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*Common Resources-Resource Bundling-  
Performance: the Mediating Role of Resource  
Bundling in Container Terminal Operations*

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# Common Resources-Resource Bundling-Performance: the Mediating Role of Resource Bundling in Container Terminal Operations

## ABSTRACT

**Purpose-** Building on the resource-based view (RBV) perspective of common resources, the objective of this paper is to empirically examine the impact of container terminals' common resources (i.e. government support and terminal resources) on resource bundling strategies and subsequent effect on service performance.

**Methodology-** Using cross-sectional survey data collected from a sample of 216 respondents of Indonesia's container terminals, this study used structural equation modeling to test the hypothesised relationships between common resources, resource bundling strategies and service performance.

**Findings-** Government support and terminal resources (personnel and physical), both as sources of common resources when bundled effectively, are found to have positive and significant effect on terminal service performance. The resource bundling strategies fully mediate the relationship between container terminals' common resources and service performance.

**Practical implications-** The study introduces the notion of common resources to container terminal managers in contrast to the valuable, rare, inimitable and non-substitutable (VRIN) types. It is recommended that appropriate resource bundling strategies can turn the common resources into VRIN resources that can be used to obtain desired service performance.

**Originality-** RBV theorists suggest that resources that are VRIN types can be the source of competitive advantage. However, the resources can also be common, basic and valuable, a fact that is rarely investigated in the literature. These common resources can be bundled judiciously with other pre-existing resources to create VRIN resources. This research enriches the RBV by empirically validating that VRIN resources are embedded within various common resources bundling strategies.

**Keywords:** *Government support, container terminal resources, common resources, resource bundling, service performance, container terminal, SEM, Indonesia*

**Paper type:** Research paper

## 1. Introduction

International seaborne trade uses seaport, the choice of which is influenced by transit time, port efficiency, reliability, infrastructure, connectivity and port cost (Anderson, Opaluch, & Grigalunas, 2009). Other factors that appear to determine the shippers' choice of container port include cargo volume and port charges (Hsu, Huang, Tseng, & Li, 2020); cost, space availability and connectivity (Wang & Yeo, 2019); and service efficiency (Chao, Yu, & Hsieh, 2018). Port operations depend on the efficiency of container terminal (henceforth terminal) which plays a key role in trade development (Yuen, Zhang, & Cheung, 2012). While resources, both tangible and intangible, are key to terminal operations (Lyu, Chen, & Huo, 2019), terminal, however, suffer from resource scarcity (e.g. cargo handling equipment, skilled labour and IT systems); inadequate physical infrastructure causing shipping congestion (Talley & Ng, 2016b); and excess dwelling time causing delays in cargo unloading/loading. As resource scarcity is mostly inevitable, introducing a notion of 'common resource' and its judicious bundling to drive performance is vital. The common resources, as we define, are very common (imitable), exchangeable, replaceable and easily acquirable by firms. However, a firm's competitive edge depends on the way these common resources are bundled and deployed.

The resources, so far, are argued to be valuable, rare, inimitable and non-substitutable (VRIN) to gain competitive advantage (Barney, 1991). However, little attention has yet been paid in literature to the other types of resources that could be quite basic and conventional but equally valuable. It is true that organisations survive and compete for years relying on these common resources. From the resource-based view (RBV) perspective, common resources are still valuable (i.e. useful in exploiting the opportunities) as well as strategic but not necessarily rare, inimitable and non-substitutable (Porter, 1998; Ray, Barney, & Muhanna, 2004). Other organisations are likely to easily acquire these common resources to challenge their competitors. Therefore, the question is how these common resources can be the source of competitive parity (if not advantage) (Ray et al., 2004). This is typically relevant for emerging economies where the common resources are limitedly available and allocated. We argue that governments, being an external source for these resources, help organisations remain in business, particularly container terminal operations within a port. However, resource shortage is inevitable and the government faces challenges due partly to investment delays and funding scarcity (Cho & Kim, 2015). With the resource constraint, the question is how a firm can enhance service performance and remain competitive. Service performance is defined as all service provisions to deliver goods and services to the satisfaction of customers by a judicious bundling of available (common) resources (Yang & Lirn, 2017). The configuration and

bundling of these common resources may likely to create VRIN resources. Wong and Karia (2010, p. 53) define bundling “as the processes used to integrate resources in order to create capability”. Bundling of the common resources is rarely discussed in the literature and therefore demands further investigation.

Resources are a set of tangible and intangible assets owned or acquired by firms, and the firms hold the ability to judiciously make a unique bundle of these resources (Hafeez, Zhang, & Malak, 2002; Lyu et al., 2019). Ray et al. (2004) argue that competitive advantage can be achieved through the right bundling of physical resources with other organisational resources. Resource bundling thus adds value in product and service delivery. This research investigates resources provided through government support (external source) and terminal resources (internal source) as two sources of common resources (for clarity, we henceforth refer to both types as ‘resources’). Resource bundling capability can assist firms in differentiating themselves. Wong and Karia (2010) go so far as to argue that bundling organisational resources (e.g. physical, human, information, knowledge, and relational) is necessary to gain competitive advantage. However, studies thus far have not investigated common resources and their bundling mechanism. Doing so is also essential to reveal whether the bundling of common resources enhances service performance.

The objective of this study, therefore, is to empirically investigate the effect of common resources and their bundling strategies on service performance. Although we use RBV as a theoretical lens, we have made a significant departure from the RBV’s traditional focus on VRIN to the notion of common resource bundling strategies. Thus, it helps address the current gap in knowledge in couple of ways, particularly in the container terminal context. First, the RBV explains how terminal operators select, mobilise and allocate resources while investing in infrastructure, equipment and personnel resources (Casaca, 2005). The RBV also considers government support as an external source of common resources to fund infrastructure development, ranging from heavy equipment and plants, hinterland access, and information technology (IT) backbones within terminals. Second, existing research in the maritime context makes limited use of RBV (Cho & Kim, 2015; Gordon, Lee, & Lucas, 2005; Lyu et al., 2019; Yang & Lirn, 2017), and has not yet operationalised these common but valuable resources.

The remainder of the paper presents background literature, conceptual framework and hypotheses in Section 2; methodology in Section 3; analysis and results in Section 4; and; discussion and conclusion in Section 5 and Section 6 respectively.

## **2. Background literature, conceptual framework and hypotheses**

### **2.1 Resources-based view and common resources**

RBV uses resources at its core, and these resources are yet characterised as valuable, rare, inimitable and non-substitutable (VRIN) (Barney, 1991). We argue that not all resources are VRIN types; they are mostly common types. As we speak the common resources, they are categorised as physical (e.g. labour, equipment, material, terminal yard, funds and information technologies), human/personnel (e.g. employees and their training, experience, technical skills), and organisational (e.g. firm image, process, routines) (Barney, 1991). Further, it can also be tangible (e.g. plants, equipment, and brick-and-mortar infrastructure), and intangible (e.g. corporate image and branding) (Das & Teng, 2000; Lu, 2007). These basic and common resources are not readily available to deploy; they need to be configured and deployed amid multiple challenges associated with bundling practices. For this reason, bundling practices or strategies play a key role in turning the common resources into VRIN resources.

