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The effects of dynamic capabilities, service capabilities, competitive advantage, and organizational performance in container shipping

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Abstract

Recent changes in the world economy have had a significant impact on container shipping in recent decades. A growing number of studies have demonstrated that service capabilities are related to competitive advantage and organizational performance. When encountering an environment characterized by economic uncertainty, the shipping industry was required to emphasize dynamic capabilities associated with adaptation to sustain competitive advantage. The purpose of this study was to examine the linkages between dynamic capabilities, service capabilities, competitive advantage, and organizational performance in container shipping using data surveys from 134 respondents in container shipping firms in Taiwan. Exploratory factor analysis was employed to identify the crucial dimensions underlying dynamic capabilities, and service capabilities. Furthermore, structural equation modeling (SEM) was used to test the research hypotheses. The research findings indicated that dynamic capabilities positively influenced both competitive advantage and service capabilities. Service capabilities and competitive advantage were positively related to organizational performance. Practical implications of the research findings for container shipping firms are discussed.

1. Introduction

Maritime transport is essential for the development of trade and global economy. Over 80 per cent of global merchandise trade was carried by sea and administered by ports worldwide (UNCTAD, 2015). However, the current shipping environment remains complex and unpredictable. This is due in particular to economic variation, ship overcapacity, the restructure of strategic alliances, significant fluctuation in bunker prices, imbalance between supply and demand, and environmental requirements

(UNCTAD, 2015). For instance, growth in container shipping companies has emerged in the form of more routes and increased frequency of service, which in turn have increased the number of port calls (Das, 2011). Container shipping companies have launched a restructuring of their networks and adjusted their strategic alliances in response to the dynamic environment. Major strategic alliances will be formulated include THE Alliance (Hapag-Lloyd, K-Line, MOL, NYK, and Yang Ming), Ocean Alliance (CMA CGM, COSCO, Evergreen, and OOCL), and 2M (Maersk and MSC) (Alphaliner, 2016a). Moreover, global container carriers are suffering from severe economic stagnation and overcapacity. For example, Hanjin was the 7th largest container shipping company in the world in 2015. However, Hanjin filed for receivership on 31 August 2016 (Alphaliner, 2016b). The rapid disintegration of Hanjin sent shock waves across the container shipping market. As Hanjin crashed, carriers and shippers scrambled to take contingency measures to fill the void left, which caused turmoil in global freight rates, and is expected to lead to further restructuring in the shipping market. Since global container carriers occupy an environment characterized by economic uncertainty as well as divergent supply and demand in different cycles of the container shipping market, they are required to emphasize important capabilities related to adaptation in order to meet changes related to organizational resources (Teece, 2007).

Container shipping is an international industry that provides maritime transport service on a regularly scheduled basis to predetermined ports based on customers' needs (Tran *et al*., 2012). In the field of strategic management, the resource-based view (RBV) suggests that an organization's capabilities are a core source for the creation and development of sustainable competitive advantage (Barney, 1991; Schreyögg and Kliesch-Eberl, 2007). Two distinct categories of capabilities may be distinguished: dynamic capabilities and service capabilities.

Service capabilities reflect service providers' ability to successfully employ their resources to satisfy their customers' needs (Lai, 2004). With the significant changes taking place in the global business environment, the container shipping industry has become highly competitive and seeks to enhance its service capabilities in order to better meet the various requirements of shippers (Lu, 2007). In the container shipping industry, the capability relates to transit time, freight rate, and frequency of service. Service capabilities are drivers for superior competitive advantage (Lu and Yang, 2006), and have been discussed in previous research (Barney, 1991). However, in an uncertain environment with increasingly higher costs and risks (UNCTAD, 2015), container shipping companies also need to focus on dynamic capabilities to renew and adjust their management strategies (Tsekouras *et al*., 2011; Yang *et al*., 2009).

A firm's dynamic capabilities are its ability "to renew itself in the face of a changing environment by changing its set of resources" (Danneels, 2010, p. 1). They can be disaggregated into these capabilities: "(1) to sense and shape opportunities and threats, (2) to seize opportunities, and (3) to maintain competitiveness through enhancing, combining, protecting, and when necessary, reconfiguring the business enterprise's intangible and tangible assets" (Teece, 2007, p.1319; Wilden *et al*., 2013). Romme *et al*. (2010) stated that dynamic capabilities can enhance an organization's ability to change and adapt to new environmental requirements. In a changing environment, therefore, dynamic capabilities are a necessary resource by which to sustain competitive advantage (Haleblian *et al*., 2012).

Drawing on the resource-based view of firms, one of the purposes of this study is to examine the role of dynamic capabilities in developing and sustaining competitive advantage. While prior studies (Lu, 2007; Lu and Yang, 2006; Schreyögg and Kliesch-Eberl, 2007) have focused on the effects of different capabilities on organizational performance, they have failed to consider in detail how dynamic capabilities influence organizational performance. Additionally, most of the previous studies on service capabilities have described how to provide a satisfactory service to customers, but few studies

have examined the relationship between dynamic capabilities and service capabilities. This study endeavours to empirically examine how dynamic capabilities influence service capabilities. Furthermore, prior studies have usually been based on a single capability, and have examined specific concepts. There has been a noticeable absence of research projects dealing with dynamic capabilities and service capabilities in container shipping. Therefore, this study seeks to investigate the relationship between dynamic capabilities, service capabilities, competitive advantage, and organizational performance in the container shipping industry.

There are five sections in this paper. The first section introduces the motivation for the study. The second section reviews the literature on dynamic and service capabilities in order to develop the study hypotheses. The third section describes the research methodology, including the study sample, the research instrumentation, and data analyses. Section four presents the analyses results relevant to the research hypotheses. The research findings and their implications for container shipping firms are discussed in the final section.

2. Theoretical background and hypotheses

2.1 Definition of resource-based view

The resource-based view (RBV) defines a firm as a bundle of resources and capabilities (Nath *et al*., 2010), which can be used to create and develop competitive advantage (Talaja, 2012). Barney (1991) identified four characteristics of resources that can sustain a firm's competitive advantage, namely, value, rarity, imperfect imitability, and imperfect substitutability. Amit and Schoemaker (1993, p.35) referred to resources as "stocks of available factors that are owned or controlled by the firm". They comprised tangible components such as financial and physical assets, equipment, land, and buildings; and intangible components, which include human resources, client trust, firm reputation, and know-how (Nath *et al*., 2010). The resource-based view suggests that superior organizational performance is dependent on the manner in which shipping service providers leverage their resources (Lai, 2004). Gavronski *et al*. (2011) viewed capabilities as the organizational ability to use current resources to perform tasks or activities. Wu (2010) stated that a firm can use its capabilities to develop its resources to create competitive advantage.

2.2 Dynamic capabilities and organizational performance

Teece *et al*. (1997, p. 516) defined dynamic capabilities as "the firm's ability to integrate, build, and reconfigure internal and external competences to address a rapidly changing environment". Accordingly, dynamic capabilities can be deployed to acquire, allot, integrate, and recombine resources to generate new value for the firm (Eisenhardt and Martin, 2000). Sensing capability refers to a firm's activities in scanning, searching, identifying and exploring new opportunities (Ellonen *et al*., 2009). Seizing capability is defined as strategic insight and denotes making the correct decisions and executing them (O'Reilly and Tushman, 2008). Reconfiguring capability refers to "the ability to recombine, to reconfigure assets and organizational structures as the enterprise grows and markets change" (Teece, 2007, p. 1335).

