
ie1	0.391	0.439	0.509	0.914	0.441	0.175	0.140	0.052	0.070
ie2	0.364	0.439	0.455	0.858	0.259	0.214	0.250	0.021	0.018
ie3	0.460	0.487	0.454	0.785	0.459	0.155	0.123	0.128	0.224
o1	0.422	0.416	0.337	0.335	0.904	0.116	0.171	0.238	0.301
o2	0.424	0.317	0.540	0.484	0.921	0.225	0.211	0.140	0.171
o3	0.142	0.202	0.255	0.203	0.200	0.957	0.858	0.395	0.444
o4	0.126	0.290	0.197	0.203	0.161	0.952	0.706	0.485	0.534
o5	0.131	0.179	0.285	0.200	0.210	0.821	1.000	0.322	0.412
f1	0.165	0.164	0.249	0.078	0.204	0.460	0.322	1.000	0.710
f2	0.173	0.169	0.276	0.120	0.255	0.511	0.412	0.710	1.000

	External integration capabilities				Cost advantages			Financial performance		
	Segmental focus	Financial linkage	Information sharing		Information exchange	Resource efficiency	Cost competitiveness		Operating profit margin (by season)	
			Connectivity	Information sharing			Facilities	Labor		QoQ growth
sf1	0.888	0.528	0.622	0.582	0.507	0.671	0.364	0.293	0.409	0.473
sf2	0.926	0.634	0.645	0.707	0.564	0.667	0.390	0.301	0.454	0.476
sf3	0.825	0.662	0.736	0.577	0.459	0.710	0.463	0.395	0.547	0.521
sf4	0.739	0.489	0.531	0.736	0.666	0.387	0.349	0.221	0.260	0.351
sf5	0.906	0.626	0.728	0.561	0.499	0.682	0.510	0.354	0.388	0.519
fl1	0.543	0.872	0.812	0.645	0.553	0.547	0.609	0.566	0.461	0.548
fl2	0.626	0.818	0.439	0.566	0.393	0.463	0.511	0.448	0.403	0.380
cn1	0.835	0.707	0.933	0.713	0.714	0.704	0.560	0.452	0.490	0.546
cn2	0.630	0.747	0.909	0.597	0.537	0.653	0.567	0.510	0.386	0.431
cn3	0.422	0.453	0.704	0.491	0.507	0.222	0.233	0.228	0.348	0.253
is1	0.762	0.640	0.682	0.889	0.653	0.663	0.461	0.338	0.425	0.483
is2	0.618	0.719	0.617	0.738	0.510	0.617	0.541	0.483	0.400	0.409
is3	0.539	0.542	0.582	0.881	0.835	0.414	0.442	0.325	0.351	0.310
is4	0.564	0.537	0.521	0.871	0.774	0.374	0.376	0.317	0.396	0.346
ie1	0.582	0.490	0.622	0.737	0.938	0.413	0.501	0.401	0.360	0.359
ie2	0.622	0.535	0.665	0.809	0.942	0.474	0.431	0.334	0.389	0.382
ie3	0.533	0.548	0.634	0.724	0.894	0.392	0.414	0.354	0.328	0.297
o1	0.780	0.559	0.618	0.636	0.472	0.964	0.490	0.384	0.346	0.369
o2	0.628	0.600	0.635	0.550	0.421	0.966	0.581	0.597	0.386	0.371
o3	0.587	0.685	0.605	0.559	0.513	0.634	0.937	0.788	0.538	0.680
o4	0.320	0.563	0.429	0.446	0.396	0.407	0.937	0.794	0.544	0.598
o5	0.365	0.604	0.478	0.429	0.392	0.510	0.844	1.000	0.552	0.607
f1	0.481	0.513	0.482	0.465	0.389	0.380	0.577	0.552	1.000	0.796
f2	0.546	0.556	0.498	0.460	0.376	0.383	0.681	0.607	0.796	1.000

**Table IV.**  
Factor loadings  
(italic) and cross-  
loadings in China

**Table V.**  
Inter-construct  
correlations for  
Taiwan: consistency  
and reliability tests

	AVE	Composite reliability	Cronbach's $\alpha$	External integration capabilities	Resource efficiency	Cost competitiveness	QoQ growth	Operating profit margin (by season)
External integration capabilities	0.438	0.920	0.907	0.662				
Resource efficiency	0.833	0.909	0.800	0.594	0.913			
Cost competitiveness	0.864	0.950	0.921	0.279	0.205	0.930		
QoQ growth	1.000	1.000	1.000	0.196	0.204	0.431	1.000	
Operating profit margin (by season)	1.000	1.000	1.000	0.232	0.255	0.498	0.710	1.000

