

The Effects of Dry Port–Seaport Integration on Seaport Performance: An Exploratory Study in Vietnam

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ABSTRACT

In the current global environment, where competition is increasingly between supply chains rather than among individual firms, supply chain integration (SCI) is more critical than ever. Effective SCI helps reduce unnecessary costs, thereby improving an organisation's competitiveness. Although many studies have found a positive relationship between SCI and the operational performance of the focal firm, integration between dry ports (DP) and seaports (SP), and the impact of this integration dyad on seaport performance, have not been well explored. This research addresses this gap by investigating the impact of DP–SP integration on seaports' operational performance as well as customer satisfaction, which in turn impacts seaport financial performance. Through a comprehensive literature review, a conceptual model was developed that comprises the key constructs examined in previous studies. 14 semi-structured in-depth interviews with key members of the Vietnamese maritime supply chain were conducted. The outcome aligns with the literature, which suggests that DP–SP integration in Vietnam could be examined through information integration, operational integration, relationship integration, and geographical integration. The integration could also lead to improvements in operations, customer satisfaction, and financial performance. These qualitative findings may help policymakers, port authorities, and operators in Vietnam formulate policies and strategies to improve port competitiveness. They can also serve as useful references for ports in other countries seeking to advance their DP–SP integration.

Keywords: dry port, seaport, integration, port service quality, customer satisfaction, firm performance.

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1 INTRODUCTION

In the maritime industry, the boundary between forelands and hinterlands among seaports has been blurred during the past decades due to the sustained increase in international trade and the establishment of multimodal supply chains (Ng et al., 2013; Rodrigues et al., 2021). Competitive seaports are those whose capability for the efficient movement of physical cargo and information flows excels that of others. To operate efficiently, some cargo processing activities, such as storage, consolidation, distribution, and customs brokerage, can be carried out at inland terminals before cargo is transferred to seaports. Thus, in such circumstances, the integration between seaports and their business partners in the hinterland, i.e. dry ports, is an optimal solution to facilitate physical cargo flows and administrative activities of seaports in the chains (Roso et al., 2009; Ivanov, 2024; Zain et al., 2022). Such integration falls within the realm of supply chain integration, which has been a topic of research in the extant literature.

Flynn et al. (2010) defined supply chain integration (SCI) as the degree to which a focal company strategically collaborates with its supply chain partners and collaboratively manages intra- and inter-organizational processes. SCI is also considered one of the potential tools for management to generate competitive advantages for organisations (Flynn et al., 2010; Liao et al., 2017; Hendijani & Saeidi Saei, 2025).

An organisation taking advantage of SCI could complement its resources with those of its partners and, thus, improve the performance of both organisations. Flynn et al. (2010) analysed the relationship between SCI and firm performance and found that there are differences in terms of measurement dimensions. While some defined SCI as integrated flows of materials and parts, others focused more on flows of information, resources and cash (Flynn et al., 2010; Tseng & Liao, 2015; Ivanov, 2024). While SCI was defined by some as a formalised process of partnership or collaboration (Cao et al., 2010), others viewed SCI as a set of practices that involve shared resources and shared information across internal departments and external organisations (Swink et al., 2007). Although there were differences, the relationship is generally positive.

As evidenced in the literature, the construct of SCI can ultimately be collapsed into three categories, namely, customer, supplier, and internal integration. Customer and supplier integration are commonly referred to as external integration, which is the degree to which a firm partners with its external partners to structure inter-organizational strategies, practices and processes into collaborative, synchronized processes (Flynn et al., 2010).

Customer integration involves core competencies derived from the coordination with critical customers, whereas supplier integration involves core competencies related to the coordination with critical suppliers (Yuen & Thai, 2016). In contrast, internal integration focuses on coordinating activities across various business units within a firm. In the context of the maritime supply chain, dry ports are essential as integral nodes to enhance seaport efficiency in many aspects; for example, solutions for seaport terminal congestion (Roso, 2007; Roso et al., 2009; Bergqvist, 2013; Zain et al., 2022), reduction of freight costs (Bergqvist, 2013; Henttu & Hilmola, 2011; Lättilä, Henttu et al., 2013; Rodrigues et al., 2021), contribution to a better ecological environment (Roso, 2007; Song & Panayides, 2008; Trupac & Twrdy, 2010) and so on. However, these studies mainly examined the use of dry ports in terms of helping seaports' matters in developed countries, while empirical research on the dry port–seaport integration and its effects on seaport performance is scarce, especially in developing countries. Besides, existing studies mainly focus on seaport operational performance, while the effects of dry port–seaport integration on seaport customer performance are not well investigated.