The resources that we argue as basic and common types have been treated as VRIN types in earlier studies (Kamasak, 2017; Lu, 2007; Lyu et al., 2019). For example, material handling equipment, cargo loading/unloading crane, truck, conveyor belt, and others are treated as VRIN type of resources in the context of container terminals. Lyu et al. (2019) discuss particularly how these VRIN resources drive the competitive advantage. The question remains, however, how it is possible to call the same resources common and conventional, and also the source of competitive parity (or advantage) (Ray et al., 2004). Barney (1991) states that resources that are valuable and common will result in competitive parity; resources that are valuable and rare can be a source of temporary competitive advantage; and VRIN resources can be a source of sustained competitive advantage (Ray et al., 2004, p. 26). We, therefore, split the resources roughly in a ratio of 80 to 20 (i.e. common to VRIN). Arguably, no resources are exclusively common nor VRIN. They are always a complex bundle of two types of resources within an organisation. For example, in an organisation, approximately 20% of resources may include high-end automatic machinery and state-of-the-art material handling equipment (i.e. VRIN), while the remaining 80% resources are basic and common types. The competitive advantage does not merely lay upon the possession of these common resources, but in the extent they are exploited by being configured, mixed and bundled with other pre-existing in-house resources (e.g. human, organisational, IT). Thus, the bundling strategies are likely to make these resources VRIN types and firms can differentiate themselves from their competitors based on the bundling capability. Conversely, a lack of bundling strategies will cripple firms' operations and

diminish service performance.

Further, firm resources are built over time either by generating them internally or sourcing them externally through inter-firm partnerships (Das & Teng, 2000). Governments can initially support the acquisition of capital-intensive infrastructure such as container yards, stacking facilities, berth facilities for faster cargo loading/unloading, hinterland connectivity, and telecommunications. Government can also enter into private partnership (i.e. facilitative intervention) (Wang, 2018) with external parties such as logistics service providers and freight forwarders that invest in terminal-specific resources. This study, therefore, considers common resources from both internal and external sources and argues that their judicious bundling can create VRIN resources.

The distinguishing attributes of common and VRIN resources are summarised in Table 1. It essentially argues that the VRIN resources can be sourced through strategic bundling of common resources.

*<insert Table 1 here>*

## **2.2 Conceptual framework**

### *2.2.1 Common resources-*

The common resources, in this study, consider both government supports and terminal resources (personnel and physical resources). Government supports refer to state-based financial and regulatory incentives directed towards the development of capital projects that consume financial resources. For example, government supports fund national road networks, IT network, container yards, dry port terminals, and initiate shipping lines. Allocation of such resources at the country level is often flexible, since it can be shared across multiple industries, or across firms within an industry (Combs, Ketchen, Ireland, & Webb, 2011). For example, port development and modernisation can share these resources among all ports, and benchmark against others in the region. However, limited resources set the allocation priority for those strategic ports that contribute a larger share to GDP. This differential allocation acts as a source of competitive advantage for some ports (Lazzarini, 2015), while others have to survive through the strategy of bundling the limited resources. Thus, government supports act as a proxy for resources to create a positive business environment. Landau, Karna, Richter, and Uhlenbruck (2016) posit that firms need to be aware of governmental supports and fully exploit the available resources to gain or maintain competitive advantage.

Terminal resources can be classified into three categories: terminal personnel (e.g. specialised

skills and competencies); terminal equipment (e.g. quayside and yard gantries, straddle carriers, top handlers, etc.), and terminal infrastructure and hinterland connectivity (Appendix 1 outlines sources of these terminal resources). From the RBV perspective, these resources can be viewed as common, since they are often found in container terminals and may therefore only serve as a basis for competitive parity (Ray et al., 2004). Ultimately, firms that can configure these resources into a strategic bundle are likely to survive.

### *2.2.2 Resource bundling strategies*

The terminal coordinates the flow of goods (cargo containers), shipping documents and information between providers and consumers (Braziotis, Bourlakis, Rogers, & Tannock, 2013). The in-terminal activities include cargo storage and consolidation facilities, packing and documentation, custom clearance, cargo tracing and tracking, loss/damage claims, delayed delivery, information and transportation services and customer services from unloading at berth to landside exit gate (Burns, 2015; Lu, 2007). While these activities consume resources within the terminal, we argue the strategic bundling of these resources based on principles of lean practices (Tortorella & Fettermann, 2018), relationship management (Prajogo, Oke, & Olhager, 2016), optimisation of logistics operations through resource integration (Prajogo et al., 2016), and information sharing (Shee, Miah, Fairfield, & Pujawan, 2018). Lean practices transform information and knowledge about lean into activities that help reduce errors and waste (Tortorella & Fettermann, 2018). Relationship management focuses on bundling relational resources through communication with shipping lines, government agencies, inland transport and terminal operators through enhanced service provision (Feng, Wang, & Prajogo, 2014; Prajogo et al., 2016). The optimisation of logistics operations helps integrate and optimise available resource use. Last, information sharing contributes to enhanced visibility and timely decision-making by bundling information resources through well-connected IT systems. The bundling mechanism transforms the commonly available resources into those of VRIN that help accomplishing the tasks better than competitors.

### *2.2.3 Service performance*

The core business within the container terminal is service provision to quickly move containers from the ship's berth to the exit gate (Burns, 2015). Terminal service performance is defined as all service provisions achieved by seamless integration of container logistics to the satisfaction of customers (Yang & Lirn, 2017), and is measured in both financial and non-financial terms. In this study, we evaluate terminal services, and measure service efficiency through several indicators sourced from the literature. These include on-time delivery with less lead time; value-

added customised services at competitive price (Chang & Thai, 2016); responsiveness to new requirements; timely delivery and innovative services (Schellinck & Brooks, 2015), and; customer satisfaction with better service quality, meeting standards, quick response to service requirement (Feng et al., 2014). Any variation in terminal capacity to process containers delivery economically, in full and on-time (Arif & Jawab, 2018), can be attributed to a lack of common resources and inadequate bundling capability of these available common resources. The theoretical framework depicting the relationships between common resources, resource bundling strategies and performance is presented in Figure 1.

*<insert Figure 1 here>*

## **2.3 Hypotheses development**

This study theorises that efficient resource bundling strategies can drive service performance by using container terminals' common resources (both government supports and terminal resources). Following hypotheses are developed using theoretical relationship between the variables in the framework.

### *2. 3.1. Government supports, terminal resources, resource bundling strategies and service performance*

Government policy significantly focuses on improving port efficiency and competitiveness by financing port infrastructure, ensuring navigation safety, and facilitating trade relationships (Ng & Gujar, 2009). Gordon et al. (2005) state that government favours port operations and development. This includes facilitation of terminal operations through benchmarking with other ports in the region; catalysing operations (e.g. by regulating public transport financing); defining statutory regulations (e.g. by regulating coastal management and navigation safety), and; facilitating trade (e.g. by negotiating trade agreements) (Juhel, 2001). Government intervention maintains and strengthens transshipment operations (Jansen, van Tulder, & Afrianto, 2018). As shipping lines identify cargo volume, terminal handling charges, berth availability, port location, transshipment volume and feeder network as their port selection criteria (Chang, Lee, and Tongzon, 2008), government supports specifically target the development of such facilities in port and container terminals to enhance performance.