Organizational performance has been described as the extent of a firm's efficiency, which is different from target achievement. Based on the preceding discussion, a perceptual measure has been employed in this paper to accurately measure container shipping company performance. Tsamenyi *et al*. (2010) employed balanced scorecard-measures to investigate organizational performance. According to Tsamenyi *et al*. (2010), there are five dimensions of a balanced business scorecard that include a financial dimension (profits, sales growth, and expense growth), an internal business dimension, a

customer perspective (customer satisfaction, service quality, and market share), a learning and growth perspective (employee job satisfaction, and employee training), and a community perspective (corporate reputation). Fraj-Andrés *et al*. (2009) categorized performance measures into operational performance (e.g. cost efficiency), commercial performance (e.g. corporate reputation), and economic performance (e.g. sales growth). Green *et al*. (2008) surveyed 142 managers who operate supply chains in the U.S. and focused on logistics performance (delivery speed, delivery dependability, responsiveness, delivery flexibility, and order filling capacity), marketing performance (return on investment, profits, profit growth, return on sales), and financial performance (market share growth, sales volume growth, and sales growth).

Wang *et al*. (2007) indicated that knowledge based dynamic capabilities are associated with superior firm performance in the manufacturing industry because dynamic capabilities enable a quick response to changes in the business environment. Protogerou *et al*. (2011) demonstrated the impacts of dynamic capabilities on firm performance in the manufacturing industry and found that operational capabilities had a significant effect on performance. In a stable operating environment, dynamic capabilities can be used as tools to nurture and enhance existing operational capabilities. Dynamic capabilities have been shown to be a key mechanism for organizational growth, renewal, and innovation related to organizational performance (Lawson and Samson, 2001). Accordingly, this study hypothesizes that:

Hypothesis 1: Dynamic capabilities are positively related to organizational performance in the container shipping industry.

2.3 Dynamic capabilities and competitive advantage

Competitive advantage has been defined as "the implementation of a strategy not currently being implemented by other firms that facilitates the reduction of costs, the exploitation of market opportunities, and/or the neutralization of competitive threats, and performance is generally conceptualized as the rents a firm accrues as a result of the implementation of its strategies" (Newbert, 2008, p.749). Dynamic capabilities are considered important for sustaining a firm's competitive advantage (Teece, 2007). Since the nature of future competition and market conditions are difficult to forecast, a firm especially needs to be flexible with regard to the timing of market entry and decision changes occurring in response to the current environment (Sher and Lee, 2004). Prior studies have examined the effects of dynamic capabilities on competitive advantage (Marcus and Anderson, 2006; O'Reilly and Tushman, 2008; Sher and Lee, 2004). Marcus and Anderson (2006) found that dynamic capabilities had an impact on firm competence in supply chain management in the retail food industry because dynamic capabilities helped to flexibly solve the allocation problems in supply chain networks. O'Reilly and Tushman (2008) discovered that dynamic capabilities could integrate organizational resources to keep costs low and asset utilization high thereby increasing competitive advantage in response to environmental changes. These findings indicate that dynamic capabilities have a significant positive influence on competitive advantage. Accordingly, this study hypothesizes that:

Hypothesis 2: Dynamic capabilities are positively related to competitive advantage in the container shipping industry.

2.4 Definition of service capabilities

Service capabilities refer to "the process of delivering products in a way that creates added value to customers" (Liu and Lyons 2011, p. 549). Service capabilities have been found to be the key factor for fully satisfying customers' increasing requirement in container shipping (Lu, 2007). Kent and Parker (1999) investigated shippers' and international carriers' perceptions of 18 selection attributes and

reported that the five most important attributes were claims processing, pickup and delivery service, special equipment, line haul services, and quality of carrier salesmanship. Lu (2003) assessed the impact of carrier service attributes on shippers' satisfaction from the perspective of shipper-carrier partner relationships. Seven service factors were extracted by factor analysis: timing-related services, pricing-related services, warehousing service, sales service, door-to-door service, information service, and advertising. The findings indicated that timing related services were significantly increased shippers' satisfaction in a partner relationship. Subsequently, Lu (2007) evaluated key resources and capabilities for liner shipping services in Taiwan. Three resource dimensions (marine equipment, information equipment, and corporate image) and seven capability dimensions were identified from factor analysis. Operational capabilities were perceived to be the most important dimension, followed by customer service, human resource management, information integration, pricing, purchasing, and financial management.

Yang *et al*. (2009) evaluated the impacts of resources and capabilities on container shipping services in Taiwan. The five most important resource attributes were: financial stability, corporate reputation, low cargo damage or loss record, geographical coverage of service, and high frequency of sailing. The five most important logistics service capabilities were: courtesy of sales representatives, accurate price calculation, long term contractual relationship with customers, reliability with regard to booking space, and accuracy of documentation. Kannan *et al*. (2011) investigated the theory of reasoned action to determine important carrier service attributes from the shippers' point of view in India. The analytic hierarchy process (AHP) was used, and the results indicated that the most important service attribute was low freight, followed by pricing flexibility, gifts and compliments, online booking, physical facilities, professional appearance, and trade announcements.

2.5 Dynamic capabilities and service capabilities

A growing number of studies have demonstrated that the concept of dynamic capabilities is derived from the resource-based view of the firm (Fawcett, 2010; Newbert, 2008; Teece, 2007; Wu, 2006). Wu (2006) found that dynamic capabilities positively affect a firm's capabilities because dynamic capabilities constitute a firm's basis for the creation of additional value and new service. Fawcett (2010) employed a theoretical framework, devised to examine dynamic capabilities in supply chain collaboration, demonstrated that a high level of dynamic collaboration can provided successful inventory management capabilities and enhanced customer satisfaction. Moreover, the information infrastructure between suppliers and customers is a key determinant of dynamic collaboration and the creation of more inimitable value. Dynamic capabilities are the capacity to renew a firm's different resources and capabilities (e.g. complementary capability, financial capability, institutional assets, structural assets, research and development capability, information technology capability, and marketing capability) to achieve congruence with the changing business environment (Teece *et al*., 1997). A firm's dynamic capabilities should enable it to offer better service to its customers. Accordingly, this study hypothesizes that:

Hypothesis 3: Dynamic capabilities are positively related to service capabilities in the container shipping industry.