In summary, the existing literature lacks knowledge on how the integration between dry ports and seaports, key players in the maritime supply chain, affects seaports' performance, specifically service quality and customer satisfaction. Customer performance, as one of the important dimensions of seaports' performance,



could possibly be influenced by the way seaports integrate with their key supply chain partner – dry ports. This paper, therefore, addresses the literature gap by exploring the integration between dry ports and seaports and investigating how the integration impacts seaport performance in Vietnam. The remainder of the paper is organised as follows. Section 2 reviews relevant literature on supply chain integration and that in the maritime supply chain sector, which leads to the conceptual model developed in Section 3. The methodology of this research, including sampling and data collection, is discussed in Section 4, while Section 5 elaborates on the data analysis and key findings. Finally, Section 6 summarises the findings, discusses academic and managerial implications, and outlines limitations as well as directions for future research.

2 LITERATURE REVIEW

Recent years have seen an increase in research on dry ports within the maritime sector; however, scholars have focused on the definition of a dry port (Roso et al., 2009) and its roles (Cronje et al., 2009; Roso, 2013), functions and operation modes (Jaržemskis & Vasiliauskas, 2007; Nguyen & Notteboom, 2016). Studies investigating the integrated relationship between dry ports and seaports are relatively few in number. Jeevan and Roso (2019) studied the relationship in which dry ports play a supporting role in enhancing seaports to meet the increase in vessel size; however, this study is the first to explore the unique resources resulting from DPSP-I (in which dry ports are supposed to be key partners of seaports) and how these resources impact seaport performance in terms of port service quality, customer satisfaction, and financial performance.

Although there is scant literature on the relationship between dry ports and seaports, these are critical nodes in the maritime supply chain. As research on SCI spans decades across a variety of areas, the study of the integration between dry ports and seaports is situated within the supply chain context. Therefore, the literature, including that related to SCI, the supply chain in the port sector, and DPSP-I, is reviewed before a conceptual model and hypotheses concerning the effect of this integration on seaport performance are proposed.

2.1 Supply Chain Integration: Definition and Measurement

Supply chain integration (SCI) is broadly defined as the extent to which a firm integrates internal functions and strategically collaborates with external partners, including suppliers and customers, to manage intra- and inter-organisational processes (Flynn et al., 2010). Drawing on the notion of integration as the unified control of previously independent processes (Webster, cited in Flynn et al., 2010), SCI emphasises coordinated flows of products, information, and resources to deliver superior customer value at lower cost and higher speed (Ivanov, 2024). Central to this concept is strategic collaboration, which fosters trust, long-term relationships, and effective sharing of information, risks, and rewards (Zhou & Benton, 2007; Wakolbinger & Cruz, 2011), as well as the alignment of both operational and strategic objectives (Sanders, 2008). However, the measurement of SCI remains inconsistent across the literature, with studies adopting diverse approaches, including internal–external (geographical) dimensions (Flynn et al., 2010), content-based dimensions such as information and resource integration, and multi-dimensional frameworks incorporating coordination, resource sharing, and organisational linkages (Alfalla-Luque et al., 2013).

This lack of consensus reflects the complexity of SCI and highlights the need for context-specific measurement frameworks (Tarifa-Fernandez & De Burgos-Jiménez, 2017). In the context of maritime supply chains, particularly the integration between dry ports (DP) and seaports (SP), SCI requires a tailored approach that captures the interactions among multiple stakeholders, such as port authorities, shipping lines, freight forwarders, and shippers, in order to provide a more comprehensive and accurate assessment of integration.

