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Determinants Factors Affecting the Competitiveness of Thai Ocean Freight Forwarders: An Application of the Confirmatory Factor Analysis

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Abstract
This research aims to study the factors affecting the competitiveness of Thai ocean freight forwarders. The samples for this study were 208 Thai ocean freight forwarders. The research instrument was a factor evaluation form designed to investigate the factors affecting the competitiveness of Thai ocean freight forwarders and test reliability (0.973). The content validity was assessed by experts, and the construct validity analyzed by conducting a confirmatory factor analysis (CFA) using the LISREL program. The model of factors affecting the competitiveness of Thai ocean freight forwarders was found to be consistent with the theoretical framework. The findings indicate that in order to increase their competitiveness potential, Thai ocean freight forwarders should focus on improving maritime logistics service quality, firm resources, and business networks.

Keywords: Confirmatory factor analysis, firm resource, business networks, maritime logistics service quality, and competitiveness

1. Introduction

World trading depends largely on maritime logistics. More than 90% of international trade is shipped through ports (Cho & Yang, 2011). Maritime logistics is suitable for goods shipped in great amounts because of the low cost per unit. This is also eco-friendly compared to other shipping methods (Li, 2011). Moreover, globalization has been increasing maritime trading rapidly and providing new opportunities for maritime logistics companies (Evangelista & Morvillo, 2000; Notteboom & Winkelmans, 2001). But globalization has also increased global competition among maritime logistics companies. This change in the global market structure and the needs of ocean freight forwarders has caused maritime logistics companies to revise their business plans to respond to ocean freight forwarders' demands. Ocean freight forwarders are an essential link in logistics management and the effectiveness of shippers to connect global maritime logistics networks (Notteboom & Winkelmans, 2001; Heaver, 2002; Cheung *et al*., 2003).

According to Lu & Dinwoodie (2002), Burkovskis (2008) and Banomyong & Supatn (2011), ocean freight forwarders are not only responsible for maritime shipping, they are also responsible for facilitating exporters'business operations, including freight booking confirmation, loading goods, shipping, import declaration, export declaration, document management to name a few. Ocean freight forwarders are especially important to importers and exporters as they can reduce the cost for their business and provide them with door-to-door service (Chen *et al*., 2009; Fremont, 2009). In Thailand, the number of ocean freight forwarders is increasing rapidly due to the steady growth of the export sectors (Kasikorn

Research Center, 2018). This has brought about strong competition among ocean freight forwarders and is affecting their operation plans. Ocean freight forwarders should therefore develop their competitiveness and provide more effective services to satisfy their customers (Lai, Ngai & Cheng, 2004). Moreover, they need to revise their business strategies to make their operations more effective to respond customer needs and gain competitive advantages.

This research aims to study the factors affecting the competitiveness of ocean freight forwarders in Thailand. It analyzes empirical evidence. The literature review includes competitiveness of ocean freight forwarders in Thailand and the various factors affecting their competitiveness. The relevant literature is reviewed in Section 2 and the research methodology presented in Section 3. The construct validity analysis using first order confirmatory and second order confirmatory factor analysis (CFA) is discussed in Section 4. The conclusion and various recommendations are contained in Sections 5 and 6, respectively.

2. Literature Review

The literature review includes the factors affecting the competitiveness of ocean freight forwarders, namely, firm resources, business networks, and maritime logistics service quality. This section first discusses the concept of competitiveness.

- Competitiveness

Micheal E. Porter (1985) articulated ways to gain competitive advantages. The core concept of the theory is that when a firm gains higher benefits than others in the same business group, that firm has the potential to compete in the market. The main aim of all businesses is thus to create sustainable competitiveness (Porter, 1985). Siudek & Zawojska (2014) have categorized competitiveness into three levels; the nation, the industry, and firm levels. According to Hanson et al.,(2001), the competitiveness of a firm is based on the strategic management of resources, capabilities and on its core competencies. Ambastha & Momaya (2004) studied firm competitiveness and concluded that it is linked to assets, process, and performance. ‘Assets’ refer to firm resources and ‘process’ to the process of activities and firm management. As to ‘performance’, it refers to the potential in production, the difference between price and cost, product variety, value effectiveness, and customer satisfaction. ‘Performance’ can be subdivided into financial performance and non-financial performance (Wilden et al., 2013; Yang et al., 2011).