Government policy seeks to influence terminal performance by involving private firms as strategic port operators who are encouraged to invest in terminal-specific personnel and equipment (Bouchartat, Hajbi, & Abbar, 2011; Yuen, Zhang, & Cheung, 2013). Government supports boost personnel development through skills enhancement, process standardisation and

certification (World Bank, 2018). Further, it regulates port privatisation (Tongzon & Heng, 2005), develops freight logistics (McKinnon, 2009) and facilitates hinterland connectivity (Notteboom & Rodrigue, 2007). In these ways, government supports enhance the personnel and physical resources of container terminals. In addition, government supports, as a type of common resource, are judiciously bundled with other available resources (personnel and physical) gain access to VRIN as a resource to process cargo efficiently. Since government supports ideally contribute to improved terminal service performance (Alfaraih, Alanezi, & Almujaed, 2012; Nguyen, Van, Bartolacci, & Tran, 2018; Ting, Kweh, Lean, & Juan, 2018), the following hypotheses are proposed:

H1: *Government supports have positive effect on container terminal personnel and physical resources.*

H2: *Government supports have positive effect on container terminal resource bundling strategies.*

H3: *Government supports have positive effect on container terminal service performance.*

### 2. 3.2. *Container terminal resources, resource bundling strategies and service performance*

When a port provides value-added services, it requires resources to maximise throughput (Talley & Ng, 2016a). The government encourages public-private partnerships and invites private operators to participate and invest in terminal-specific common resources such as personnel and physical assets for achieving higher scale of operational efficiency (Wanke & Barros, 2015). As we previously argued, the four bundling strategies offer the right bundling of common resources to generate those of VRIN that support container processing. As the terminals use more resources such as skilled employees, berths, and yard occupancy, the less will be their berth-dwelling time, bottlenecks, waiting time, and inventory resulting in faster container clearance. Thus, container terminals' common resources, when bundled strategically, are likely to enhance service performance. Thus, the following hypothesis is proposed.

H4: *Container terminal resources (personnel and physical) have positive effect on resource bundling strategies within the terminals.*

As customer satisfaction is significantly associated with service quality (Phan, Thai, & Vu, 2020; Sayareh, Iranshahi, & Golfakhrabadi, 2016; Thai, 2008; Yeo, Thai, & Roh, 2015), resource allocation is key to improve the services. Availability of reliable equipment, adequate intermodal connections, and skilled labour are vital for a port to be efficient in service delivery (World Bank, 2018). Timely information sharing helps the right decision-making in container processing. Further, speed, timeliness, consistency, safety, correct documentation and pricing

are perceived to have positive effect on service performance (Thai, 2008). All these require the terminal to provide resources that we claim as basic and common types. As non-value adding activities waste resources, Prajogo et al. (2016) recommend lean practices to eliminate waste while improving service performance. Thus, the container terminals' common resources positively influence the service performance. This leads to the following hypothesis:

*H5: Container terminals' resources (personnel and physical) have positive effect on service performance.*

### *2. 3.3. Resource bundling strategies and service performance*

Business processes are the source of competitive advantage (Porter, 1991). However, the terminals' business processes often employ several non-value adding activities that cause bottlenecks and delays. In an attempt to free up these non-value adding activities, resources, which are basic and common types, are sourced from government and terminal operators. The bundling and configuration mechanism transform these common resources (e.g. physical and financial) into VRIN resources. The VRIN resources help lean practices transform information and knowledge about lean to reduce non-value adding steps (Chandrakumar, Gowryathan, Kulatunga, & Sanjeevan, 2016; Olesen, Powell, Hvolby, & Fraser, 2015; Tortorella, Miorando, & Marodin, 2017). Relationship management focuses on bundling of resources from diverse stakeholder to achieve an efficient flow of cargo, and deliver new services and information (Braziotis et al., 2013), while the optimisation of logistics operations helps integrate resources and optimise resource utilisation for cost-effective delivery. Last, information sharing helps to bundle information resources by using well-connected ICT systems (Rodrigue & Notteboom, 2009; Tseng & Liao, 2015; Yang, Marlow, & Lu, 2009). The bundling strategies thus enhance terminal service performance (Shee et al., 2018). This leads to the following hypothesis:

*H6: The resource bundling strategies have positive effect on container terminals' service performance.*

### *2. 3.4. The mediating role of resource bundling strategies*

The core elements of RBV are tangible and intangible resources that are the source of competitive advantage (Porter, 1991). Since resources are inherently static in nature (Helfat & Martin, 2015), firms must therefore have some means to integrate them for competitive performance (Kamasak, 2017). Barney (1991) states that resources must be exploited by integration processes to determine service performance. In this study, highlighting the importance of resource bundling strategies, we posit that government supports and terminal resources are bundled together to turn these largely financial and physical common resources

into VRIN resources by lean practices (to add value), relationship management (to create relational rent), logistics optimisation (to optimise terminal processes) and information sharing (to inform and facilitate learning). Bundling helps the speed of work-flow, and creates value-added products and innovative services. Thus, resource bundling strategies act as a mediator between container terminal resources (from both government and terminal operators) and service performance. Thus, the bundling of common resources is likely to have a positive effect on service performance. Therefore, the following hypothesis is proposed:

*H7: Resource bundling strategies mediate the relationship between container terminals' common resources and service performance.*

### **3. Methodology**

#### *3.1 Port population and sampling frame*

Based on the Indonesian Customs database on Import Declaration documents (DGCE, 2020), there are effectively 58 seaports engaged in imports in Indonesia. However, only 11 are container ports, and the top three of those account for about 85% of Indonesian container throughput (TEUs) for the last 10 years (GlobalBusinessGuideIndonesia, 2020). These the ports of Tanjung Priok Jakarta, Tanjung Perak Surabaya and Tanjung Emas Semarang, which were chosen as the sample for this research. Tanjung Priok Jakarta acts as hub port for medium and feeder ports in western Indonesia; Tanjung Perak serves for the eastern region of Indonesia, and the Port of Tanjung Emas located in central Java services the middle hinterland of the island. Although these ports are located on the same island (Java), they are not close to each other, and service different characteristics of the hinterland, population and cities.

The port of Tanjung Priok at Jakarta holds five major container port terminal operators: Jakarta International Container Terminal, Terminal Peti Kemas Koja, Pelabuhan Tanjung Priok, New Priok Container Terminal, and Mustika Alam Lestari. Tanjung Emas at Semarang holds one container terminal operator, Terminal Peti Kemas Semarang. Tanjung Perak at Surabaya holds two container terminal operators: Terminal Petikemas Surabaya and Terminal Teluk Lamong. These terminal operators have different ownership structures and operational policies. Therefore, they represent the diversity of the business environment and logistics processes. Priok has more advantages due to its location close to Singapore, a key Asian trade and financial hub, and serves a bigger population and area.