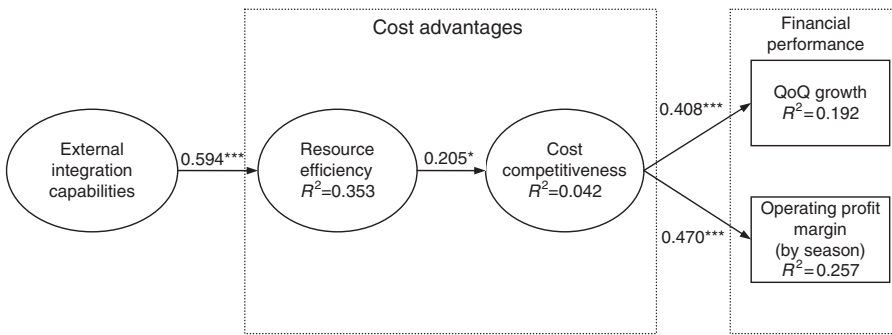
**Note:** Square root of AVE on diagonal

**Table VI.**  
Inter-construct  
correlations for  
China: consistency  
and reliability tests

	AVE	Composite reliability	Cronbach's $\alpha$	External integration capabilities	Resource efficiency	Cost competitiveness	QoQ growth	Operating profit margin (by season)
External integration capabilities	0.580	0.959	0.954	0.762				
Resource efficiency	0.932	0.965	0.927	0.712	0.965			
Cost competitiveness	0.853	0.946	0.914	0.586	0.562	0.924		
QoQ growth	1.000	1.000	1.000	0.528	0.380	0.590	1.000	
Operating profit margin (by season)	1.000	1.000	1.000	0.554	0.383	0.681	0.796	1.000

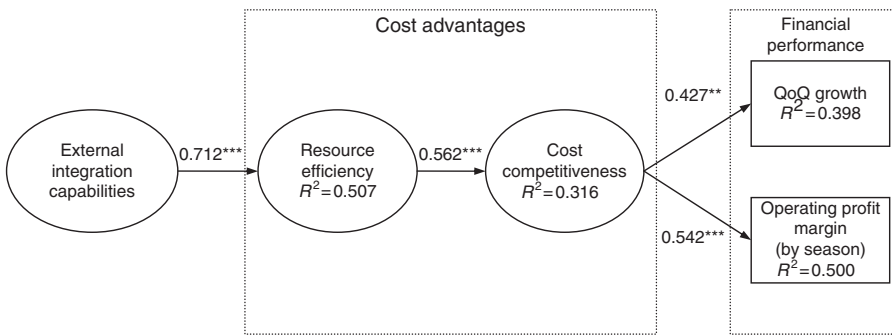
**Note:** Square root of AVE on diagonal

a direct and statistically significant relationship with 3PLs' QoQ growth (path coefficient = 0.408,  $p < 0.001$ , for Taiwan; path coefficient = 0.427,  $p < 0.01$ , for China) and operating profit margin (path coefficient = 0.470,  $p < 0.001$ , for Taiwan; path coefficient = 0.542,  $p < 0.001$ , for China), providing support for *H3a* and *H3b*. Although the direct impact of external integration capabilities on the 3PLs' financial performance (*H4a* and *H4b*) was not supported either in Taiwan or China, the relationship between external integration capabilities and financial performance is mediated by cost advantages for 3PLs. In summary, the results of this study show that external integration capabilities enabled a firm to use its resources efficiently, resulting in higher cost competitiveness and ultimately better financial performance. Table VII summarizes the total effects of the various variables, whose implications are discussed in the following section.