- Firm Resources

Resources refer to anything valuable or beneficial to the firm’s owner. Resources can be subdivided in various subgroups. Evered et al., (1980) have grouped resources into six main categories: (i) physical resources, (ii) human resources, (iii) technological resources, (iv) organization resources, (v) financial resources, and (vi) reputation. Wernerfelt (1984) also subdivided resources and grouped them into two categories; (i) tangible and (ii) intangible. Barney (1991) found that firm resources consisted of four categories, namely, (i) valuable resources, (ii) rare resources, (iii) imperfectly imitable resources, and (iv) nonsubstitutable resources. Barney et al., (2001) further identified the resources with which firms can gain advantages in competition. These consist of: (i) tangible assets, (ii) intangible assets, and (iii) organizational capital resources. Subsequently, Barney (2002) proposed another 4 firm resource categories; (i) financial capital, (ii) physical capital, (iii) human capital, and (iv) organizational capital.

- Business Networks

Wheelen & Hunger (2000) found that business networks help a firm focus on the outstanding potential together with gaining effectiveness from other firms in the network to enhance the firm potential. Jennings & Beaver (1997) reported that the successful firm was the one which can gain benefits from business networks for financial support, market access, and marketing

analysis. Getting involved in a business network is also considered to be the main point of success of small and medium enterprises (SMEs). Business networks can support SMEs to compete in global markets. Inoue & Liu (2015) found that business network can enhance their effectiveness and strengths. Moreover, information can be connected systematically within the network. This potential is likely to lead a firm to success. Hohenthal et al., (2015) mentioned that networking has a positive effect on business connections and results in business expansion at the national and international levels. Jarillo (2013) described business network strategy as a long term agreement between firms that are different but still connected.

Networks can make a firm gain more competitive advantages than outsiders and make it able to establish new markets to respond customer's needs. In addition, Moller (2013) showed that business connections were major business environmental factors for increasing value and enhancing capacities in sustainable competitiveness (Taticchi et al., 2012). The joint operations of business networks must be collaborative activities based on mutual trust and benefits (Zorlu & Hacıoğlu, 2012). Creating trust in business networks refers to situations where firms rely on one another, get awareness of mutual benefits, and treat others equally, honestly, and fairly. Moreover, it includes the way firms share valid and clear information with others with good governance (Sorensen et al., 2011). Co-cultural organizations consist of mutual values between firms and collaborative operations. The key factor that leads to success is the push from management and even staff to work together to generate innovation and integrate organization cultures (Hahn et al., 2015).

Another important construct is knowledge sharing, which refers to knowledge management between firms to enhance their potential, creativity and innovation. Knowledge sharing also involves knowledge transferring and experience sharing. Both enhance relationship through interactive activities between firms (Sanchez et al., 2013). Collaborative ideas can lead to innovation and further sustainable development (Johansson et al., 2013).

- Maritime Logistics Service Quality

Lu (2000) studied logistics services in Taiwanese maritime firms and investigated the effects of logistics services on the effectiveness of maritime shipping firms. The study identified eight strategies concerning logistics services: (i) quickness and reliability, (ii) additional service, (iii) agent service, (iv) integrated service and long term connection with national storage, (v) freight charge, (vi) facilities, (vii) firm image, and (viii) promotion. Lu & Dinwoodie (2002) looked at the perspectives of international freight forwarder services and determined that the key factors of logistics services consist of: (i) value added to the service, (ii) service support, (iii) goods distribution, (iv) information service, and (v) shipping service. These five factors can enhance the potential of logistics businesses. Focusing on carrier service and shipper's perspectives, Lu (2003) showed that exporters essentially need five types of service: (i) storage service, (ii) goods monitoring service, (iii) land shipping connection service, (iv) customs formalities service, and (v) document management service.