Definition of SCI

Building on the existing literature, Flynn et al. (2010) propose SCI as a construct encompassing integration among various functional business units within a manufacturer (internal integration) and extending in both upstream and downstream directions (supplier and customer integration). The term 'integration' is defined as 'the unified control of a number of successive or similar economic or especially industrial processes formerly carried on independently' (Webster, cited in Flynn et al. 2010, p. 59). The term is applied in the supply chain context to define SCI as the degree to which a manufacturer strategically collaborates with its supply chain partners and collaboratively manages intra- and inter-organisational processes. Thanks to SCI, the effective and efficient flow of products and services, information, money, and decisions to provide maximum value to the customer at low cost and high speed is achievable (Flynn et al., 2010, Ivanov, 2024). There are several vital elements in this definition. First, strategic collaboration, which is an ongoing partnership, is essential in order to achieve mutually strategic benefits. It engenders mutual trust, increases contract duration, and encourages efficient conflict resolution and sharing of information, rewards, and risks (Zhou & Benton, 2007; Wakolbinger & Cruz, 2011). Strategic collaboration leads to not only operational but also strategic benefits, while operational collaboration provides operational benefits (Sanders, 2008). Second, this definition also emphasises intra- and inter-organisational processes, since SCI is comprehensive and encompasses a variety of activities, including many that are focused on materials, transportation, and administrative tasks (Liao et al., 2017). Finally, SCI emphasises the customer-facing nature of the partnership, stating that its primary objective is to provide maximum value for the customer (Yu et al., 2013).

Dimensions of SCI

Although SCI has been studied intensively in the literature over the past few decades, its definition and measurement vary. Focusing on the SCI framework, Alfalla-Luque et al. (2013) conclude, after reviewing 36 journal articles, that there is a lack of clear definitions and understanding of the concept of SCI, and that a great variety of dimensions and variables and a broad spectrum of scales have been used for measuring it. Tarifa-Fernandez and De Burgos-Jiménez (2017), who reviewed 72 relevant studies, came to a similar conclusion – that there is a lack of consensus on measuring SCI, whether as a unidimensional or multidimensional construct, or as a set of practices used to evaluate the integration of a supply chain.

These differences in measuring SCI can be illustrated by several studies. For example, Rosenzweig et al. (2003) used a five-point categorical scale (from 'none' to medium and high levels) to measure SCI through the responses to a question asking about: (a) integration within the organisation (e.g. cross-functional management), (b) integration with raw material suppliers, (c) integration with distributors/retailers, and (d) integration with customers. This form of question raises a methodological issue, as different participants may have different perceptions of integration. Many other researchers, like Lii and Kuo (2016), have used sets of indirect questions relating to two main categories, internal and external integration, while yet others have focused on particular content – for example, Gu et al. (2017) focused on information integration.

A comprehensive review of the literature over the last two decades shows three main groups of studies. The first group measures SCI using geographical dimensions, i.e. internal and external integration (supplier and customer). The second group uses the content of integration as the dimensions: information integration, resource integration, operational integration, etc. Such differences may be seen in a review by Alfalla-Luque et al. (2013). In this paper, the authors propose a framework for evaluating SCI using three dimensions – information integration, coordination and resource sharing, and organisational relationship linkage – each with three sub-criteria: with customers, internal, and with suppliers. Taking another approach, Cao et al. (2010) viewed SCI as the collaboration between different actors participating in the supply chain and conceptualised supply chain collaboration according to seven interconnecting elements: (i) information sharing, (ii) goal congruence, (iii) decision synchronisation, (iv) incentive alignment, (v) resource sharing, (vi) collaborative communication, and (vii) joint knowledge creation. Although these elements (or dimensions) are defined in the study, it should be realised that clear differentiation between them may be difficult to achieve; for example, between information sharing and collaborative communication.



It may be seen through reviews of SCI measurement (Alfalla-Luque et al., 2013; Tarifa-Fernandez & De Burgos-Jiménez, 2017) that many differences exist between these studies regarding SCI definitions and measurement criteria. A possible reason for this is that SCI is much more complex than these studies assume; the current study, therefore, argues that SCI measurement should be individually characterised and contextualised for each sector of the supply chain. It is essential to develop an instrument to measure SCI for the maritime supply chain in any research on these issues in this sector.