**Notes:**  $R^2$  denotes variance explained by model. Significance level of \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

**Figure 2.** Results for structural model for Taiwan



**Notes:**  $R^2$  denotes variance explained by model. Significance level of \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

**Figure 3.** Results for structural model for China

	Taiwan				China			
	Resource efficiency	Cost competitiveness	QoQ growth	Operating profit margin (by season)	Resource efficiency	Cost competitiveness	QoQ growth	Operating profit margin (by season)
External integration capabilities	0.594	0.122	0.132	0.158	0.712	0.400	0.448	0.454
Resource efficiency	–	0.205	0.084	0.096	–	0.562	0.240	0.305
Cost competitiveness	–	–	0.408	0.470	–	–	0.427	0.542

**Note:** –, No relationship

**Table VII.** Total effects of external integration capabilities on cost advantages and financial performance

**5. Discussion**

In both Taiwan and China, external integration capabilities have positive direct effects on resource efficiency, implying that segmental focus, connectivity, and information connections with customers contribute to the effective use of logistics facilities and

human resources by 3PLs. This finding is similar to that of Chow *et al.* (2007), who found that information integration with customers can reduce the inventories of 3PLs. Moreover, external integration capabilities can improve cost competitiveness via the mediating effect of resource efficiency, indicating that external integration capabilities can reduce the operating cost as a percentage of sales by affecting the resource efficiency.

As previously stated, the resource efficiency has a positive effect on cost competitiveness in both Taiwan and China, indicating that the effective use of logistics facilities and human resources can help 3PLs gain competitive advantages. Cost competitiveness directly affects both QoQ growth and operating profit margin. If a company achieves high cost competitiveness, it not only has an advantage in making profits but can also enhance its capabilities in customer service by making a shift in investment of the saved costs. The consequent increase in customer satisfaction and customer loyalty will increase the revenue of the company. Cost competitiveness directly affects QoQ growth less than it does operating profit margin, so cost reductions are more likely to be reflected in the profits rather than the revenue growth of 3PLs.

External integration capabilities have no significant direct effect on QoQ growth, but they indirectly influence QoQ growth via cost advantages. Hence, external integration capabilities have to be converted into cost advantages before they can grow the revenue of a company. The indirect relationship between external integration capabilities and financial performance is similar to those identified in previous studies (Huo, 2012; Kim, 2009; Shang, 2009; Swafford *et al.*, 2008). For instance, Huo (2012) found that external integration capabilities can enhance financial performance by improving customer-oriented performance. Kim (2009) also found integration capabilities, treated as a sole dimension, can indirectly affect financial performance via the ability to compete in supply chain management practices.

While external integration capabilities do not have a significant direct positive effect on operating profit margins, they do have an indirect influence on them. The fact that the external integration capabilities of 3PLs depend on coordination between customers, as well as investments made for customers, such as customized services and information systems, may negatively affect their operating profit margin. Therefore, the direct positive effect of external integration capabilities on operating profit margin may be reduced by the necessary coordination and investments, resulting in an overall insignificant direct effect of external integration capabilities on operating profit margin.

In China, the total effects of external integration capabilities on QoQ growth and operating profit margin are similar (0.448 and 0.454, respectively). In Taiwan, however, external integration capabilities totally influence QoQ growth less than they do operating profit margin (0.132 and 0.158, respectively). A possible explanation of this result is that China's 3PLs market exhibits various levels of development, whereas the level of development throughout Taiwan's 3PLs market is more consistent and sophisticated. Hence, advantages in external integration will give China's 3PLs more opportunities to satisfy customer demands and acquire market share, which will ultimately be reflected in their revenue growth.

## 6. Conclusion and implications

This study evaluated the relationships among the external integration capabilities of 3PLs, their cost advantages, and their financial performance. The purpose was to help 3PLs to formulate their future operational strategies. The results herein demonstrate



that the external integration capabilities and resource efficiency of 3PLs were positively correlated: stronger external integration capabilities have a stronger positive effect on resource efficiency. The results also indicated that cost competitiveness positively influenced the financial performance of 3PLs. Although the direct impact of external integration capabilities on the financial performance of 3PLs was not supported, the results of this study showed that external integration capabilities enable a firm to improve financial performance by capturing cost advantages.

This study makes several contributions to the field. First, it provides a theoretical framework for linking the external integration capabilities, cost advantages, and financial performance for 3PLs. Second, this study provides a clear procedure for assessing the validity and reliability of questionnaires using a survey and PLS-SEM/PLS, which is effective with small samples and can handle single-item constructs. Third, the results are useful for current customers of 3PLs because they can refer to the 17 external integration capabilities to evaluate potential 3PL partners. Finally, this study's sample was drawn from the industry in Taiwan and China, providing an opportunity to undertake a comparative analysis of two countries of similar cultural backgrounds and different levels of logistics industry development and demands.