There is a strong correlation between maritime shipping and logistics activities. Liang et al., (2006) argue that four factors affect the abilities of maritime logistics service providers: (i) the ability of service response and comfortable operation, (ii) integrated services, (iii) shipping services, and (iv) price. These factors came from 22 indicators in the container shipping context. Thai (2008) studied service quality in maritime transport and concluded that the quality of the service was not solely based on customer behaviors awareness. Service providers have to respond to the needs of customers, including integrating technology into their process for better services. The indicators for service quality consist of on time service, competitive cost, and variety of services to respond customers.

The quality of service directly affects the financial health of firms (Clayton & Turner, 2000: Jenssen & Randoy, 2006; and Panayides, 2006). Banomyong & Supatn (2011)studied logistics providers and shippers' perspective and found that four factors affect customer's selection for receiving logistics services. These are (i) reliability, (ii) assurance, (iii) tangibility, (iv)empathy, (v) responsiveness, and (vi) service cost.

3. Research Model and Methodology

The body of literature discussed above indicates that key factors such as firm resource, business networks, maritime logistics service quality, competitiveness are closely related. In this study, these relationships will be verified by testing the following hypotheses:

H1: Firm resource has a direct positive relation to competitiveness.

H2: Business networks have a direct positive relation to competitiveness.

H3: Maritime logistics service quality has a direct positive relation to Competitiveness.

- Population and Samples

The population in this study was 368 Thai ocean freight forwarders (Thai international freight forwarders association, 2018; The customs broker and transportation association of Thailand, 2018). The sample in this study consists of 208 Thai ocean freight forwarders which were selected using the convenience sampling method.

- Research Instrument

The research instrument was an evaluation form designed to investigate the factors affecting the competitiveness of Thai ocean freight forwarders. The evaluation form included a Seven-Point Likert Scale evaluation form (with 1 = the lowest score and 7 = the highest score). Items of Congruence (IOC) were analyzed by 5 experts. The IOC index was between .60 - 1.00. The reliability was validated based on Cronbach's Alpha test as 0.973 is higher than 0.7 (Peterson & Kim, 2013).

- Data Collection

Data were collected from the 208 firms selected using the evaluation form developed by the researchers. The sample size was determined based on the ratio calculation of the number of samples per parameter or variables at 10:1 (Bentler & Chou, 1987; Kline, 2005; Worthington & Whittaker, 2006). Since there are 18 variables in this study; the appropriate number of samples was at least 180 samples (18 x 10). After the sampling selection, the objectives of the study were explained as was how to respond to the evaluation form. After the data were collected, they were coded and analyzed.

- Data Analysis

Data were analyzed by conducting a confirmatory factor analysis (CFA). A CFA analysis consists of a first order confirmatory and a second order confirmatory analysis designed to investigate the construct validity of the model. This method is quite practical nowadays and well suited for this research which was done based on a theoretical framework whose components have to be confirmed. These analyses can confirm whether the actual data from the authentic samples were consistent with the theoretical framework or not. In this study, the CFAs was conducting using the LISREL program.

4. Results and Discussion

The results of first order confirmatory factor analysis show that the factor loading of the first factor - firm resource – consists of (i) financial capital, (ii) physical resources, (iii) human resources, (iv) technological resources, and (v) organization resources. It was found that the standardized item factor loadings were between 0.62 – 0.92, and R^2 between 0.38 – 0.85. The heaviest loading variable was human resources, which received a standardized factor loading

at 0.92 (R^2 = 0.85). The second factor - business networks - consists of (i) the joint operations of the business networks, (ii) creating trust in business networks, (iii) co-culture organizations for promoting networks, and (iv) knowledge sharing. It was found that the standardized item factor loadings were between 0.70 – 0.90, and R^2 between 0.50 – 0.82.