#### *3.2 Measures and data collection*

An electronic survey was used as the main method of data collection, as it is the most effective

and economical means to collect data using a sampling technique. The measures of government support, terminals' personnel and physical resources, resource bundling strategies, and service performance were drawn from previous studies (see Appendix 1). A pre-test of the questionnaire was conducted with two Indonesian container terminal workers, two research scholars researching port logistics, and two academics teaching supply chain management. Next, a pilot study with key personnel from five operators in Indonesia was undertaken. That study suggested the need for changes to questionnaire wording, length, and time required. These were incorporated into the final version, which was programmed into Qualtrics. Subsequently, the main survey was distributed through a survey link via e-mail to supervisors, managers and terminal operators across diverse operational departments. These respondents were sourced through the human resource departments of the ports, with an expectation that the participants will be more responsive and return the survey. Respondents answered questions through a seven-point Likert scale ranging from 1 = Strongly disagree, 4 = Neutral, 7 = Strongly agree. Respondents were selected based on the likelihood that their role indicates extensive knowledge and experience of container port terminal operations, cargo handling, and supply chain management. A follow-up reminder was also sent after a couple of weeks for a higher response rate (Dillman, 2011). The survey was distributed to 354 respondents across all eight container terminals. Ultimately, 216 usable responses were collected after rejecting incomplete responses, representing a 61% response rate.

## **4. Analysis and results**

Survey data was analysed in three phases: data screening, checking of psychometric properties for reliability and validity, and structural path modeling (Hair, Black, Babin, & Anderson, 2014). Data screening was performed to detect missing values and data normality. Non-response and common method bias tests were performed to detect any significant differences between early and late responses, while confirmatory factor analysis was carried out to test the reliability and validity of the constructs (DeVellis, 2012). Last, the AMOS-SEM was used to test the relationship between variables, followed by the mediation analysis.

### *4.1 Respondent profile*

Respondents comprised employees in the position of supervisor (73%), manager (15%), assistant manager (5%), and others (7%). All respondents were qualified with at least a bachelor degree or above (80%), and possessed at least five years of work experience in the port industry (75%). These characteristics of the sample indicate that respondents were sufficiently

experienced to complete the questionnaire. The male-to-female ratio was 90:10. Demographic characteristics of the sample are presented in Table 2.

<insert [Table 2 here](#)>

#### *4.2 Test of non-response bias and common method bias*

Following Armstrong and Overton (1977), a non-response bias test was performed using an independent sample t-test (department, job position, work experience, and port location) to investigate any significant difference between early and late responses (Wagner & Kemmerling, 2010). No significant difference was found between the mean values of the early versus late responses using a 95% confidence interval ( $p > 0.05$ ), suggesting the non-existence of response bias in this study.

Podsakoff, MacKenzie, Lee, and Podsakoff (2003) state that method bias can result from a single individual responding to the predictor and criterion variables same time resulting in misleading conclusion validity of the relationships between measures. Harman's one-factor test was statistically employed where all variables are restrained with no rotation and loaded onto a single factor (Podsakoff et al., 2003). First, the EFA assessment indicated 10 factors with an eigen value of more than 1, which explained around 75.19% of the total variance, while the first factor explained only 35.09% of the total variance. Second, a CFA assessment was performed where all variables were loaded onto a single factor (Cao & Zhang, 2011; Flynn, Huo, & Zhao, 2010). This yielded an inferior model fit with  $\chi^2(2484) = 11197.959$ ,  $\chi^2/df = 4.508$ ,  $p = 0.000$ , CFI = 0.400, TLI = 0.383, GFI = 0.317, RMSEA = 0.128 and SRMR = 0.1121. Common method bias was not an issue with the data.

#### *4.3 Psychometric assessment using reliability and validity tests*

Reliability and validity assessment were performed for all constructs using CFA. A full measurement model of eleven latent constructs encompassing 72 items was tested for its fit with the data. The parameters showed the model fit fairly well with data:  $\chi^2(472) = 870.995$ ,  $\chi^2/df = 1.845$ ,  $p = 0.000$ , CFI = 0.927, TLI = 0.913, RMSEA = 0.063, SRMR = 0.0503, and Bollen-Stine  $p = 0.053$ . The  $\chi^2$  with  $p < 0.05$  is identified to be an inferior model fit. However,  $p < 0.05$  is acceptable for a model with more than 30 measurement items and a sample  $n < 250$  (Hair et al., 2014, p. 584). Therefore, the chi-square test is not the best-fit measure as the sample is multivariate non-normal and small (Schumacker & Lomax, 2004). Subsequently, the Bollen-Stine bootstrap ( $p = 0.053$ ; at  $p > 0.05$ ) was performed to establish the model fit (Bollen & Stine, 1992; Hazen, Overstreet, & Boone, 2015; Shee et al., 2018). Accordingly, the model

reached a satisfactory data fit. The model could have been further improved to get the indices satisfied the threshold values for a better fit. However, it was discontinued at this stage to retain two critical constructs (i.e., infrastructure and hinterland; and customer satisfaction).

#### *4.4 Reliability and validity test*

Internal consistency can be measured either by Cronbach's alpha (Hair et al., 2014) or composite reliability (CR) (Fornell & Larcker, 1981). Cronbach's alpha evaluates the degree to which the indicators measure the uni-dimensionality of a construct. The CR underlined by indicator loadings reports an accurate measure of internal consistency (Fornell & Larcker, 1981). All Cronbach's alpha values  $> 0.7$  demonstrate the value more than the minimum acceptable 0.7 (Hair et al., 2014); all CR values resulted to be  $> 0.7$ , indicating the good composite reliability of constructs (Fornell & Larcker, 1981) (See Table 3). Further, the measurement model demonstrated satisfactory standardised factor loadings to be well above the recommended value of 0.5 (J. C. Anderson & Gerbing, 1988). Average variance extracted (AVE) values were above 0.5, indicating good convergent validity (Fornell & Larcker, 1981).

*<insert Table 3 here>*

Content and construct validity test measurement accuracy. Content validity is verified using the face validity of indicators ensuring they test the concept. Convergent validity, as a measure of construct validity, estimates the inter-item correlation within a construct, while discriminant validity examines the distinctiveness of item loadings under a construct. The AVE value examines convergent validity. The AVE surpassing 0.5 signifies the measurement items' convergent validity (Fornell & Larcker, 1981), meaning that a construct explains more than 50% of the variance in scale indicators. The square root of AVE should exceed the greatest correlations of the remaining constructs (Fornell & Larcker, 1981). Table 3 demonstrates that AVEs range from 0.559 to 0.877, which satisfy the 0.5 threshold value. The discriminant validity was then evaluated using the square root of AVEs (Hair et al., 2014), and found to be satisfied.

#### *4.5 Structural model and hypotheses testing*

The final path model confirmed the model fit moderately with  $\chi^2 (39) = 91.106$ ,  $\chi^2/df = 2.336$ ,  $p = 0.000$  (Bollen-Stine  $p = 0.063 > 0.05$ ), CFI = 0.946, TLI = 0.924, SRMR = 0.0472, RMSEA = 0.079. The  $\chi^2/df$  value less than three shows a reasonable fit (Iacobucci, 2010; Kline, 2010). As the  $p < 0.05$ , the Bollen-Stine bootstrap was performed to support the model with  $p = 0.063$  ( $p > 0.05$ ) (Bollen & Stine, 1992). Further, Hair et al. (2014) suggest that GFI and AGFI are

driven by sample size; and NFI underrates fitting in small samples. Also, CFI is an advanced version of NFI (Hu & Bentler 1998). Hence, GFI, AGFI and NFI have seldom been employed supporting the current progress of far important fit indices (Hair et al., 2014).