The findings of this study have implications for 3PLs. Consistent with the general warning of Stank *et al.* (2001), our study suggests that 3PLs should intentionally develop external integration capabilities to achieve cost advantages and better financial performance. 3PLs must establish external integration capabilities before they can achieve optimal resource efficiency, including customer-specific service, financial linkage with customers, process coordination with customers, and information sharing and exchange with customers. For example, the strategies of periodically exchanging effective ideas with critical shippers and having employees work at those firms to help them with operational integration can increase coordination between 3PLs and customers, effectively increasing operational efficiency. Second, 3PLs must close attention to the efficiency of use of resources, including facilities and human resources, to improve cost competitiveness and in turn improve financial performance. 3PLs are part of an industry with low operating profit margins. If 3PLs have poor resource efficiency by having, for example, poor human resource management, poor storage utilization rates, or poor shipment planning, they will have difficulty in increasing profits. Third, 3PLs should also be aware of potential differences between markets with different levels of development in logistics services and demands in developing international marketing strategies. To make good investment decisions when they enter a new region, 3PLs need to understand the region's levels of services and demands, as well as the growth in demand, and adjust their expectations of profit accordingly. For example, China's 3PLs with excellent external integration capabilities not only enjoy increased profits, but also improved revenue growth. A possible strategy for foreign investors with an interest in entering China's logistics markets is first to acquire local 3PLs to obtain service networks, and then to use their existing know-how about external integration to increase their local market share. 3PLs that seek to extend services into new regions should also be aware of this.

This study has limitations. First, the samples comprised only 3PLs from Taiwan and one municipality (Shanghai) and two provinces (Guangdong, Fujian) along China's southeast coast. Second, the questionnaires were distributed by mail so the number of responses may be less ensured. Third, external integration was specified using a second-order model, so differences between the relationships of the sub-dimensions with cost advantages or financial performance were not examined.

Several important issues are raised and suggestions made for further research. First, this study focussed only on 3PLs in Taiwan and one municipality as well as two provinces along the southeast coast of China. Since the levels of economic development and logistics development vary greatly among regions in China (Bureau of Economic Operations (China), 2013; China Federation of Logistics and Purchasing, 2013a), future research could expand the sampling to other regions of China to elucidate regional variations in the characteristics of their logistics practices. Second, this research was quantitative. Further research can adopt a case-study approach to deeply investigate the relationship between the integration capabilities of 3PLs and their cost advantages. Third, drawing on RBT, further research can attempt to determine whether company resources other than those considered herein have any influence on the performance of 3PLs, such as organizational culture (Cao *et al.*, 2015) and intra-organizational resources (Xu *et al.*, 2014). Finally, no conclusion has yet been reached concerning the effects of internal integration or external integration on the financial performance of shippers. For example, Rodrigues *et al.* (2004) argued that simultaneously integrating a company's internal functions with those of its external supply chain partners can improve financial performance. Additionally, Huo (2012) claimed that internal integration contributes more to a company's profitability than does external integration. Future research may study the relationship between the internal and external integration capabilities of 3PLs, and the effects of these capabilities on a company's financial performance.