2.6 Service capabilities and competitive advantage

Based on the resource-based view, a firm's competitive advantage includes its unique resources and capabilities, and its ability to efficiently employ resources and capabilities to make right decisions (Talaja, 2012). Services and resources have been classed as assets and capabilities in the container shipping context. Several researchers (Lu, 2007; Kannan *et al*., 2011; Progoulaki and Theotokas, 2010)

have investigated key service capabilities in the container shipping context and analysed the degree of importance of various service attributes for shipping carriers. Kannan *et al*. (2011) used 45 criteria to identify the most important carrier service attributes from the shipper's perspective in India, and found the most important criterion to be low cost freight. When firms have low-cost capabilities, they can provide low-cost freight to customers and build strong competitive advantage. Progoulaki and Theotokas (2010) examined the impact of resources on competitive advantage in the shipping industry. They found the effective management of human resources in a shipping company to be a powerful capability for reducing cost and thereby achieving sustainable competitive advantage. In accordance with the resource-based view of the firm, container shipping companies can employ different resources to provide an integrated shipping service to achieve further competitive advantage. Accordingly, this study hypothesizes that:

Hypothesis 4: Service capabilities are positively related to competitive advantage in the container shipping industry.

2.7 Service capabilities and organizational performance

According to the resource-based view, resources can be categorized into either resources or capabilities (Lu, 2007). Increased focus by firms on their resources has been shown to result in increasing organizational competitive advantage and organizational performance (Cruz *et al*., 2013; Hsu, 2013; Yang, 2010). Yang (2010) examined the criteria for sustaining competitive advantage in a national merchant fleet based on the resource-based view. The findings indicated that the five most important criteria affecting competitive advantage and performance included freight revenue, cargo loading ratio, accuracy of shipping schedules, dead weight tonnage, and number of vessels. Cruz *et al*. (2013) evaluated the relationships between logistics resources and overall performance for 16 seaport container terminals and found that physical capacity contributed more towards overall performance than operational performance. These findings were used to improve terminals' service capabilities in order to improve overall performance. Accordingly, this study hypothesizes that:

Hypothesis 5: Service capabilities are positively related to organizational performance in the container shipping industry.

2.8 Competitive advantage and organizational performance

A number of prior studies have discussed the relationships between competitive advantage and organizational performance in the field of strategic management (Prakash, 2014; Yang *et al*., 2009). Yang *et al*. (2009) examined the effects of resources and capabilities on organizational performance in the container shipping context and found that logistics capabilities increased organizational performance and competitive advantage. Prakash (2014) examined the relationship between competitive advantage and organizational performance in internal supply chains in the manufacturing industry. The results revealed that competitive advantage has a significant effect on organizational performance because employee-driven performance is the key which can increase both competitive advantage and organizational performance. Accordingly, this study hypothesizes that:

Hypothesis 6: Competitive advantage is positively related to organizational performance in the container shipping industry.

3. Methodology

3.1 Sample

The samples for this study primarily focused on container shipping companies and container shipping agencies in Taiwan. These population firms were drawn from the Directory of ROC (Republic of China) National Shipping Companies and the National Association of Shipping Agencies. A total of 339 people who had the position of manager/above were identified from the directory and invited to participate in this research. We sent 339 questionnaires to these people on 10th October, 2013 and 88 usable questionnaires were returned. A follow-up mailing was sent to those who had not returned questionnaires in the first mailing to improve the response rate after two weeks. As a result, an additional 46 usable questionnaires were returned, contributing to an overall response rate of 39.52%.

3.2 Non-response bias

In order to ascertain the representativeness of the survey data, responses from the first data set (88 respondents) were compared with those from the second data set (46 respondents) for non-response bias testing. Paired t-test analysis of the simple across 36 measurement items revealed only one significant difference ($p < 0.05$) between responses; therefore, it was deemed appropriate to combine the two datasets for analysis purposes in this study (Agarwal and Selen, 2009).

3.3 Common methods variance

Since the data from each individual survey were collected from a single person at a single point in time, common method variance (CMV) could be a threat to the validity of the study results. To examine the extent to which CMV affected the empirical findings, this study carried out several post hoc tests of the data. Harman's one-factor test is one of the most widely used methods to ascertain whether a single factor accounts for the majority of covariance between the predicator and criterion variables. Factor analysis results indicated that no single factor accounted for the majority of covariance between the predicator and criterion variables, since the independent and dependent variables loaded on different factors, with the first factor accounting for less than 50% (42.35%) of total variance. The analysis therefore suggested that the results would not be inflated as a result of CMV (Podsakoff *et al*., 2003).

3.4 Measures

Data for the study were collected by means of a questionnaire survey whose design was based on the approach suggested by Churchill and Iacobucci (2010). Respondents were asked to indicate their level of agreement with 36 measurement items on a five-point Likert scales from 1 (strongly disagree) to 5 (strongly agree). Questionnaire items were adapted from the literature and interviews with shipping experts and were employed to assess the dynamic capabilities, service capabilities, and competitive advantage of respondents' employing container shipping companies or agencies. Measurement items for dynamic capabilities, service capabilities, and competitive advantage constructs and respondents' level of agreement with management scales can be found in Appendix A.

Dynamic capabilities- Dynamic capabilities were measured as respondents' employing companies'/ agencies' ability to integrate, build, and reconfigure their competences to face a changing environment. The 16 measurement items were adapted from Agarwal and Selen (2009), Drnevich and Kriauciunas (2011), Hung *et al*. (2010), Lin and Wu (2014), Wilden *et al*. (2013), and Wu (2007, 2010).

Service capabilities- Service capabilities of respondents' employing container shipping companies/ agencies were measured using 12 items adapted from the studies of Kannan *et al*. (2011), Kent and Parker (1999), Lu (2003, 2007), Lu and Marlow (1999), and Yang *et al*. (2009).

Competitive advantage- Competitive advantage was measured by respondents identifying specific competitive advantage in their employing companies/agencies. Four measurement items were adapted from Bharadwaj *et al*. (1993), Schilke (2014), Spanos and Lioukas (2001), and Wu (2010).

Organizational performance- Organizational performance was measured by respondents identifying specific organizational performance in their employing companies/agencies. Four measurement items were adapted from Fraj-Andrés *et al*. (2009), Green *et al*. (2008), Tsamenyi *et al*. (2010), and Yang *et al*. (2009).

3.5 Research methodology

The aim of this study was to examine the linkages between dynamic capabilities, service capabilities, and competitive advantage in the container shipping industry. First, exploratory factor analysis was employed to identify the crucial dimensions of dynamic capabilities, service capabilities, and competitive advantage. Confirmatory factor analysis (CFA) was then performed to assess the convergent and discriminant validity of the measurement items. Third, structural equation modelling (SEM) was used to examine the research hypotheses and the mediating effect of dynamic capabilities. All analyses were carried out using SPSS18.0 and AMOS18.0 for Windows statistical packages.

4. Results and empirical analysis

4.1 Profile of respondents

The profile of respondents is presented in Table 1. Table 1 shows that 73% of respondents were managers, vice president or above. This implied that most respondents had abundant practical experience and a high enough position to answer questions with respect to dynamic capabilities, service capabilities, competitive advantage, and organizational performance. With regard to length of work experience in their employing company, only 15% of respondents had worked at their company for 10 years or less. The majority of respondents therefore possessed abundant knowledge of their employing companies' dynamic and service capabilities and competitive advantage. Table 1 also shows that 31% of respondents' employing firms employed between 101 and 500 employees and 28 % employed 50 or less employees. The length of business operations of 86% of respondents' employing firms was 31 years or more. As regards ownership pattern, more than half (52%) of respondents' employing firms were locally owned, and 34% were foreign-owned.