The model demonstrated a satisfactory fit. The path model and fit statistics are presented in Figure 2 and Table 4 respectively.

<insert [Figure 2](#) here>

<insert [Table 4](#) here>

The path analysis was also used to test the seven hypotheses. Government support (GS) has a positive and significant effect on terminals' personnel and physical resources (PPR) ( $\beta = 0.425$  at  $p < 0.001$ ), resource bundling strategies (RBS) ( $\beta = 0.242$  at  $p < 0.001$ ) and terminal service performance (TSP) ( $\beta = 0.164$  at  $p < 0.05$ ) supporting *H1*, *H2* and *H3* respectively. The PPR of container terminals has a positive and significant effect on their RBS ( $\beta = 0.758$  at  $p < 0.001$ ) supporting *H4*. However, the container terminals' PPR had no significant effect on TSP ( $\beta = 0.139$  at  $p > 0.05$ ). Hence, *H5* was not supported. Further, RBS has significant and positive effect on TSP ( $\beta = 0.550$  at  $p < 0.05$ ), supporting *H6*. The non-support of *H5* implies that PPR of terminals has no direct influence on TSP. This confirms the findings of the study by Yang and Lirn (2017), who find no significant relationship between firms' resources and logistics performance. This validates the fact that resources (e.g. GS and PPR) do not directly influence service performance. Therefore, we undertook a mediation analysis to check if the RBS mediated this relationship. *H7* was supported.

#### *4.6 Mediation analysis*

There are three ways to analyse the mediation effect: indirect and total effect analysis (Chen, Paulraj, & Lado, 2004); SEM mediation modeling (Paulraj, 2011); and path coefficients and t-values (Cao & Zhang, 2011). The indirect and total effect results are shown in Table 5. The indirect effects of GS on (a) RBS ( $b = 0.326$ ;  $P < 0.01$ ); and (b) TSP ( $b = 0.392$ ;  $P < 0.01$ ) indicate that GS has an indirect effect on TSP through RBS.

Given that the path connecting PPR and TSP was insignificant, we looked at the indirect effect through RBS. The parameter estimates for indirect effect of PPR on TSP is  $b = 0.531$  ( $P < 0.01$ ). The second mediation analysis shows that all paths are positive and significant at  $p < .001$  indicating that the RBS fully mediate the relationship between PPR and TSP. The results are shown in Table 5.

<insert [Table 5 here](#)>

The relationships between the GS and PPR with TSP were also analysed using a partial mediation model (Model 3) (Paulraj, 2011). In addition to the paths in the hypothesised model (Model 1), a direct path from GS to TSP was drawn recommending that RBS partially mediates the relationship between these two variables. However, the direct path from PPR to TSP was insignificant ( $p > 0.05$ ), suggesting that RBS fully mediates the relationship between PPR and TSP. It implies that the partial mediation model (Model 3) does not fit the data well. All path coefficients in Model 3 were significant, except for the relationship between PPR and TSP ( $p > 0.05$ ) and GS and TSP ( $p > 0.05$ ). This indicates that RBS fully mediated the relationship between GS and PPR with TSP. To further verify the mediating role of RBS, a direct model (Model 4) was also examined (see Figure 3). This model directly incorporated GS, PPR and RBS into TSP. The model fit was the worst among all models. Additionally, the three paths were found to be significant at  $p < 0.01$ . Therefore, the results of these mediation analyses suggest that RBS mediated the relationship between common resources (GS and PPR) and TSP.

Next, the third mediation analysis was performed using path coefficients and t-values (Table 6). The results demonstrated that RBS mediated the relationship between the antecedents (GS and PPR) and TSP. This supported hypothesis H7.

<insert [Figure 3 here](#)>

<insert [Table 6 here](#)>

## **5. Discussion and implications**

This study empirically examined the common resources - resource bundling - service performance relationship in the context of container terminals underpinned by RBV perspective of common resources. The findings show that government support can directly improve terminal service performance; significantly enhances terminal personnel and physical resources; and considerably supports resource bundling strategies. It is important to note that VRIN resources are embedded in these bundling practices, and thus serve to strengthen competitive advantage. Resource bundling strategies are found to have positive and significant effect on service performance. However, the terminals' personnel and physical resources did not appear to have any significant direct effect on service performance. This indicates that resource bundling strategies significantly mediate the relationship between the container terminals' common resources and service performance. The literature supports the assertion that firm-specific resources have positive effect on service performance while these resources

are all assumed as VRIN (Lyu et al., 2019). We argue that resources are not necessarily VRIN types; most of them could be basic, conventional and common types. These common resources are easily acquired, imitated and replaced. Also, judicious bundling turns these common resources into VRIN resources that offer competitive advantage.

There are two types of sources discussed in this paper: government support, and terminal personnel and physical resources. First, government support, as an external source, is crucial in the development of capital intensive port infrastructure by facilitating favourable land pricing and distribution, helping in new facilities and terminals (Lee & Flynn, 2011; Munim & Schramm, 2018; Ng & Gujar, 2009), and development of hinterland road access and tolls (De Borger & De Bruyne, 2011; Lee & Flynn, 2011). This is especially true in Asian region where infrastructure funding remains a major issue (Lee & Flynn, 2011). Second, terminal operators from authorised firms are allowed to invest in terminal-specific common resources (e.g. personnel, equipment, and infrastructure). This kind of alliance with vertically integrated firms allows container terminals to gain access to external firms' resources (Das & Teng, 2000). Further, the container shipping lines' strategic alliances (Alphaliner, 2020) attempt to create operational efficiencies and broader service exposure through economies of scale (e.g. the utilisation of bigger vessels) and scope (e.g. proposing a worldwide transport linkage by service consolidation of shipping lines) (Thai & Grewal, 2019). For example, the alliances among 2M, Ocean Alliance, and THE Alliance collectively hold 76.8% of worldwide container shipping market share (Thai & Grewal, 2019).

Given the Indonesian ports are heavily dependent on government supports, the terminal operators' investment in personnel and physical resources are adding further to those resources in container terminals. While these resources are very much common in nature, as such they form the source of competitive parity, if not advantage. Leveraging these common resources by effective bundling strategies, as we argue, creates VRIN resources. In the context of increasing consolidation in container shipping lines through three strategic alliances (Alphaliner, 2020), the finding that government support has a significant positive effect on terminal service performance through resource bundling strategies is particularly noteworthy. Specifically, having government supports, as another external resource, would enhance terminal operators' resource bundling capability and thereby in their ability to meet increasing expectations from shipping lines.