The literature review also raises concerns about the evaluators of SCI in previous studies. In most of the studies reviewed, the participants selected for the evaluation of SCI are manufacturers. In other words, in these studies, the researchers focused only on the focal firms of the supply chain. The lack of supplier and customer voices makes the evaluation of SCI in these studies unilateral, as it is based on self-report rather than triangulated data. The participation of different stakeholder groups as evaluators of SCI will enhance the quality of a study. For example, incorporating other players in the maritime supply chain, like shipping lines, freight forwarders and shippers, in assessing SCI between dry ports and seaports could strengthen research findings.

2.2 Supply Chain Integration in the Port Industry

As the maritime supply chain has a critical role in facilitating international trade and globalisation, thanks to its large-volume shipments over long distances at low costs, research on the effective performance of the maritime supply chain in general, and the efficiency of shipping lines in particular, has been undertaken by scholars for past decades. As is well established, a container shipping firm has to maintain an abundance of good relationships with both suppliers and customers to achieve good performance (Thai & Jie, 2018); integration is a central tenet of maritime logistics, particularly in transportation modes and between partners along the global supply chain (Panayides, 2006). In recent years, shipping companies have integrated both horizontally (through mergers, acquisitions and strategic alliances) and vertically (through operating dedicated terminals and by providing integrated logistics and intermodal services) (Panayides & Cullinane, 2002; Notteboom, 2004; Agarwal & Ergun, 2010; Gao & Yoshida, 2013; Divyaranjani, 2018).

Studies on the integration between ports, as nodes in the maritime supply chain, have been slower to attract interest and are still few in number, meaning that SCI in maritime logistics is similarly under-studied (Panayides & Song, 2009; Woo et al., 2013; Seo et al., 2015; Kurtuluş & Çetin, 2016). It is noticeable through reviewing the literature that, as in other sectors, SCI in the maritime sector has been constructed and measured in diverse ways, and a consensus on the parameters, items, components or criteria with which to measure integration between a port or terminal and other counterparts or port users is lacking.

For example, recognising that empirical work on the integration of ports or terminals in supply chains was limited, Panayides and Song (2009) proposed a model of SCI measurement including four parameters: (i) information and communication systems, (ii) value-added services, (iii) multimodal systems and operations, and (iv) SCI practices. In order to validate this model, they developed a questionnaire consisting of 19 indirect questions relating to these four parameters and distributed this questionnaire to 440 employees of container terminals in Europe and the Asia-Pacific region.

In a later study by Woo, Pettit and Beresford (2013), Panayides and Song's (2009) model was revised to include five components measuring port SCI: (i) information and communication systems, (ii) long-term relationships, (iii) value-added logistics services, (iv) intermodal transport services, and (v) SCI practices. Port SCI was then evaluated by the responses of ports, shipping companies and freight forwarders to a questionnaire relating to these five components. In a more recent study by Kurtuluş and Çetin (2016), the model of Panayides and Song (2009) was again developed, here into a model comprising four components to measure container terminal SCI: (i) relationship with terminal users, (ii) information and communication systems, (iii) value-added services, and (iv) multimodal systems and operations. The participants in this study were employees responsible for port and/or terminal operations at liner agencies, shipping lines, freight forwarders, logistics service providers and other container terminal user companies.

Meanwhile, Seo et al. (2015, p. 292) also found through their literature review that 'few valid and reliable instruments are available to measure accurately and objectively the multiple dimensions of supply chain collaboration in maritime logistics contexts'. With an assumption that supply chain collaboration more aptly captures joint relationships in the maritime industry than SCI, they constructed a supply chain collaboration model in container logistics including five components focusing on the relationship between ports and port users: (i) information sharing, (ii) knowledge creation, (iii) goal similarity, (iv) decision harmonisation, and (v) joint supply chain performance measurement. The participants in this study were not only terminal operators but also shipping lines, inland transport companies, freight forwarders, ship management companies and third-party logistics providers.

It is obvious that the lack of consistency in the literature can be observed in a number of studies over the past ten years relating to SCI in maritime logistics.