<**Insert Table 1 about here**>

4.2 Exploratory factor analysis

Exploratory factor analysis was used to clarify the factors/dimensions underlying the measurement items of the dynamic capabilities constructs in the context of container shipping companies. Principal component analysis with VARIMAX rotation was employed to extract the factors with eigenvalues greater than 1.0 (Hair *et al*., 2010). The initial factor for dynamic capabilities accounted for 62.96% of the total variance and indicated that the items "My company possesses good learning capabilities", and "My company has the ability to rapidly respond organizationally to market changes" had factor loading scores of lower than 0.5.

Subsequent analysis, shown in Table 2, revealed two factors underlay the fourteen measuring dynamic capabilities attributes. The KMO statistic was 0.928 and Bartlett's Test of Sphericity was 1,171 ($p <$

0.000), which confirmed their suitability for further factor analysis (Hair *et al*., 2010). The two factors accounted for approximately 63.166% of the total variance. Therefore, these two factors were subsequently identified as underlying dynamic capabilities in the view of survey respondents. They are labelled and described as below:

Factor 1: Sensing and Seizing Capability
Factor one consisted of eight items, namely, "My company understands customers' specific needs"; "My company is good at customer information collection and potential market exploration"; "My company learns or acquires new skills from partners"; "My company adopts the best practices in the industry"; "My company changes our practices when customer feedback gives us a reason to change"; "My company is good at evaluating its own strengths and weakness"; "My company has the ability to gather economic information on our operations and operational environment"; "My company is rapidly aware of new business opportunities or threat possibilities". As these items were related to sensing and seizing capability, this factor was therefore identified as sensing and seizing capability. "My company understands customers' specific needs" had the highest loading on this dimension. This factor accounted for 55.766% of total variance.

Factor 2: Reconfiguring Capability
Factor two comprised six items, namely, "My company has the ability to change our ways of doing business"; "My company has the ability to reconfigure resource"; "My company has the ability to rapidly response organizationally to competitors' actions"; "My company has the ability to efficiently and effectively communicate with cooperative organizations"; "My company can flexibly compete in the industry in the future"; "My company can flexibly develop new services". "My company has the ability to change our ways of doing business" had the highest loading on this dimension. These six items were related to a firm's capabilities to reconfigure their resources and capabilities in the container shipping industry, therefore, this factor was identified as a reconfiguring capability dimension. This factor accounted for 7.399% of total variance.

<**Insert Table 2 about here**>

Similarly, exploratory factor analysis with VARLIMAX rotation was conducted to reduce and identify the 12 service capabilities attributes in order to gain a better understanding of the underlying factors. The Kaiser-Meyer-Olkin statistic was 0.898 and Bartlett's Test of Sphericity was 901 ($p < 0.000$), which indicated that the data were adequate for conducting factor analysis (Hair *et al*. 2010). With component analysis each variable contributes a value of one to the total eigenvalue; eigenvalues of service attributes greater than one were considered significant in each set.

As seen in Table 3, all items had factor loading scores higher than 0.5. The two factors accounted for approximately 61.88% of the total variance. Thus, two factors were found to underlie the service capabilities dimensions in the view of survey respondents. They are labelled and described as follows.

Factor 1: Operational Capability
Factor one consisted of seven items, namely, "My company is good at information integration"; "My company is good at purchasing"; "My company is good at on-time pick-up and delivery"; "My company provides high frequency of sailing"; "My company provides short transit times"; "My company is good at cargo tracing"; and "My company has a low damage or loss record for cargo delivery". All these items relate to operational capability, so this factor was labeled an operational capability dimension. "My company is good at information integration" had the highest loading on this dimension. This factor accounted for 53.397% of the total variance.

Factor 2: Marketing Capability
Factor two comprised five items, namely, “My company provides a flexible service”; “My company can efficiently respond to customer complaints”; “My company has reasonable freight rates”; “My company is good at sales activity”; and “My company has good relationships with partners”. As these items were associated with marketing capability, so this factor was labelled a marketing capability dimension. “My company provides a flexible service” had the highest factor loading on this dimension. Factor two accounted for 8.488% of the total variance.

<**Insert Table 3 about here**>

Exploratory factor analysis with VARIMAX rotation was also used to identify the factors underlying competitive advantage. The Kaiser-Meyer-Olkin value was 0.799 and Bartlett’s Test of Sphericity was 223.824 ($p < 0.000$), indicating that the results were valid. One factor was obtained to underlie the competitive advantage dimension was viewed by survey respondents. The single factor consisted of all items, namely, “My company provides greater delivery service”, and “My company has service differentiation from its competitors”, “My company has cost advantage”, and “My company has gained strategic advantages over its competitors”. Therefore, this factor was named as a competitive advantage dimension. “My firm has cost advantage” had the highest factor loading on this dimension. This factor accounted for approximately 68.780% of the total variance.

Similarly, exploratory factor analysis was utilized to identify the factors underlying organizational performance attributes. The Kaiser-Meyer-Olkin statistic value was 0.796 and Bartlett’s Test of Sphericity gave a result of 400.037 ($p < 0.000$), suggesting that the data were acceptable for conducting exploratory factor analysis. Factors with eigenvalues of over one were selected. Only one factor was found, which comprised all four items, namely, market share, customer satisfaction, service quality, and corporate reputation. “Customer satisfaction” had the highest factor loading on this dimension. Factor analysis indicated that the one factor accounted for approximately 73.955% of the total variance.

4.3 Reliability test

This study utilised Crobach’s alpha statistic and corrected item-total correlation coefficients to examine the reliability of the path loading of the measurement items (Bagozzi and Yi, 1988). The high level of item reliability indicated the items were strongly affected by each measure construct and implied that sets of items were unidimensional. Table 4 shows the Cronbach’s alpha values and corrected item-total correlation coefficients of each measurement scale, which are all above the recommended threshold of 0.3 (Hair *et al*., 2010).

<**Insert Table 4 about here**>

4.4 Second-order confirmatory factor analysis

Confirmatory factor analysis was employed to test the model fit, reliability, and validity (Hair *et al*., 2010). There were three latent variables in the measurement model, made up of their corresponding multiple indicators, namely, dynamic capabilities, service capabilities, and competitive advantage. Latent variables (common factors) are represented by circles and marked with the Greek letters ξ and

η. Ten observed indicators are represented by squares. 14 observed indicators (D1 to D14) were loaded onto two indicators (DC1: sensing and seizing capability; DC2: reconfiguring capability), and two observed indicators (DC1 and DC2) were loaded onto dynamic capabilities. 12 observed indicators (S1 to S12) were loaded onto two observed variables (SC1: operation capability; SC2: marketing capability), and two observed variables (SC1 and SC2) were loaded onto service capabilities. Four observed vindicators (CA1: my company provides greater delivery service; CA2: my company has service differentiation from its competitors; CA3: my company has cost advantage; CA4: my company has gained strategic advantages over its competitors) were loaded onto competitive advantage. Four observed vindicators (OP1: market share; OP2: service quality; OP3: corporate reputation; OP4: customer satisfaction) were loaded onto organizational performance. The Greek letter ϕ_{ij} represents the correlation between the latent variables, whereas the coefficients are the factor loadings of the observed indicators on the latent variables.