Common resources, sourced from government support and container terminals, have no value

in themselves unless they are optimally bundled. This study, therefore, has argued resource bundling strategies based on the principle of lean practices, relationship management, optimisation of logistics operations and information sharing mechanism. In effect, the terminals' personnel and physical resources, and government support are mobilised through bundling strategies. Lean practices consolidate information and knowledge about lean that helps identify and eliminate unnecessary movement of these resources, streamline document and container flow, and standardise terminal operations. Relationship management focuses on relational resources such as coordination between terminal operators, shipping lines, government agencies and inland transport operators to help reduce cost and ensure higher quality services through better understanding of customer requirements. The optimisation of logistics operations supports the view of resource utilisation of various intermodal operators for faster operations with greater cost saving. Further, information sharing helps bundle information resources within the terminals. For example, the ongoing workshops and professional development training use consolidated knowledge resources about logistics operations where people share their hands-on experiences and best practice examples.

### *5.1. Theoretical contributions*

Theoretically, this research contributes to the maritime literature in several ways. *First*, the study, underpinned by the RBV perspective of common resources, offers a framework that empirically investigates the role of resource bundling of common resources to improve container terminals' service performance. Resources such as government supports, and container terminal personnel and physical resources are commonly available, and the proposed bundling strategies can configure them into VRIN resources. This confirms the study of Wong and Karia (2010), who argue bundling of strategic resources for logistics service providers (LSPs) to gain competitive advantage. *Second*, this study contributes to RBV by proposing 'resource bundling strategies', measured through lean practices, relationship management, optimisation of logistics operations and information sharing, as mediator to enhance service performance. *Third*, this study suggests that government supports as a resource external to the terminal can provide skills and financial support to enhance the terminals' personnel and physical resources. Terminal performance can be improved by bundling of these resources that create VRIN resources. Such VRIN resources can directly improve terminal services by providing various incentives, funding infrastructure connecting to terminals, and help in promotional activities.

### *5.2. Managerial implications*

First, this study introduces terminal managers to the notion of common resources in contrast to VRIN resources, which have often been framed as the primary or exclusive source of competitive advantage. Managers need to be aware that a component of terminal resources are common, and that these can influence service performance through the appropriate bundling strategies that offer VRIN resources. Second, managers should note that resources can come from two sources: government supports, and container terminals. Given our findings on the role of government support, senior management should engage in dialogue with the government to secure their supports with the aim of enhancing service performance. Third, as common resources are limited and often scarce, managers must formulate strategies for allocation of these resources (Hsu et al., 2020) and bundle them judiciously with pre-existing resources to create VRIN resources.

## **6. Conclusion and limitations**

Drawing on the RBV perspective of common resources, the findings of this study indicate that resource bundling strategies mediate the relationship between container terminals' common resources and service performance. While most of the resources are basic and common, the bundling strategies can turn them into VRIN resources by lean practices (to add value), relationship management (to create relational rent), logistics optimisation (to optimize terminal processes) and information sharing (to inform and facilitate learning). We acknowledge some limitations of this study. For example, there remains a need to clearly define the distinction between common and VRIN resources. Also, this study was conducted in the context of container terminals in Indonesia. Therefore, generalising the findings to other container terminals elsewhere in the emerging economy must be made with caution. Future studies with a larger sample size should also consider age, experience, asset base, firm size and education level as control variables will likely moderate terminal performance.

### ***Acknowledgement***

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<insert Appendix 1>

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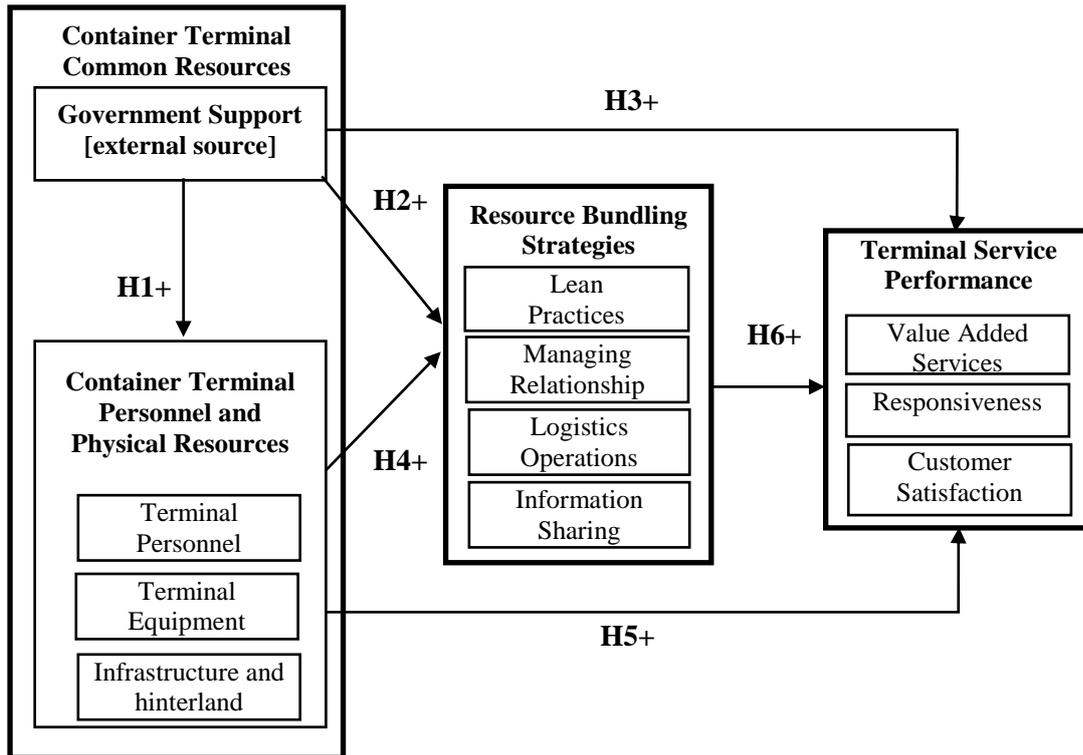