2.3 Research into Dry Port–Seaport Integration

Following certain prior definitions of dry/inland ports, such as those by Jaržemskis and Vasiliauskas (2007); Roso et al. (2009); Lättilä et al. (2013); Bask et al. (2014); Awad-Núñez et al. (2016); Roso et al. (2019) and Varese et al. (2020), as well as Rodrigues et al. (2021), the term 'dry port' is understood in the current study to refer to an inland terminal where shippers can leave and/or collect standardised units (containers) and clear import and export customs formalities for their shipments, as at a seaport. A dry port may also provide various value-added services for cargo, such as stuffing/unstuffing, packaging and labelling.

In the context of the rapidly increasing volume of cargo transported through seaports, there is a growing need for dry ports to act as the extended gates of seaports (Roso, Woxenius and Lumsden, 2009; Veenstra et al., 2012; Khaslavskaya & Roso, 2020; Zain et al., 2022) or as modern logistics centres, with customs declaration, inspection, quarantine and other port service functions, to reduce traffic congestion around city terminals, pollutant emissions and logistics costs (Wei & Sheng, 2017; Khaslavskaya & Roso, 2020; Zain et al., 2022). Some researchers go further to claim that what takes place inland will shape the future of containerised maritime transport (Notteboom & Rodrigue, 2009) or that 'seaports will revert back to being nodes for cargo handling and transshipment, and will lose their role as logistics nodes' (Veenstra et al., 2012, p. 30). In this context, research on DPSP-I and its effects on seaport performance is necessary to develop such dyads.

A review of the literature reveals scant research on the integration or collaboration of dry ports and seaports. Using certain key words, i.e. 'supply chain integration', 'maritime logistics', 'seaport' and 'dry port' or 'inland terminal', most earlier studies have focused on container shipping integration, and none relate to the integration of seaports and dry ports or inland terminals. In a study by Song and Panayides (2008), one of the parameters used to find the relationship between the integration and competitiveness of a seaport was 'relationship with inland transport operators', with six questions answered by seaport operators. In another recent study, it was argued that there is currently very little research on the model of the seaport–dry port dyad for the development of a dry port–seaport supply chain (Bask et al., 2014; Jeevan & Roso, 2019). These researchers concluded that integration/collaboration could be driven from the inland terminal side, from the seaport side, or from both, and that mutual understanding and collaboration among the different actors involved in this supply chain will decide the level of development of a dry port–seaport dyad. However, they emphasised that measuring the collaboration between these ports and other actors involved in the relationship can be challenging.

There has been little research into DPSP-I or collaboration in the current context, and the literature is very divergent in terms of the definition and measurement of SCI. A conceptual model of DPSP-I is very necessary in order to examine the collaboration of these two nodes or players in the maritime logistics supply chain. Such a model may help to ease the difficulty in evaluating the integration of the dry port–seaport dyad and in studying the relationship between this integration and different factors of dry port and seaport performance.



2.4 SCI and Its Effects on Port Service Quality

2.4.1 Port service quality

There has never been a universal definition of the concept of quality and its associated dimensions in general as well as in maritime transport (Thai, 2008); however, it is noticed in Table 1 that one of the most important aspects of a firm's performance is its service quality in meeting customers' demands.

In this connection, numerous studies have been conducted to measure and improve service quality in business to meet customers' demand for higher service quality; however, such studies in the maritime industry are not only scant but also somewhat divergent (Yuen & Thai, 2016). For example, Compés López and Poole (1998) used three dimensions, namely: 'efficiency', 'timeliness' and 'security' to measure port service quality; meanwhile, Ha (2003) used seven dimensions to evaluate service quality factors at 15 major container ports, namely 'information availability of port-related activities', 'port location', 'port turnaround time', 'facilities available', 'port management', 'port costs' and 'customer convenience'. Some authors like Ugboma et al. (2004) stated that SERVQUAL dimensions, developed by Parasuraman et al. (1985) for measuring service quality in general business, were suitable for measuring port service quality, while some other researchers, such as Kim and Cho (2010) developed a tool for measuring port service quality by using three dimensions: 'endogenous quality', 'exogenous quality' and 'relational quality'. The divergence in the research into measuring service quality suggests that such measurement should be developed and validated accordingly to each specific sector.