CFA was used to further justify the factor structure. The first model fit indices were Chi-square (χ^2) value = 849.003 with 517 degrees of freedom and was significant (p = 0.000), goodness-of-fit index (GFI) = 0.763, comparative fit index (CFI) = 0.890, adjusted good-of-fit index (AGFI) = 0.709, mean square residual (RMR) = 0.038, and root-mean-square error of approximation (RMSEA) = 0.069, indicating the model was unacceptable. Adjusting the model in response to CFA, the items of D2, D4, D9, D12, S1, S4, S6, S10, S11, and S12 were deleted in the final model. Acceptable overall model fit was reflected by the Chi-square (χ^2) value = 285.000 with 214 degrees of freedom and was significant (p = 0.001) below the minimum level of 0.05. The GFI was 0.854, CFI was 0.963, and the adjusted goodness-of-fit index (AGFI) was 0.811. RMR was 0.036, and RMSEA was 0.050, below the recommended level of 0.05. The normed Chi-Square (χ^2/df) was 1.33 (below 3.0) showing a good fit (Hair *et al*. 2010). The values of the goodness-of-fit indices thus suggested that the model acceptably represented the hypothesized constructs.

4.5 Convergent validity and item reliability

Convergent validity can be measured by examining the critical ratio (C.R.) values. The C.R. values should be greater than 1.96 or smaller than -1.96 for the model estimate to be acceptable (Hair *et al*., 2010). Table 3 shows that all C.R. values were significantly higher than the recommended level of 1.96. All the indicators in each construct showed good convergent validity and unidimensionality. The reliability of a particular item or variable can be estimated by the R^2 value. Table 5 shows that R^2 value of each measurement item was over 0.3. Overall, results indicated that the final model had convergent validity and item reliability (Hair *et al*., 2010).

<**Insert Table 5 about here**>

Table 6 shows descriptive statistics and composite reliability for each construct reliability value and provides further assessment of international consistency. The reliability values of dynamic capabilities, service capabilities, and competitive advantage were 0.84, 0.81, 0.59, and 0.69 respectively. A construct reliability reflects internal consistency. Construct reliability values in the study ranged from 0.85 to 0.91, reflecting excellent internal consistency, and there was strong evidence of convergent validity (Hair *et al*., 2010).

The Average Variance Extracted (AVE) value shows the amount of variance accounted for by a latent construct (Bagozzi and Yi, 1988). The AVE value should exceed 0.5 to justify the use of a construct (Hair *et al*., 2010). Table 6 shows that dynamic capabilities had the highest AVE value of 0.84 followed

by service capabilities (AVE = 0.81), and competitive advantage (AVE = 0.59). All the constructs therefore exceeded the level of 0.5. AVE was subsequently employed to evaluate discriminant validity. Table 4 also shows that the square root of the AVE for each construct was higher than all the other cross correlations. Overall, the goodness-of-fit results and assessment of the final model confirmed its reliability and acceptability.

<**Insert Table 6 about here**>

4.6 Hypotheses testing results

Structural equation modelling (SEM) was used to test the research hypotheses H1-H6 and Figure 1 shows the structural equation model results. Dynamic capabilities were not found to be related to organizational performance (H1) (estimate = -0.22, $p > 0.05$). Dynamic capabilities were found to have a significant relationship with competitive advantage (H2) (estimate = 0.70, $p < 0.05$), H2 was validated. Dynamic capabilities were found to have a positive influence on service capabilities (H3) (estimate = 0.89, $p < 0.05$). Service capabilities were not positively related to competitive advantage (H4) (estimate = 0.-34, $p > 0.05$). Since no direct association was found between service capabilities and organizational performance (H5) (estimate = 0.48, $p > 0.05$), H5 was not supported. As stated in H6, competitive advantage was found to positively relate to organizational performance (estimate = 0.62, $p < 0.05$).

<**Insert Figure 1 about here**>

Structural model comparisons offer a specific test for stating a number of hypotheses, and identifying the different relationships among variables (Hair *et al*., 2010). This study examined the different relationships among dynamic capabilities, service capabilities, competitive advantage, and organizational performance. As results of tests of the proposed model, the final model is displayed in Figure 2. The findings indicated that dynamic capabilities had a significant impact on competitive advantage (estimate = 0.49, $p < 0.05$) and service capabilities (estimate = 0.88, $p < 0.05$), so H2 and H3 were as expected. The path coefficient between service capabilities and organizational performance was positive and significant after model adjusting (H5) (estimate = 0.18, $p < 0.05$). Competitive advantage was found to have a positive influence on organizational performance (H6) (estimate = 0.56, $p < 0.05$), therefore H6 was supported.

<**Insert Figure 2 about here**>

5. Discussion and conclusions

This study investigated the linkages between dynamic capabilities, service capabilities, competitive advantage, and organizational performance in the container shipping industry. Several studies (Lu, 2007; Lu and Yang, 2006; Schreyögg and Kliesch-Eberl, 2007) have investigated the different capabilities utilizing the resource-based view of the firm, but few have focused on dynamic capabilities. To full this gap in the literature, this study specifically explored the effects of service capabilities and dynamic capabilities on competitive advantage and organizational performance in the container shipping context.

5.1 Summary and findings

As regards dynamic capabilities attributes, respondents most strongly agreed that their employing companies understood customers' special needs. Container shipping is a service industry; therefore, providing relevant service to customers is very important. Identifying customers' needs and rapidly fulfilling them can bring about positive and fruitful outcomes. In contrast, respondents rated their firms poorly in the implementation of flexibly developing new services. According to the study of Yang *et al*. (2009), the generation of new services is crucial to sustainable development in long term. This study suggests that container shipping companies need to improve their development of new services in order to create more customers. Recognizing customers' special requirements and creating appropriate service for them will improve and enhance the customer service relationship and increase business.

Regarding service capabilities attributes, respondents strongly agreed that their employing companies were good at cargo tracing, followed by having good relationships with partners, and efficiently responding to customer complaints. Controlling the condition of cargo is a foundational skill essential for meeting customers' requirements. Moreover, through instantaneous cargo tracing, container shipping companies can allocate adequate space on board and efficiently arrange all activities relating to cargo delivery. In addition, developing a long-term customer relationship and efficiently responding to shippers' questions are important to ensure a high quality service. In contrast, respondents did not feel that their firms provided short transit times, good at on-time pick-up and delivery, or providing high frequency of sailing. These results were not surprising because container carriers often conduct vessel operations in order to reduce bunker costs (UNCTAD, 2015).

Consistent with expectations, this study found that dynamic capabilities were positively related to service capabilities, showing that dynamic capabilities are critical capabilities for creating new service in response to environmental uncertainty. Dynamic capabilities were found to be positively related to competitive advantage. This finding indicates that a firm with greater dynamic capabilities is more easily to be able to directly enhance its competitive advantage and indirectly to have an impact on organizational performance. The study also found that service capabilities were not positively related to competitive advantage. Dynamic capabilities were the suppressed variable because the relationship between service capabilities and competitive would be hidden or suppressed when viewed solely in a bivariate relationship, while in fact dynamic capabilities had a positive impact on both service capabilities and competitive advantage. These findings are consistent with those reported in previous studies (Lai, 2004; Lu, 2007).