Table 1: Average Variance Extracted (AVE), Construct Reliability (CR) and Factor Loading of the First Order CFA

Key Factors Indicator	AVE	CR	Key Components Indicator	b	B	SE	t	R2
Firm resource	0.58	0.87	-Financial capital	0.98	0.78	0.08	12.68*	0.60
			-Physical resources	0.97	0.81	0.07	13.41*	0.65
			-Human resources	1.18	0.92	0.07	16.35*	0.85
			-Technological resources	0.96	0.62	0.10	9.48*	0.38
			-Organization resources	1.03	0.66	0.10	10.32*	0.44
Business networks	0.63	0.87	-Joint operation of the business networks	1.57	0.90	0.10	15.90*	0.82
			-Creating trust in business networks	1.44	0.85	0.10	14.27*	0.72
			-Co-Culture organization for promoting networks	1.27	0.71	0.11	11.19*	0.50
			-Knowledge sharing	1.31	0.70	0.12	11.13*	0.50
Maritime logistics service	0.50	0.83	- Reliability	0.87	0.79	0.07	12.82*	0.63
			- Responsive	0.82	0.75	0.07	11.93*	0.56
			- Assurance	0.76	0.72	0.07	11.10*	0.51
			- Empathy	0.77	0.60	0.09	8.97*	0.37
			- Service cost	0.90	0.63	0.10	9.36*	0.39
Chi-Square($\chi2$) = 91.75, p = 0.024, df = 67, $\chi2$/df = 1.37, GFI = 0.94, AGFI = 0.91, CFI = 0.99, RMSEA = 0.042 and SRMR = 0.057								

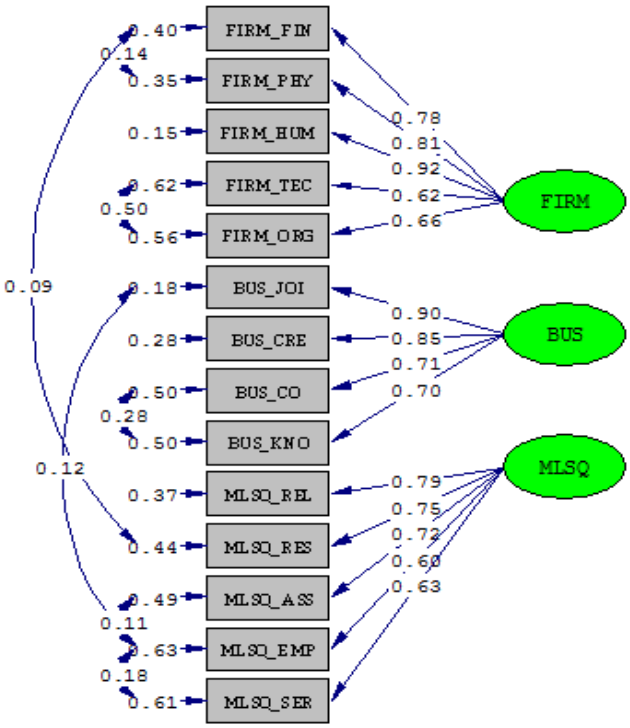
* p < .01

The heaviest loading variable was joint operations of the business networks. It has a standardized factor loading of 0.90 (R^2 = 0.82). Finally, the third factor - maritime logistics iv) empathy, and (v) service cost. It was determined that the standardized item factor loadings were between 0.60 – 0.79, and R^2 between 0.37 – 0.63. The heaviest loading variable was reliability. The standardized factor loading is 0.79 and R^2 = 0.63. These 14 variables affect the competitiveness of ocean freight forwarders as shown in Table 1.

Table 1 shows that the average variance extracted indices of the key factor indicators were between 0.50-0.63, which are higher than 0.50 (Hair et al., 2010). Additionally, the construct reliability indices of the key factor indicators were between 0.83-0.87, which are higher than 0.70 (Hair et al., 2010). These indices confirm that the model developed by the researchers contains convergent validity and high construct reliability.