In an attempt to specify the measurement of port service quality, Thai (2008) explored the concept of service quality in the maritime industry, developed and validated a measurement model named ROPMIS, which was employed by a number of later studies, such as Yuen and Thai (2015) and Thai (2016). ROPMIS consists of six dimensions: 'resources', 'outcomes', 'processes', 'management', 'image' and 'social responsibility'. This measurement model provided a holistic view of port service quality; however, with regard to meeting customer expectations, the most important dimension could be the 'outcomes' dimension. The description of the 'resources-related dimension' as equipment and facilities availability and condition, financial stability, shipment tracing capability, and physical infrastructure focused much on the port facility condition with the assumption that this condition would probably create port service quality. This argument leads to the question of whether port staff quality is another dimension of port service quality or whether it is the 'process-related dimension' which was equated with attitude, behaviour, and customer understanding of staff, leaving alone staff professional knowledge and skills. Another issue with the ROPMIS is the 'image and social responsibility-related dimension' because it is argued that the image and social responsibility of a port are cumulative as a result of the port development over a long period of time, and this image also depends much on social viewpoints and perceptions of quality. Therefore, if service quality is meeting or satisfying customers' requirements/expectations, the 'outcome-related dimension' of the ROPMIS should be more focused on than the other dimensions.

2.4.2 SCI and port service quality

Although research into the relationship between SCI and firm performance is extensive, such research in the sector of maritime logistics is still scant. In a study which is somehow related to this issue, Cheng and Choy (2013) found a positive relationship between quality management practices and organisational performance in the shipping industry. In another study conducted by Yuen and Thai (2017), it was found in the literature that integration with ports and freight forwarders brings shipping firms closer to their customers and improves the overall quality of logistics services. Although there has been little research into the special relationship between SCI and port service quality, the findings in the manufacturing sectors suggest a certain relationship between dry port–seaport integration and the seaport's performance.

2.5 SCI and Its Effects on Customer Satisfaction

2.5.1 Customer satisfaction

Customer satisfaction is the result of customers' perception of the value received in a transaction or a relationship, and it can be seen as customers' response pertaining to a particular focus or at a particular time (Jahanshahi et al., 2014). According to Olsen and Johnson (2003), there are two types of customer satisfaction, i.e. (i) transaction-specific satisfaction defined 'as a customer's evaluation of his or her experience with and reactions to a particular product transaction, episode, or service encounter' and (ii) cumulative satisfaction defined 'as a customer's overall evaluation of a product or service provider to date'. In alignment with many studies in the literature, herein we use cumulative satisfaction because this definition is a more fundamental conceptualisation of the past, current, and future performance of a supply chain (Yu et al., 2013). Customer satisfaction is the main driving force in the market, and therefore a high level of customer satisfaction is regarded as a key element for the success of a business. This is the reason why customer satisfaction has been intensively studied in the literature.

2.5.2 Supply chain integration and customer satisfaction in the port sector

In the transport industry, several studies have focused on finding the relationship between customer satisfaction and other factors pertaining to a supply chain such as timeliness, freight costs, cargo safety and security, complaints, information, order acceptance, cargo receipt and delivery, which were used as criteria to evaluate customer satisfaction in a rail door-to-door transport service (for example, see Tang & Sun, 2015). In another study, in order to find the relationship between port service quality and customer satisfaction, Thai (2016) used five measurement items to evaluate cumulative customer satisfaction with port services, i.e. relating to infrastructures, management and employees, service quality, continued use of services, and recommending the services to other partners.

Although customer satisfaction has been intensively studied and well defined and measured in the literature, research on factors relating to customer satisfaction in the supply chain is still limited, especially those between supply chain integration and customer satisfaction in the dry port–seaport maritime supply chain context.

Since customer satisfaction is one of the most crucial factors that decide the existence of any business, the lack of understanding about the link between dry port–seaport integration and customer satisfaction may result in the lack of effort and commitment in enhancing integration in this supply chain. Until recently, studies on the relationship between customer satisfaction and port SCI in the maritime logistics context have not been identified. Therefore, it is necessary to conduct such studies to explore this link and include voices from different players participating in this type of supply chain to derive more robust findings.