## References

- Armstrong & Associates Inc. (2014), "Global 3PL market size estimates", available at: [www.3plogistics.com/3plmarketglobal.htm](http://www.3plogistics.com/3plmarketglobal.htm) (accessed December 31, 2014).
- Armstrong, J.S. and Overton, T.S. (1977), "Estimating nonresponse bias in mail surveys", *Journal of Marketing Research*, Vol. 14 No. 3, pp. 396-402.
- Barney, J. (1991), "Firm resources and sustained competitive advantage", *Journal of Management*, Vol. 17 No. 1, pp. 99-120.
- Barney, J.B. (2001), "Is the resource-based 'view' a useful perspective for strategic management research? Yes", *Academy of Management Review*, Vol. 26 No. 1, pp. 41-56.
- Bowersox, D.J., Closs, D.J. and Cooper, M.B. (2010), *Supply Chain Logistics Management*, 3rd ed., McGraw-Hill/Irwin, Boston, MA.
- Brah, S.A. and Lim, H.Y. (2006), "The effects of technology and TQM on the performance of logistics companies", *International Journal of Physical Distribution & Logistics Management*, Vol. 36 No. 3, pp. 192-209.
- Buhi, E.R., Goodson, P. and Neilands, T.B. (2008), "Out of sight, not out of mind: strategies for handling missing data", *American Journal of Health Behavior*, Vol. 32 No. 1, pp. 83-92.
- Bureau of Economic Operations (China) (2013), *Report of China Logistics Development*, Peking University Press, Beijing, in Chinese.
- Cao, Z., Huo, B., Li, Y. and Zhao, X. (2015), "The impact of organizational culture on supply chain integration: a contingency and configuration approach", *Supply Chain Management: An International Journal*, Vol. 20 No. 1, pp. 24-41.
- China Credit Information Service Ltd (2007), "China credit information service database", available at: [www.credit.com.tw/newweb/index\\_all.cfm](http://www.credit.com.tw/newweb/index_all.cfm) (accessed March 10, 2007).
- China Federation of Logistics and Purchasing (2013a), *China Logistics Yearbook*, China Fortune Press, Beijing, in Chinese.

- China Federation of Logistics and Purchasing (2013b), "A-class logistics company database", in Chinese, available at: [www.chinawuliu.com.cn/pgb/](http://www.chinawuliu.com.cn/pgb/) (accessed November 25, 2013).
- Chow, H.K.H., Choy, K.L., Lee, W.B. and Chan, F.T.S. (2007), "Integration of web-based and RFID technology in visualizing logistics operations – a case study", *Supply Chain Management: An International Journal*, Vol. 12 No. 3, pp. 221-234.
- Coyle, J.J., Langley, C.J. Jr, Novack, R.A. and Gibson, B.J. (2013), *Managing Supply Chains: A Logistics Approach*, 9th ed., South-Western Cengage Learning, Boston, MA.
- Danese, P. and Romano, P. (2011), "Supply chain integration and efficiency performance: a study on the interactions between customer and supplier integration", *Supply Chain Management*, Vol. 16 No. 4, pp. 220-230.
- Dillman, D.A. (2007), *Mail and Internet Surveys: The Tailored Design Method*, 2nd ed., Wiley, Hoboken, NJ.
- Droge, C., Vickery, S.K. and Jacobs, M.A. (2012), "Does supply chain integration mediate the relationships between product/process strategy and service performance? An empirical study", *International Journal of Production Economics*, Vol. 137 No. 2, pp. 250-262.
- Fawcett, S.E., Calantone, R.J. and Roath, A. (2000), "Meeting quality and cost imperatives in a global market", *International Journal of Physical Distribution & Logistics Management*, Vol. 30 No. 6, pp. 472-499.
- Feng, T.W. and Wang, D. (2013), "Supply chain involvement for better product development performance", *Industrial Management & Data Systems*, Vol. 113 No. 2, pp. 190-206.
- Flynn, B.B., Huo, B. and Zhao, X. (2010), "The impact of supply chain integration on performance: a contingency and configuration approach", *Journal of Operations Management*, Vol. 28 No. 1, pp. 58-71.
- Fornell, C. and Larcker, D.F. (1981), "Evaluating structural equation models with unobservable variables and measurement error", *Journal of Marketing Research*, Vol. 18 No. 1, pp. 39-50.
- Frazelle, E. (2002), *World-Class Warehousing and Material Handling*, McGraw-Hill, New York, NY and London.
- Frohlich, M.T. and Westbrook, R. (2001), "Arcs of integration: an international study of supply chain strategies", *Journal of Operations Management*, Vol. 19 No. 2, pp. 185-200.
- Goldsby, T.J. and Stank, T.P. (2000), "World class logistics performance and environmentally responsible logistics practices", *Journal of Business Logistics*, Vol. 21 No. 2, pp. 187-208.
- Hair, J.F., Hult, G.T.M., Ringle, C. and Sarstedt, M. (2014), *A Primer on Partial Least Squares Structural Equations Modeling (PLS-SEM)*, Sage, Los Angeles, CA.
- Halley, A. and Beaulieu, M. (2010), "A multidimensional analysis of supply chain integration in Canadian manufacturing", *Canadian Journal of Administrative Sciences*, Vol. 27 No. 2, pp. 171-180.
- He, Y. and Lai, K.K. (2012), "Supply chain integration and service oriented transformation: evidence from Chinese equipment manufacturers", *International Journal of Production Economics*, Vol. 135 No. 2, pp. 791-799.
- Huo, B. (2012), "The impact of supply chain integration on company performance: an organizational capability perspective", *Supply Chain Management*, Vol. 17 No. 6, pp. 596-610.
- Jacobs, F.R. and Chase, R.B. (2014), *Operations and Supply Chain Management*, 14th ed., McGraw-Hill/Irwin, New York, NY.
- Jayaram, J. and Tan, K.C. (2010), "Supply chain integration with third-party logistics providers", *International Journal of Production Economics*, Vol. 125 No. 2, pp. 262-271.