Table 2: Goodness of Fit Index Analysis

Goodness of Fit Index	Criteria	Statistical Model	Results
$\chi2$	Not Significant	$\chi2$ = 91.75 (p = 0.024), df = 67	Passed
$\chi2$/df	<2.00	1.37	Passed
CFI	≥ 0.95	0.99	Passed
GFI	≥ 0.90	0.94	Passed
AGFI	≥ 0.90	0.91	Passed
RMSEA	0.05-0.08	0.042	Passed
SRMR	>0.08	0.057	Passed



Chi-Square = 91.75, df = 67, P-value = 0.024, RMSEA = 0.042

Figure 1: Model of the First Order CFA of the Factors Affecting the Competitiveness of Ocean Freight Forwarders

The results of the Goodness of Fit Index analysis shown in Table 2 indicate that the Goodness of Fit Index (GFI) = 0.94, the Adjusted Goodness of Fit Index (AGFI) = 0.91, the Comparative Fit Index (CFI) = 0.99, the Root Mean Square Error of Approximation (RMSEA) = 0.042, and the Standardized Root Mean Square Residual (SRMR) = 0.057,

The results of the second order confirmatory factor analysis indicate that the three factors considered (firm resource, business networks, and maritime logistics service quality) took effects on competitiveness. All factors have significantly positive standardized factor loadings ($P < 0.01$). This confirms that the three factors are determinant factors affecting the competitiveness of Thai ocean freight forwarders. The maritime logistics service quality factor received the heaviest standardized factor loading (0.92 and $R^2 = 0.84$), followed by the firm resource factor, whose standardized factor loading was 0.84 ($R^2 = 0.70$). The least standardized factor loading was that of the business networks factor with a standardized factor loading = 0.46 and $R^2 = 0.21$.

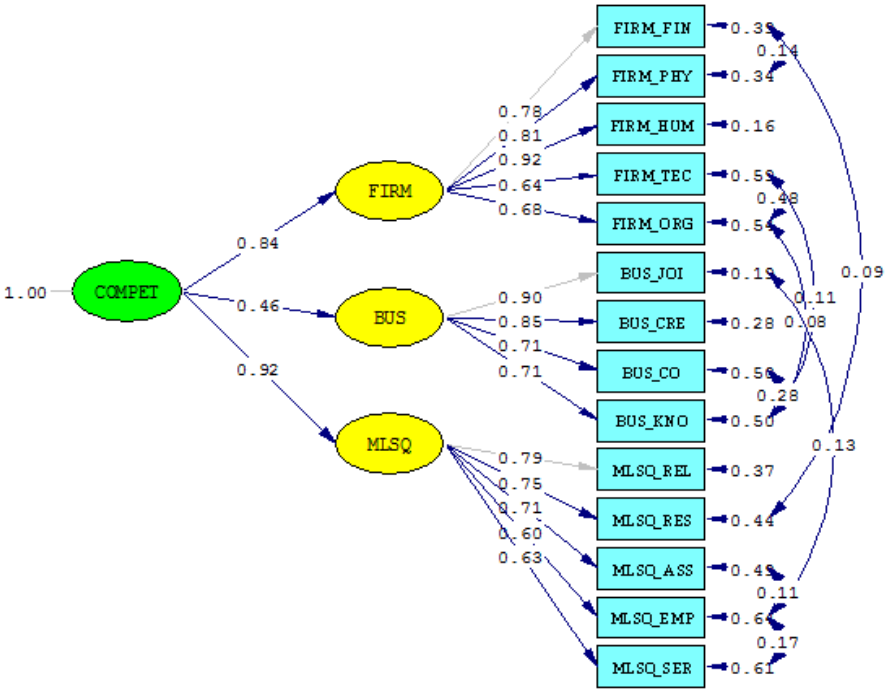
Thus, firm resource, business networks, and maritime logistics service quality are factors affecting the competitiveness of ocean freight forwarders similarly to the hypotheses. The results confirm the CFA model of factors affecting the competitiveness of ocean freight forwarders in keeping with the theoretical framework as shown in Table 3.