2.6 Service Quality and Customer Satisfaction

Research has found that customer satisfaction is positively related to the quality of products or services provided to the customer – that is, the level of customer satisfaction increases along with the level of positive product (or service quality) experience the customer has. Many prior studies have examined the relationship between service quality and customer satisfaction in many service sectors and have confirmed this positive relationship (see, for example, Santouridis & Trivellas, 2010; Liao, 2012). In the transport sector, a small number of studies have researched the relationship between service quality and customer satisfaction in aviation (Anderson et al., 2009) and high-speed trains (Cao & Chen, 2011); these have found that the relationship is positive and significant. Other researchers have expanded the discussion of service quality and customer satisfaction to include other marketing variables. Chen and Hu (2013) found that



service quality has positive effects on relational benefit and customer loyalty in the airline industry; while relational benefit influences customer loyalty directly, service quality also affects customer loyalty through customer relational benefits. Most recently, in the hotel and hospitality sector, Nunkoo et al. (2020) and Ali et al. (2021), have also found that service quality significantly influences customer satisfaction. These results are in line with the study conducted on travel agencies by Setó-Pamies (2012), which revealed that loyalty depends on the customer's degree of satisfaction and trust, and that satisfaction is, in turn, influenced by service quality. Elsewhere, satisfaction can be either a factor mediating the indirect relatedness of service quality to customers' behavioural intentions (Rajic & Dado, 2013) or an outcome of service quality via relationship quality (Chang et al., 2016).

Due to the limited availability of studies in the port industry, more recently Thai (2016) and Chang and Thai (2016) used the ROPMIS model for measuring port service quality. They used four criteria – satisfaction with port facilities, management and employees; satisfaction with port service quality; intention to recommend port services; and intention to continue using port services – to measure customer satisfaction. Both studies found that port service quality has a direct and positive impact on both customer satisfaction and customer loyalty.

2.7 SCI and Its Effects on Port Financial Performance

Firm performance has been studied extensively in the literature as reviewed by Tarifa-Fernandez and De Burgos-Jiménez (2017). According to these authors, firm performance could be seen from many different perspectives across a range of disciplines, and this has led to a proliferation of approaches to the development of firm performance measures. Different groups of managers, for example, accounting, marketing, human resource divisions, and corporate strategy, are likely to develop different sets of firm performance measures which could be mainly divided into financial performance and non-financial performance. While the profit-based (financial) measures are widely used to provide financial data and advice to a company in management and administration, non-profit-based measures help in strategic decision-making for long-term goals (Chenhall & Langfield-Smith, 2007). In some other studies, non-financial performance could be divided into a variety of sub-categories; for example, operational and strategic performance (Fabbe-Costes & Jahre, 2008), or operational, relational, and strategic performance (Chang et al., 2016).

The same observation is also evidenced in the context of maritime transport, in which different port performance indicators are proposed depending on different perspectives. From the perspective of different port stakeholders, Ha et al. (2019) found that reconciling the conflicts of internal and external port stakeholders is really challenging. Three groups of port stakeholders, i.e. port operators, port users, and port administrators, with hundreds of port performance indicators insufficiently developed from some perspectives (Ha et al., 2019; Rezaei et al., 2019), make port performance even more complicated.

Ports can be seen as a part or node of different transport chains, and the ambition to evaluate a port's performance by all indicators from all perspectives is unrealistic. In this connection, container terminals operators see financial performance as a fundamentally significant measure related to the cost efficiency of container terminals (Ha et al., 2019). Thus, as suggested by Chang et al. (2016), seaports' revenue, service cost, and profit are adopted in this study as three seaport performance indicators so as to evaluate seaports' financial performance.