- Kim, S.W. (2009), "An investigation on the direct and indirect effect of supply chain integration on firm performance", *International Journal of Production Economics*, Vol. 119 No. 2, pp. 328-346.
- Lai, F., Zhao, X. and Wang, Q. (2007), "Taxonomy of information technology strategy and its impact on the performance of third-party logistics (3PL) in China", *International Journal of Production Research*, Vol. 45 No. 10, pp. 2195-2218.
- Lai, K.H. (2004), "Service capability and performance of logistics service providers", *Transportation Research Part E-Logistics and Transportation Review*, Vol. 40 No. 5, pp. 385-399.
- Lai, K.H. and Cheng, T.C.E. (2003), "Supply chain performance in transport logistics: an assessment by service providers", *International Journal of Logistics*, Vol. 6 No. 3, pp. 151-164.
- Langley, C.J. Jr, Newton, B.F. and Tyndall, G.R. (1999), "Has the future of third-party logistics already arrived?", *Supply Chain Management Review*, Vol. 3 No. 3, pp. 85-94.
- Lieb, R.C. and Lieb, K.J. (2012), "The North American third-party logistics industry in 2011: the provider CEO perspective", *Transportation Journal*, Vol. 51 No. 3, pp. 353-367.
- Lin, Y., Wang, Y. and Yu, C. (2010), "Investigating the drivers of the innovation in channel integration and supply chain performance: a strategy orientated perspective", *International Journal of Production Economics*, Vol. 127 No. 2, pp. 320-332.
- Liu, C.L. and Lyons, A.C. (2011), "An analysis of third-party logistics performance and service provision", *Transportation Research Part E-Logistics and Transportation Review*, Vol. 47 No. 4, pp. 547-570.
- Marcoulides, G.A. and Saunders, C. (2006), "PLS: a silver bullet?", *MIS Quarterly*, Vol. 30 No. 2, pp. iii-ix.
- Mendes Primo, M.A. (2010), "Supply chain integration mechanisms for alleviating supply problems in manufacturing firms", *Operations Management Research*, Vol. 3 Nos 1/2, pp. 43-59.
- Ministry of Economic Affairs (Taiwan) (2007), "Logistics information network database", available at: <http://gcis.nat.gov.tw/link/Common/Main.aspx?Page=BSSearch> (accessed February 5, 2007).
- Ministry of Transportation and Communication (Taiwan) (2014), "Monthly statistics of transportation & communications", available at: [www.motc.gov.tw/en/home.jsp?id=609&parentpath=0,154](http://www.motc.gov.tw/en/home.jsp?id=609&parentpath=0,154) (accessed December 31, 2014).
- Mortensen, O. and Lemoine, O.W. (2008), "Integration between manufacturers and third party logistics providers?", *International Journal of Operations & Production Management*, Vol. 28 No. 4, pp. 331-359.
- Pagell, M. (2004), "Understanding the factors that enable and inhibit the integration of operations, purchasing and logistics", *Journal of Operations Management*, Vol. 22 No. 5, pp. 459-487.
- Panayides, P.M. (2007), "The impact of organizational learning on relationship orientation, logistics service effectiveness and performance", *Industrial Marketing Management*, Vol. 36 No. 1, pp. 68-80.
- Porter, M.E. (1980), *Competitive Strategy: Techniques for Analyzing Industries and Competitors*, Free Press, New York, NY.
- Quesada, G., Rachamadugu, R., Gonzalez, M. and Martinez, J.L. (2008), "Linking order winning and external supply chain integration strategies", *Supply Chain Management*, Vol. 13 No. 4, pp. 296-303.
- Ringle, C.M., Wende, S. and Will, A. (2005), "SmartPLS 2.0.M3", available at: [www.smartpls.com](http://www.smartpls.com) (accessed July 20, 2013).