Figure 1 Conceptual framework

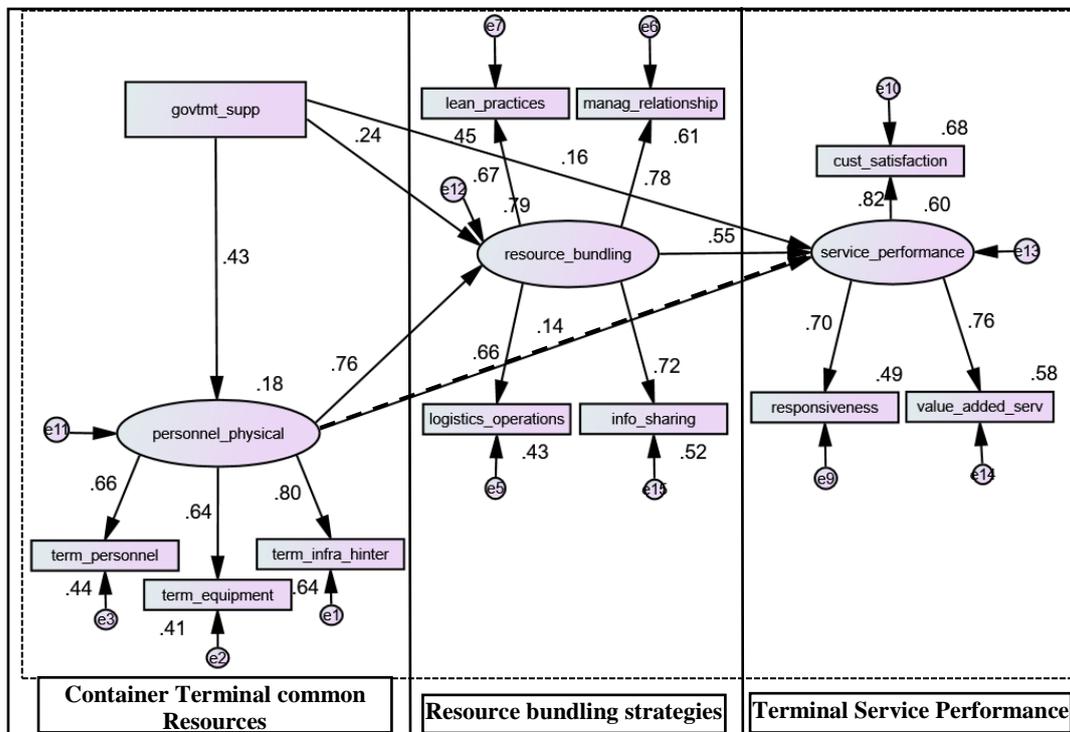
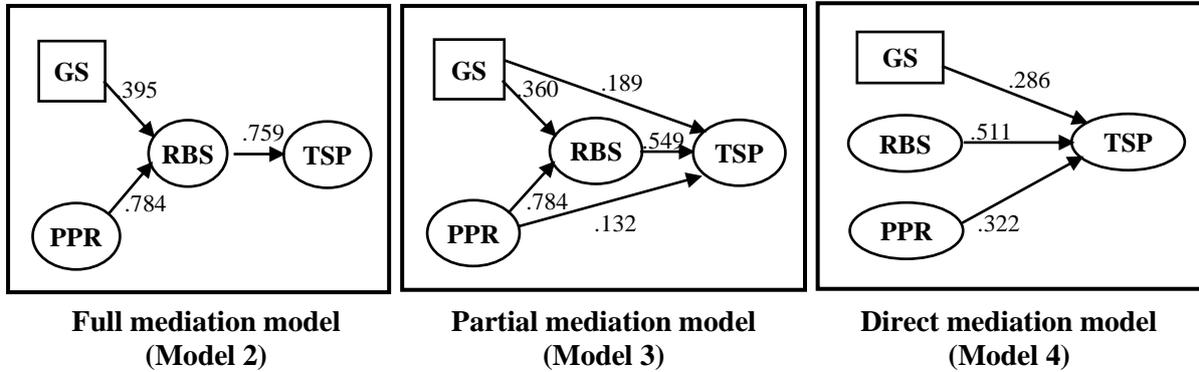


Figure 2 Structural path model



**Figure 3 Alternative mediation models**

Table 1 VRIN versus common resources

Attributes	VRIN resources	Common resources
Valuable	√	√
Rare	√	usually available
Inimitable	√	imitable
Non- substitutable	√	substitutable
Source	Internally/externally through interfirm partnership and strategic bundling of resources	Internally/externally through interfirm partnership
Advantage	Competitive advantage by bundling strategies	Competitive parity

Table 2 Demographic profile (N=216)

Department	Frequency	%	Education Level	Frequency	%
Human Resources	1	0.46%	High School	15	6.94%
Marketing	1	0.46%	Diploma	28	12.96%
Quality, Health & Safety	1	0.46%	Bachelor	140	64.81%
Finance	2	0.93%	Master	32	14.81%
Corporate Communication	3	1.39%	Doctoral	1	0.46%
General Affairs	3	1.39%	<b>Year of Experience</b>	Frequency	%
Legal and Commercial	4	1.85%	<5 years	56	25.93%
Management	6	2.78%	6 - 10 years	42	19.44%
ICT	12	5.56%	11 – 15 years	20	9.26%
Engineering	18	8.33%	16 – 20 years	66	30.56%
Operation	165	76.39%	>20 years	32	14.81%
<b>Position Level</b>	Frequency	%	<b>Work Experience</b>	Frequency	%
Director	1	0.46%	<5 years	74	34.26%

Department	Frequency	%	Education Level	Frequency	%
General Manager	1	0.46%	6 - 10 years	36	16.67%
President Director	1	0.46%	11 – 15 years	14	6.48%
Vice President Director	1	0.46%	16 – 20 years	70	32.41%
Senior Manager	2	0.93%	>20 years	22	10.19%
Senior Staff	7	3.24%	<b>Gender</b>	Frequency	%
Assistant Manager	11	5.09%	Male	195	90.28%
Manager	33	15.28%	Female	21	9.72%
Supervisor	159	73.61%			

### Appendix 1 Measurement scale, Cronbach Alpha, CR, AVE and factor loadings

Construct	Scale Items	Factor Loading	$\alpha$	CR	AVE	
<b>Government Support (GS)</b>						
<u>Government Support</u> Cai, Jun, and Yang (2010); Wang (2018)	the government provides support, incentive, policy and regulation in:					
	GS1	tolls and road network development	Item dropped in CFA			
	GS2	implementing best practices	0.887	0.941	0.942	0.804
	GS3	container transportation related ICT	0.947			
	GS4	logistics education system	0.892			
	GS5	financial support to build new container facilities	Item dropped in CFA			
	GS6	container logistics warehousing and storage	Item dropped in CFA			
	GS7	expedite import container logistics flow	0.858			
<b>Container terminal personnel and physical resources (PPR)</b>						
<u>Personnel</u> Chang and Thai (2016); Schellinck and Brooks (2015); Thai, Yeo, and Pak (2016)	our terminal operations have:					
	TP1	sufficient personnel	Item dropped in CFA			
	TP2	capable personnel	0.821	0.793	0.803	0.585
	TP3	certified personnel	Item dropped in EFA			
	TP4	reliable personnel	0.879			
	TP5	trustworthy personnel	0.554			
<u>Equipment</u> Chang and Thai (2016); Díaz-Reza et al. (2018); Tortorella and Fettermann (2018)	TE1	sufficient quantity of terminal equipment	0.849	0.900	0.911	0.673
	TE2	equipment is always ready to engage	0.894			
	TE3	reliable equipment	0.912			
	TE4	regularly modernize the equipment	0.717			
	TE5	regularly maintain the equipment	0.707			
<u>Terminal Infrastructure and Hinterland</u> Chang and Thai (2016); Thai (2008); Wang, Jung, Yeo, and Chou (2014)	IH1	berths available when the ships arrive	Item dropped in EFA			
	IH2	storage capacity in Container Yard (CY)	Item dropped in EFA			
	IH3	container handling capacity in CY	0.743	0.715	0.717	0.559
	IH4	container handling capability in the red channel	Item dropped in EFA			
	IH5	capability of exit gate operations	0.752			
	IH6	connectivity for ship and inland transportation	Item dropped in CFA			
	IH7	maintain channel depth/ length/ width	Item dropped in CFA			
<b>Resource bundling strategies (RBS)</b>						
<u>Lean practices</u> Prajogo, Oke, and Olhager (2016); Tortorella and Fettermann (2018)	implementation of methods and tools to reduce:					
	LP1	errors	Item dropped in CFA			
	LP2	unnecessary process stage	Item dropped in CFA			
	LP3	waiting time for customers	Item dropped in CFA			
	LP4	manual documentation	Item dropped in CFA			
	LP5	unnecessary movement of equipment/people	0.677	0.825	0.835	0.631
	LP6	delay in contingency plan to resume system downtime	Item dropped in CFA			
	LP7	delay of container and document flows	0.870			
	LP8	late operational procedures	0.823			
	LP9	slow feedback to update our operational procedures	Item dropped in CFA			
<u>Managing relationship</u> Feng, Wang, and Prajogo (2014); Prajogo et al. (2016); Prajogo and Olhager (2012)	MR1	We view shipping lines, government agencies and inland transport operators as strategic partners	Item dropped in CFA			
	MR2	build mutual trust with stakeholders	Item dropped in CFA			
	MR3	work with stakeholders to reduce cost and ensure higher service quality	0.772	0.888	0.891	0.732
	MR4	diagnose our external customers' requirements	Item dropped in CFA			
	MR5	Customer requirements are understood well	0.910			