5.2 Managerial implications

The findings of this research provide several important implications for managers who are responsible for implementing and managing container shipping. First, in a rapidly changing business environment, maintaining the status quo is a risk, especially if a firm is pursing growth or maintaining its advantage. The findings indicate that dynamic capabilities have an impact on competitive advantage. Dynamic capabilities were identified as the key leverage points for driving growth. In order to improve competitive advantage, a better approach is to sense the business environment, seizing the emerging trends, and reconfiguring resources. In other words, once container shipping companies are successful in sensing opportunities and seizing the right opportunities, they are on the right track to reconfigure their assets and structures when they need to do business in competitive shipping markets. If shipping managers understand dynamic capabilities, they can generate actionable plans to enhance their competitive advantage.

Second, dynamic capabilities have been found to have a positive effect on service capabilities. Dynamic capabilities not only focus on how one plays the game but also how to deploy and redeploy service capabilities. Container shipping companies need to possess to be good at: understanding customers' specific needs; evaluating their own strengths and weaknesses; and communicating efficiently and effectively with partner organizations. Additionally, container shipping companies have to: flexibly develop new services; be able to flexibly compete in the industry in the future; and become aware of new business opportunities or threat possibilities rapidly.

Third, service capabilities were found to have a positive effect on organizational performance. The findings indicated that operational capability and marketing capability should be improved in container shipping. This implies that understanding how to develop better services to meet customers' needs is of greatest concern. As customers' needs changes, studying how to provide providing flexible services with a customer-oriented pattern need to be prioritized in the container shipping industry. Container shipping companies should first enhance service capabilities in the areas of cargo tracing, good relationship with cooperative partners, and customer response and service. More specifically, container shipping companies could improve in the areas of short transit times, on-time pick-up and delivery, and high frequency of sailing, while still minimizing bunker cost.

5.3 Contributions

The purpose of this study is to lay a foundation for discussion of theoretical assumptions and practical implications. Going beyond previous literature, this study found new information concerning the interrelationships between dynamic capabilities, service capabilities, competitive advantage, and organizational performance. Several prior studies (Cruz *et al*., 2013; Nath *et al*., 2010; Yang, 2010; Yang *et al*., 2009) employed a view of service capabilities to examine cross-functional relationships between capabilities and performance. This research adds new knowledge to this domain of study by showing the effects of the relationships between dynamic capabilities, service capabilities, competitive advantage, and organizational performance.

The second original contribution of this study concerns how dynamic capabilities are used or applied by container shipping companies. Dynamic capabilities have a positive effect on both service capabilities and competitive advantage. However, dynamic capabilities have a greater positive effect on competitive advantage than on service capabilities. This suggests that dynamic capabilities are core values in impacting competitive advantage. If container shipping firms wish to improve their competitive advantage, they should review and enhance their dynamic capabilities first.

Third, the results indicate that both competitive advantage and service capabilities were found to have a positive relationship with organizational performance. Container shipping companies which have greater competitive advantage can reduce their total cost and utilize different strategies against their competitors to improve organizational performance. As container shipping companies are primarily focused on delivery services, the quality of their service capabilities will directly influence organizational performance.

Fourth, this study uses the RBV theory to examine the relationships between dynamic capabilities and service capabilities. Although several studies have discussed RBV theory, there has been a lack of interpretation of the relationships between dynamic capabilities and service capabilities. Through data collection begins with a theoretical framework which directs attention to certain kinds of research questions in the RBV. This study has proposed a model with a theoretical explanation for the RBV in container shipping companies. The study results support the implications of the RBV theory, and provides a theoretical foundation to examine the relationships between dynamic capabilities, service

capabilities, competitive advantage, and organizational performance in the context of container shipping.

Finally, this study has used quantitative research with rigorous statistical techniques such as exploratory factor analysis, validity and reliability tests, structural equation modeling, and hierarchical regression to examine research hypotheses as related to research questions and research objectives. This study provides a comprehensive methodology to identify capabilities in container shipping.

5.4 Limitations and direction for future research

This study has several limitations and can be suggested for future research. First, this study has demonstrated that dynamic capabilities are needed and should be especially stressed in a situation of environmental dynamism. However, in order to prove that this is also useful in the other parts of the world, it would be valuable to collect data from other regions or countries to obtain a balanced view of the relationships between dynamic capabilities, service capabilities, competitive advantage, and organizational performance in operations of container shipping companies.

Second, data collection of this study was performed at one point in time, and all the hypotheses were examined in a static fashion. A fruitful research avenue would be to test the model using data over a longer time series. Future studies might be conducted using a longitudinal approach to investigate the short- and long-term effects of this conceptual model. A longitudinal approach design will reveal the nature of changes in the research model over time.
Third, while this study found a relationship between dynamic capabilities and service capabilities, other capabilities based on the RBV such as innovation capabilities (Yang *et al*., 2009), logistics capabilities (Lu and Yang, 2006), and marketing capabilities (Nath *et al*., 2010) may also influence dynamic capabilities. A future study might therefore consider investigating other latent variables. Another direction for future research might be considering the moderating effect of environmental dynamism. Even that the economic environment environmental changes, investigating how environmental dynamism moderates the relationship between dynamism capabilities and competitive advantage is a must (Drnevich and Kriauciunas, 2011). Such investigation may also provide useful insights for strategic management to effectively competitive in a continually changing economic environment. Several studies (Drnevich and Kriauciunas, 2011; Ellonen *et al*., 2009; Teece, 2007) have examined the effect of dynamic capabilities on financial performance (Chien and Tsai, 2012) and innovation outcomes (Ellonen *et al*., 2009).

Finally, importance-performance analysis (IPA) is a useful approach to identify the priorities of strategic choices (Martilla and James, 1997), which can be adopted in future research. Despite its limitations, this study's findings obtained from container shipping managers/ directors' viewpoints may provide practical suggestions for sustaining competitive advantage in other related transportation industries.