- Rodrigues, A.M., Stank, T.P. and Lynch, D.F. (2004), "Linking strategy, structure, process, and performance in integration logistics", *Journal of Business Logistics*, Vol. 25 No. 2, pp. 65-94.
- Rosenzweig, E.D., Roth, A.V. and Dean, J.W. Jr (2003), "The influence of an integration strategy on competitive capabilities and business performance: an exploratory study of consumer products manufacturers", *Journal of Operations Management*, Vol. 21 No. 4, pp. 437-456.
- Ross, S.A., Westerfield, R. and Jordan, B.D. (2010), *Fundamentals of Corporate Finance*, 9th ed., McGraw-Hill Irwin, Boston, MA.
- Roth, P.L. (1994), "Missing data: a conceptual review for applied psychologists", *Personnel Psychology*, Vol. 47 No. 3, pp. 537-560.
- Saeed, K.A., Malhotra, M.K. and Grover, V. (2011), "Interorganizational system characteristics and supply chain integration: an empirical assessment", *Decision Sciences*, Vol. 42 No. 1, pp. 7-42.
- Sanders, N.R. (2005), "IT alignment in supply chain relationships: a study of supplier benefits", *Journal of Supply Chain Management*, Vol. 41 No. 2, pp. 4-13.
- Shang, K.C. (2009), "Integration and organisational learning capabilities in third-party logistics providers", *The Service Industries Journal*, Vol. 29 No. 3, pp. 331-343.
- Shang, K.C. and Marlow, P.B. (2005), "Logistics capability and performance in Taiwan's major manufacturing firms", *Transportation Research Part E: Logistics and Transportation Review*, Vol. 41 No. 3, pp. 217-234.
- Shang, K.C. and Sun, L.F. (2004), "Taxonomy in logistics management: a resource-based perspective", *International Journal of Management*, Vol. 21 No. 2, pp. 149-165.
- So, S. and Sun, H. (2010), "Supplier integration strategy for lean manufacturing adoption in electronic-enabled supply chains", *Supply Chain Management*, Vol. 15 No. 6, pp. 474-487.
- Springinkle, M. and Wallenburg, C.M. (2012), "Improving distribution service performance through effective production and logistics integration", *Journal of Business Logistics*, Vol. 33 No. 4, pp. 309-323.
- Stank, T., Brzica, M. and Ficenc, J. (2009), "The benefits of supply chain integration using a third-party integrator", *Transfusion*, Vol. 49 No. 11, pp. 2536-2538.
- Stank, T., Keller, S. and Closs, D. (2001), "Performance benefits of supply chain logistical integration", *Transportation Journal*, Vol. 41 Nos 2/3, pp. 32-46.
- Stefansson, G. (2006), "Collaborative logistics management and the role of third-party service providers", *International Journal of Physical Distribution & Logistics Management*, Vol. 36 No. 2, pp. 76-92.
- Swafford, P.M., Ghosh, S. and Murthy, N. (2008), "Achieving supply chain agility through IT integration and flexibility", *International Journal of Production Economics*, Vol. 116 No. 2, pp. 288-297.
- Thun, J.-H. (2010), "Angles of integration: an empirical analysis of the alignment of internet-based information technology and global supply chain integration", *Journal of Supply Chain Management*, Vol. 46 No. 2, pp. 30-44.
- UPS (2014), "UPS 2013 annual report", available at: [www.investors.ups.com/phoenix.zhtml?c=62900&p=irol-reportsannual](http://www.investors.ups.com/phoenix.zhtml?c=62900&p=irol-reportsannual) (accessed November 1, 2014).
- Vickery, S.K., Jayaram, J., Droge, C. and Calantone, R. (2003), "The effects of an integrative supply chain strategy on customer service and financial performance: an analysis of direct versus indirect relationships", *Journal of Operations Management*, Vol. 21 No. 5, pp. 523-539.