Table 3: Factor Loading of Factors Affecting the Competitiveness of Ocean Freight Forwarders from the Second Order CFA

Key Factors Indicator	**b**	**B**	**SE**	**t**	**R^2**
Firm resources	0.83	0.84	0.10	8.36*	0.70
Business networks	0.72	0.46	0.12	5.77*	0.21
Maritime logistics service quality	0.79	0.92	0.09	8.94*	0.84
Chi-Square ($\chi 2$) = 75.85, p = 0.17, df = 65, $\chi 2$ / df = 1.17, GFI = 0.95, AGFI = 0.92, CFI = 1.00, RMSEA= 0.028, SRMR = 0.054					

* p < .01

The results of the Goodness of Fit Index analysis of the model of the second order CFA of factors affecting the competitiveness of Thai ocean freight forwarders show that the Chi-Square (χ^2) = 75.85, p = 0.17, df = 65, the Goodness of Fit Index (GFI) = 0.95, the Adjusted Goodness of Fit Index (AGFI) = 0.92, the Comparative Fit Index (CFI) = 1.00, the Root Mean Square Error of Approximation (RMSEA) = 0.028, the Standardized Root Mean Square Residual (SRMR) = 0.054, which are close to zero. The model is thus consistent with the empirical evidence shown in Figure 2.



Chi-Square = 75.85, *df* = 65, P-value = 0.17, RMSEA = 0.028

Figure 2: Model of the Second Order CFA of Factors Affecting the Competitiveness of Ocean Freight Forwarders

5. Conclusion and Recommendations

The model of first order CFA determinants affecting the competitiveness of Thai ocean freight forwarders developed by the researchers is consistent with the empirical evidence. Moreover, the most influential variable, maritime logistics service quality, is reliable. The second most influential variable was firm resources, and the third one, human resources are also reliable. The most influential variable of the business networks factors was joint operation of business networks.

The model of second order CFA of factors affecting the competitiveness of Thai ocean freight forwarders consists of firm resources, business networks, and maritime logistics service quality. These three factors were consistent with the empirical evidence. LISREL was used to conduct a construct validity analysis meant to confirm the research hypothesis, evaluate the model construct and examine the consistency of the model with the empirical evidence. The model can therefore be further used for developing the competitiveness of Thai ocean freight forwarders.

Recommendations

In order to stimulate Thai ocean freight forwarders to increase their competitiveness potential, management should focus on three factors. These include maritime logistics service quality, firm resources, and business networks. With regard to maritime logistics service quality factor, ocean freight forwarders should focus on reliability variables such as accuracy of documents, accurate price calculation, reliability of booking space, and reliability of service performance. As to the firm resources factor, ocean freight forwarders should focus on human resources variables , most notably the knowledge of customer needs and requirements, rewards to employees, experience and expertise of employees, evaluation of employee performance, and skillful human resources.

As to business networks, the third factor, ocean freight forwarders should focus on joint operations of the business networks. This involves working together, sharing resources, and making joint decisions. Moreover, as the second order confirmatory factor analysis shows, these three factors are key elements affecting the competitiveness of ocean freight forwarders. Ocean freight forwarders should therefore develop these factors to increase their competitive potentials and be able to compete with internationals competitors. In light of this study, the following suggestions are proposed:

- Human resources variables consist of knowledge of customer needs and requirements, rewards to employees, experience and expertise of employees, evaluations of employee performance, and skillful human resources. All these variables are considered to be the most influential factors affecting the competitiveness of Thai ocean freight forwarders. As mentioned earlier, they should therefore take advantage of these factors to strengthen theor competitiveness.
- Maritime logistics service quality factors affect competitiveness the most, followed by firm resources and business networks factors, respectively. Ocean freight forwarders should therefore focus on these three factors and develop them in order to increase their competitive potentials.
- Future studies should look at international ocean freight forwarder, not just Thai ones, to further understand the factors that influence their competitiveness.

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