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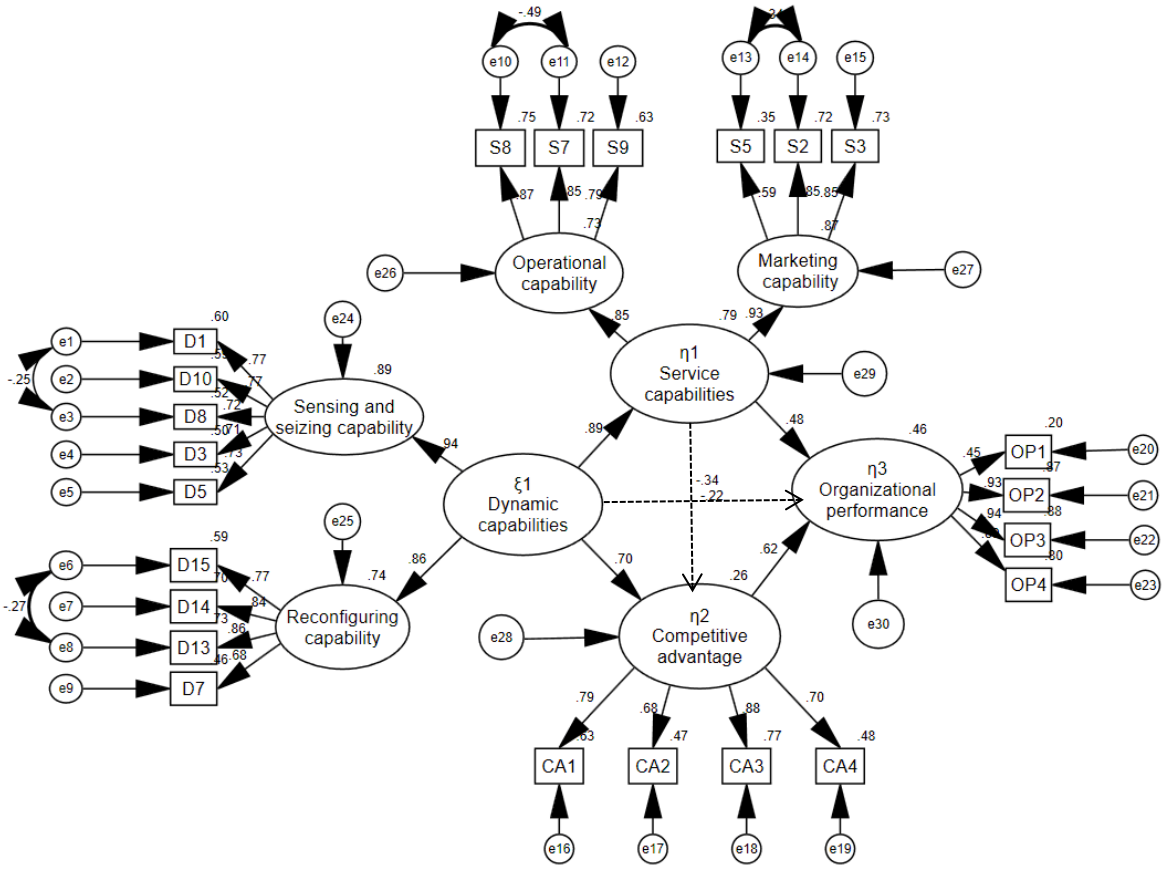

Fig.1. Structural equation competing model

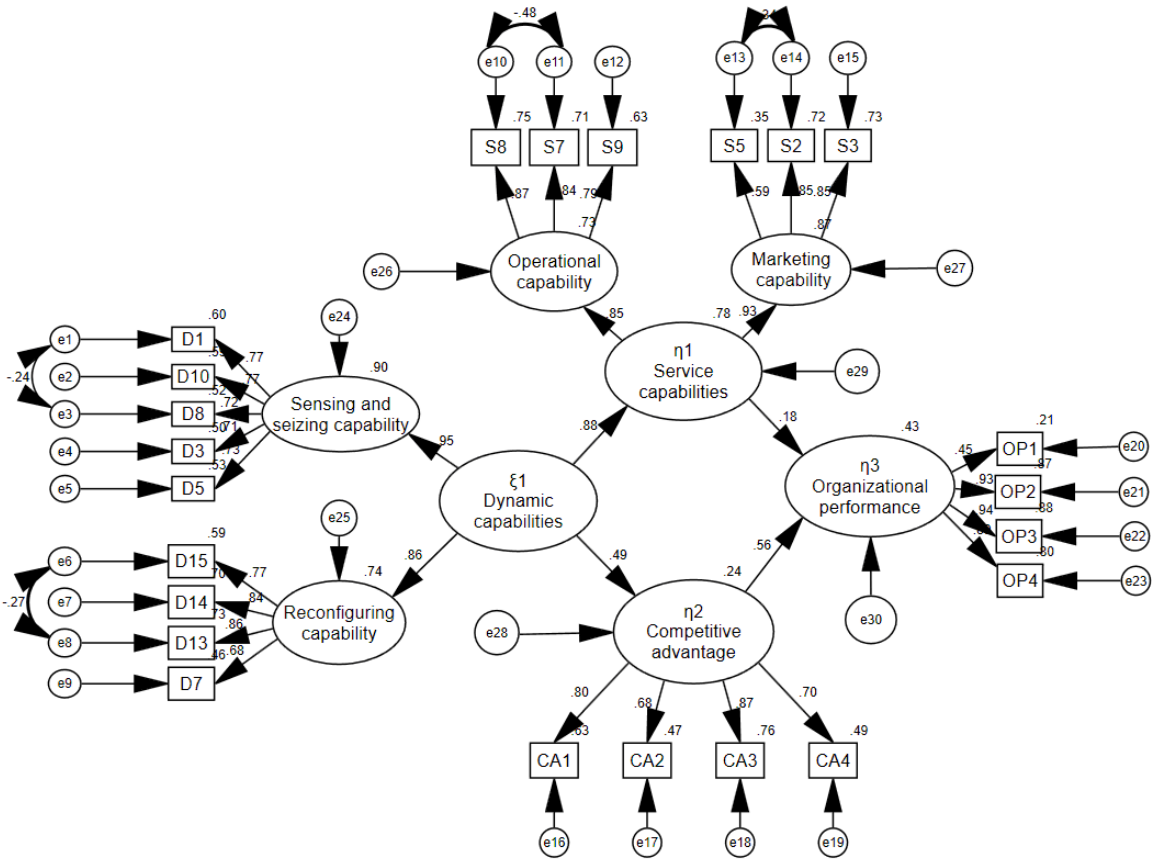

Fig.2. Structural equation model results

Note: Chi-square = 288.188; P value = 0.001; Degrees of freedom = 218; CFI = 0.963; GFI = 0.851; IFI = 0.964; TLI = 0.957; AGFI = 0.812; RMR = 0.037; RMSEA = 0.049.

Table 1

Profile of respondents

	Number of respondents	Percentage of respondents
Job title		
Vice president or above	43	32
Manager	55	41
Director	20	15
General employee	12	9
Sales representative	4	3
Work experience (years)		
5 years or less	10	7
6-10	11	8
11-15	20	15
16-20	22	16
21 or above	71	54
Number of employees		
50 or less	37	28
51-100	17	13
101-500	42	31
501-1,000	8	6
1,001 or above	30	22
Length of business operations (years)		
5 years or less	1	1
6-10	0	0
11-20	7	5
21-30	11	8
31 or above	115	86
Ownership pattern		
Local firm	70	52
Foreign-owned firm	46	34
Foreign-local firm	18	14