- Wang, Q., Lai, F. and Zhao, X. (2008), "The impact of information technology on the financial performance of third-party logistics firms in China", *Supply Chain Management*, Vol. 13 No. 2, pp. 138-150.
- Wei, H.-L., Wong, C.W.Y. and Lai, K.-H. (2012), "Linking inter-organizational trust with logistics information integration and partner cooperation under environmental uncertainty", *International Journal of Production Economics*, Vol. 139 No. 2, pp. 642-653.
- Wong, C.Y. and Boon-itt, S. (2008), "The influence of institutional norms and environmental uncertainty on supply chain integration in the Thai automotive industry", *International Journal of Production Economics*, Vol. 115 No. 2, pp. 400-410.
- Wong, C.Y. and Karia, N. (2010), "Explaining the competitive advantage of logistics service providers: a resource-based view approach", *International Journal of Production Economics*, Vol. 128 No. 1, pp. 51-67.
- Xu, D., Huo, B. and Sun, L. (2014), "Relationships between intra-organizational resources, supply chain integration and business performance", *Industrial Management & Data Systems*, Vol. 114 No. 8, pp. 1186-1206.
- Yang, C.-C., Marlow, P.B. and Lu, C.-S. (2009), "Assessing resources, logistics service capabilities, innovation capabilities and the performance of container shipping services in Taiwan", *International Journal of Production Economics*, Vol. 122 No. 1, pp. 4-20.
- Yeung, J.H.Y., Selen, W., Sum, C.-C. and Huo, B. (2006), "Linking financial performance to strategic orientation and operational priorities: an empirical study of third-party logistics providers", *International Journal of Physical Distribution & Logistics Management*, Vol. 36 No. 3, pp. 210-230.
- Zhao, M., Dröge, C. and Stank, T.P. (2001), "The effects of logistics capabilities on firm performance: customer-focused versus information-focused capabilities", *Journal of Business Logistics*, Vol. 22 No. 2, pp. 91-107.

## Appendix. Items used in developing scales

### 1. External integration capabilities

Respondents were asked to rate the strength of their agreement with statement about the B2B external integration capabilities of their firms using a seven-point Likert scale, ranging from 1 for "strongly disagree" to 7 for "strongly agree."

My company ...

- sf1. takes into account shippers' best interests when providing logistics service;
- sf2. regularly reviews specific customer service offerings for potential expansion or dissolution;
- sf3. has comprehensive plans for future logistics services to meet shippers' demands;
- sf4. customizes its logistics services for various shippers;
- sf5. provides shippers with logistics processing and value-added services;
- fl1. communicates with shippers on issues related to new logistics services with the goal of sharing increases in costs;
- fl2. can convince shippers to sign a long-term contract;
- cn1. effectively exchanges ideas with key shippers;
- cn2. effectively integrates its logistics operations with the operations of shippers;
- cn3. has its employees working at shipping companies to support the operational integration;
- is1. provides technical support for crucial shippers to facilitate the operations;
- is2. effectively provides operational information for shippers;



- is3. provides information about warehouse storage spaces for key shippers;
- is4. effectively provides real-time storage information for shippers;
- ie1. properly integrates its information systems with those of crucial shippers;
- ie2. establishes a fast order system with key shippers; and
- ie3. receives information regarding cargo replenishment from crucial shippers to ensure rapid replenishment.

## 2. Performance

Respondents were asked to rate their company's B2B performance relative to the industry average using a seven-point Likert scale anchored by "1 = much worse" and "7 = much better."

Resource efficiency:

- o1. effective use of logistics facilities; and
- o2. effective use of logistics human resources.

Cost competitiveness:

- o3. lower transportation cost as a percentage of sales;
- o4. lower warehousing cost as a percentage of sales; and
- o5. lower labor cost as a percentage of sales.

Financial performance:

- f1. QoQ growth; and
- f2. operating profit margin (by season).

### Corresponding author

Chiung-Lin Liu can be contacted at: [realskyer@googlemail.com](mailto:realskyer@googlemail.com)

For instructions on how to order reprints of this article, please visit our website:

[www.emeraldgroupublishing.com/licensing/reprints.htm](http://www.emeraldgroupublishing.com/licensing/reprints.htm)

Or contact us for further details: [permissions@emeraldinsight.com](mailto:permissions@emeraldinsight.com)

Reproduced with permission of copyright owner. Further reproduction prohibited without permission.