Construct	Scale Items	Factor Loading	$\alpha$	CR	AVE	
	MR6	customers' requirements incorporated into services	0.879			
	MR7	customers' complaints are recorded	Item dropped in CFA			
	MR8	customers' complaints considered to improve services	Item dropped in CFA			
<u>Optimisation of logistics operations</u> Prajogo et al. (2016); Prajogo and Olhager (2012); Tortorella and Fettermann (2018)	IP1	performance of various transport modes are assessed	0.678	0.834	0.849	0.655
	IP2	alternative routes for more efficient transportation	Item dropped in CFA			
	IP3	members collaboration for cost optimization	0.839			
	IP4	competing channels are identified for cargo flow	0.896			
	IP5	benchmark the logistics/supply chain options	Item dropped in CFA			
	IP6	optimise cost for cargo to hinterland destinations	Item dropped in CFA			
<u>Information sharing</u> Blome, Schoenherr, and Eckstein (2014); Prajogo and Olhager (2012); Shee, Miah, Fairfield, and Pujawan (2018)	IS1	Use of knowledge transfer system	0.865	0.868	0.869	0.688
	IS2	team that continuously updates working knowledge	0.819			
	IS3	use of formal mechanisms to share best practices	0.803			
	IS4	share issues that affect each other	Item dropped in CFA			
	IS5	share business knowledge and processes	Item dropped in CFA			
	IS6	exchange information with our stakeholders	Item dropped in CFA			
	IS7	training and development courses for everyone	Item dropped in CFA			
	IS8	senior management encouragement to apply best practices	Item dropped in CFA			
	IS9	improvement of container processes and services	Item dropped in CFA			
<b>Terminal service performance (TSP)</b>						
<u>Services</u> Thai (2008); Blome et al. (2014); Chang and Thai (2016)	VAS1	terminal's service charges are competitive	Item dropped in CFA			
	VAS2	services charges are value for money	Item dropped in CFA			
	VAS3	lead time is appropriate to customer requirements	0.799	0.880	0.890	0.731
	VAS4	import container service delivery on time	0.910			
	VAS5	service performance delivers higher value	0.852			
	VAS6	container services are faster than competitors	Item dropped in CFA			
	VAS7	customized services to customers	Item dropped in CFA			
	VAS8	service offered to meet customers' need	Item dropped in CFA			
<u>Responsiveness</u> Thai (2008); Blome et al. (2014); Chang and Thai (2016); Schellinck and Brooks (2015)	R1	services development division for responsiveness	0.877	0.857	0.869	0.689
	R2	quick delivery of services to market	Item dropped in CFA			
	R3	first to introduce innovative services	0.791			
	R4	respond customer's import container related new service requirement	0.819			
<u>Customer satisfaction</u> Feng et al. (2014)	CS1	performance exceeds customers' expectation	Item dropped in CFA			
	CS2	always met customer service standards	Item dropped in CFA			
	CS3	customers are pleased with services	0.922	0.934	0.935	0.877
	CS4	customers are pleased with responsiveness	0.951			

Table 3 Construct correlation and discriminant validity (n=216)

	1	2	3	4	Mean	SD	$\alpha$	CR	AVE
GS	0.897				5.443	1.056	0.941	0.942	0.804
PPR	0.366	0.705			6.051	0.552	0.725	0.746	0.497
RBS	0.506	0.665	0.708		6.010	0.554	0.791	0.800	0.502
TSP	0.490	0.525	0.621	0.762	5.993	0.643	0.789	0.805	0.581

Diagonal values signify the square root of AVE. The correlation coefficients are under the diagonal.

Table 4 Path coefficients and mediation analysis

Structural paths	Stdzd. Reg	p-value	Model 1 <sup>a</sup>	Model 2 <sup>b</sup>	Model 3 <sup>c</sup>	Model 4 <sup>d</sup>
GS → PPR	.43	***				
GS → RBS	.24	***	.242*	.395*	.360*	–
GS → TSP	.16	.039**	.164**	–	.189	.286*
PPR → RBS	.76	***	.758*	.784*	.784*	–
PPR → TSP	.14	.489	.139	–	.132	.322*
RBS → TSP	.55	.015**	.550**	.759*	.549**	.511*
<i>Model fit statistics</i>						
$\chi^2$			91.106	126.776	123.061	284.949
df			39	42	40	42
CFI			0.946	0.912	0.914	0.749
RMSEA			0.079	0.097	0.098	0.164
TLI			0.924	0.885	0.882	0.671

\*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$

<sup>a</sup>Hypothesised model; <sup>b</sup>Full mediation model; <sup>c</sup>Partial mediation model; <sup>d</sup>Direct model

Table 5 Indirect and total effects

Constructs	GS		PPR		RBS		TSP	
	Indirect	Total	Indirect	Total	Indirect	Total	Indirect	Total
PPR	.000	.425	.000	.000	.000	.000	.000	.000
RBS	.326	.567	.000	.767	.000	.000	.000	.000
TSP	.392	.533	.531	.531	.000	.692	.000	.000

$p < 0.01$

Table 6 RBS as mediator

Item	Path coefficient	t-value	Path coefficient	t-value	Path coefficient	t-value	RBS as mediator
GS	<i>H2</i> GS → RBS		<i>H3</i> GS → TSP		<i>H6</i> RBS → TSP		Partial mediation
	.242 <sup>a</sup>	3.696*	.164 <sup>a</sup>	2.065**	.550 <sup>a</sup>	2.442**	
PPR	<i>H4</i> PPR → RBS		<i>H5</i> PPR → TSP		<i>H6</i> RBS → TSP		Full mediation
	.758 <sup>a</sup>	6.780*	.139 <sup>a</sup>	0.692 <sup>b</sup>	.550 <sup>a</sup>	2.442**	

\* $p < 0.01$ , \*\* $p < 0.05$

<sup>a</sup>: stand. coefficient

<sup>b</sup>: non-sig at 0.05