Table 2

Factor Analysis of Dynamic Capabilities Attributes

Dynamic capabilities attributes	Factor 1	Factor 2
My company understands customers' specific needs.	0.756	0.267
My company is good at customer information collection and potential market exploration.	0.753	0.277
My company learns or acquires new skills from partners.	0.719	0.347
My company adopts the best practices in the industry.	0.713	0.278
My company changes our practices when customer feedback gives us a reason to change.	0.696	0.268
My company is good at evaluating its own strengths and weaknesses.	0.684	0.336
My company has the ability to gather economic information on our operations and operational environment.	0.626	0.404
My company is rapidly aware of new business opportunities or threat possibilities.	0.611	0.422
My company has the ability to change our ways of doing business.	0.171	0.841
My company has the ability to reconfigure resource.	0.313	0.825
My company has the ability to rapidly response organizationally to competitors' actions.	0.454	0.692
My company has the ability to efficiently and effectively communicate with cooperative organizations.	0.484	0.692
My company can flexibly compete in the industry in the future.	0.402	0.689
My company can flexibly develop new services.	0.420	0.593
Eigenvalues	7.807	1.036
Percentage variance (%)	55.766	7.399
Cumulative percentage variance (%)	55.766	63.166

Table 3

Factor Analysis of Service Capabilities Attributes

Service capabilities attributes	Factor 1	Factor 2
My company is good at information integration.	0.830	0.148
My company is good at purchasing.	0.754	0.123
My company is good at on-time pick-up and delivery.	0.701	0.430
My company provides high frequency of sailing.	0.698	0.382
My company provides short transit times.	0.634	0.440
My company is good at cargo tracing.	0.610	0.339
My company has a low damage or loss record for cargo delivery.	0.552	0.480
My company provides a flexible service.	0.144	0.785
My company can efficiently respond to customer complaints.	0.422	0.754
My company has reasonable freight rates.	0.160	0.739
My company is good at sales activity.	0.499	0.647
My company has good relationships with partners.	0.440	0.623
Eigenvalues	6.408	1.019
Percentage variance (%)	53.397	8.488
Cumulative percentage variance (%)	53.397	61.884

Table 4

Reliability test results

	No. of items	Mean	S.D.	Cronbach's alpha	Range of corrected item-total correlation
Sensing and seizing capability	8	4.03	0.71	0.90	0.464-0.732
Reconfiguring capability	6	4.00	0.76	0.90	0.639-0.792
Operational capability	7	4.12	0.75	0.88	0.581-0.752
Marketing capability	5	4.20	0.69	0.85	0.595-0.777
Competitive advantage	4	3.67	0.86	0.84	0.638-0.759
Organizational performance	4	3.85	0.89	0.87	0.435-0.863

Table 5

Parameter estimate, standard errors, critical ratios, and R2 values for the final model

Latent Variable Item	Completely standardized factor loading	Standard error[a]	Critical ratio[b]	R^2
ξ1 Dynamic capabilities				
DC1	0.94	-[c]	-[c]	0.89
DC2	0.87	0.14	7.29	0.75
η1 Service capabilities				
SC1	0.90	-[c]	-[c]	0.85
SC2	0.85	0.14	6.67	0.72
η2 Competitive advantage				
CA1	0.79	-[c]	-[c]	0.63
CA2	0.68	0.99	7.97	0.47
CA3	0.88	0.11	10.66	0.77
CA4	0.70	0.10	8.16	0.48
η3 Organizational performance				
OP1	0.45	-[c]	-[c]	0.30
OP2	0.94	0.39	5.58	0.87
OP3	0.94	0.42	5.55	0.88
OP4	0.89	0.38	5.49	0.80

Note: [a] S.E. is an estimate of the standard error of the covariance.

[b] C.R. is the critical ratio obtained by dividing the estimate of the covariance by its standard error. A value exceeding 1.96 represents a level of significance of 0.05.

[c] Indicates a parameter fixed at 1.0 in the original solution.

Table 6

Assessment of average variance extracted

Measure	AVE[a]	Construct reliability[b]	Dynamic capabilities	Service capabilities	Competitive advantage	Organizational performance
Dynamic capabilities	0.84	0.91	**1** [c]			
Service capabilities	0.81	0.90	0.72 **	**1**		
Competitive advantage	0.59	0.85	0.40**	0.36**	**1**	
Organizational performance	0.69	0.89	0.39**	0.36**	0.58**	**1**

Note: ** Correlation is significant at the 0.01 level.

[a] Average variance extracted (AVE) = (sum of squared standardized loading)/[(sum of squared standardized loadings) + (sum of indicator measurement error)]; Indicator measurement error is calculated as 1-(standardized loading)^2.

[b] Construct reliability = (sum of standardized loadings)^2/[(sum of standardized loadings)^2+(sum of indicator measurement error)]; Indicator measurement error is calculated as 1-(standardized loading)^2.

[c] The square root of the shared variance between the constructs and their measures are provided in the diagonal (in bold).

Appendix A

Measurement scales

Items	Mean	S.D.
Dynamic capabilities		
D1 My company is good at customer information collection and potential market exploration.	3.97	0.68
D2 My company understands customers' specific needs.	4.16	0.69
D3 My company is good at evaluating its own strengths and weaknesses.	4.11	0.67
D4 My company has the ability to change our ways of doing business.	3.96	0.79
D5 My company has the ability to gather economic information on our operations and operational environment.	4.04	0.70
D6 My company possesses good learning capability.	3.96	0.76
D7 My company can flexibly develop new services.	3.80	0.80
D8 My company adopts the best practices in the industry.	4.07	0.68
D9 My company changes our practices when customer feedback gives us a reason to change.	3.98	0.72
D10 My company learns or acquires new skills from partners.	3.96	0.72
D11 My company has the ability to rapidly respond organizationally to market changes.	4.04	0.70
D12 My company has the ability to rapidly response organizationally to competitors' actions.	4.00	0.76

D13 My company has the ability to efficiently and effectively communicate with cooperative organizations.	4.07	0.72
D14 My company has the ability to reconfigure resource.	3.97	0.77
D15 My company is rapidly aware of new business opportunities or threat possibilities.	3.93	0.78
D16 My company can flexibly compete in the industry in the future.	4.03	0.76
Service capabilities		
S1 My company is good at cargo tracing.	4.30	0.70
S2 My company can efficiently respond to customer complaints.	4.22	0.67
S3 My company is good at sales activity.	4.20	0.71
S4 My company has reasonable freight rates.	4.11	0.68
S5 My company provides a flexible service.	4.16	0.71
S6 My company is good at information integration.	4.15	0.81
S7 My company provides high frequency of sailing.	4.06	0.77
S8 My company is good at on-time pick-up and delivery.	4.03	0.70
S9My company provides short transit times.	4.02	0.72
S10 My company is good at purchasing (e.g. vessel or fuel).	4.10	0.82
S11 My company has good relationships with partners.	4.28	0.69
S12 My company has a low damage or loss record for cargo delivery.	4.16	0.75
Competitive advantage		
CA1 My company provides a better delivery service.	3.56	1.07
CA2 My company has service differentiation from its competitors.	3.64	0.98
CA3 My company has cost advantage.	3.73	1.10
CA4 My company has gained strategic advantages over its competitors.	3.74	0.99
Organizational Performance		
OP1 Market share	3.56	0.84
OP2 Service quality	3.97	0.88
OP3 Corporate reputation	4.60	0.95
OP4 Customer satisfaction	3.72	0.92