2.8 Customer Satisfaction and Port Financial Performance

A number of studies have found a positive relationship between customer satisfaction and financial performance (Yu et al., 2013; Hairuzzaman, 2019). This study argues that customer satisfaction, as the proof that customers' wants and needs have been understood, increases customer loyalty, which, in turn, helps a firm to ensure a steady stream of future customers and cash flow. Conducting research into this relationship in the manufacturing sector in China, Yu et al. (2013) used a survey questionnaire in which customer satisfaction was evaluated by overall customer satisfaction, after-sales service satisfaction and customer expectation, and financial satisfaction was evaluated by growth in sales, growth in profit, growth in market share and return on investment. The study found a mediating effect of customer satisfaction on the relationship between customer integration and financial performance. Although there has not been much research into this relationship in the sector of maritime logistics, the findings of Yu et al. (2013) and Hairuzzaman (2019) suggest that the same relationship may exist between port user satisfaction and port financial performance.

3 THEORETICAL UNDERPINNING AND CONCEPTUAL MODEL DEVELOPMENT

3.1 Theoretical Underpinning

In general, SCI is considered as a managerial tool to generate competitive advantages in an organization under a strategic view (Flynn et al., 2010). Under Porter's (1985) perspective, an organisation could be competitive over its competitors when it can create a defensible position compared to them. Therefore, the maximization of the firm's benefit would be put as a priority under this perspective. However, SCI involves joint decision-making among interdependent firms, where competitive advantage is increasingly derived from collaboration and coordinated value creation at the network level rather than solely from individual firm positioning, taking into account a joint decision-making process among firms in which the decision-making implies a consideration of the advantage at an integrative level to produce mutual benefits (Flynn et al., 2010).

In this way, the roots of competitive advantage in inter-organisational arrangements can be approached mainly through two perspectives: resource-based view (RBV) and transaction cost economics (TCE).

According to transaction cost economics (TCE) theory, hierarchies and markets are two ways to organise firms' activities (Williamson, 1975). The decision to use either vertical integration/hierarchies or market mechanisms depends on the monitoring costs that arise from bounded rationality and uncertainties due to partners' self-interest and opportunism (Kaufman et al., 2000). SCI helps firms reduce the costs of opportunism and monitoring that are inherent in market transactions through process integration and mutual trust, thus increasing the probability that partners behave in the best interest of the partnership (Kaufman et al., 2000). SCI also helps firms avoid internalising an activity that may not be aligned with their competencies (Harrigan, 1988). Thus, SCI can be interpreted as a hybrid governance structure that lies between pure market exchange and full vertical integration, improving efficiency without necessarily internalising activities that fall outside core competencies.

Meanwhile, the resource-based view (RBV) theory argues that variance in firm performance can be explained by strategic resources, such as core competence (Prahalad & Hamel, 1990), dynamic capability (Teece et al., 1997), and absorptive capacity (Cohen & Levinthal, 1990). Firms that combine resources in a unique way may achieve an advantage over competing firms who are unable to do so (Dyer & Singh, 1998). RBV claims that investing in relation-specific assets and combining complementary and scarce resources can create unique products and services (Knudsen, 2003). The embedded nature of the partnering firms' relational



assets and the causal ambiguity make it difficult for their competitors to imitate them (Jap, 2001). Extending RBV to the inter-organizational level, relational resources such as trust, joint routines, and relation-specific investments can generate relational rents. These embedded relational assets are causally ambiguous and socially complex, making them difficult for competitors to imitate. SCI allows firms to focus on what they do best and contribute to the value-adding process of the supply chain (Park & Ram, 2004) and thus can become a relation-specific asset positively influencing firm performance.

Importantly, TCE and RBV are not contradictory but complementary. TCE primarily addresses efficiency and governance alignment (cost minimization and risk mitigation), while RBV explains value creation and sustained competitive advantage (resource recombination and capability development).

Using only TCE would overemphasise cost reduction, while relying solely on RBV would under-address coordination risks and contractual hazards. Their integration enables the framework to simultaneously capture governance efficiency and relational capability development.

3.2 The Proposed Conceptual Model

The relationship between a dry port and a seaport is more special than many other relationships in terms of integration or collaboration because this is a bidirectional logistics relationship. Either a dry port or a seaport can be a supplier and customer to each other, and cargo moves in both directions of the supply chain. Therefore, measuring the integration of this bidirectional logistics system could be different from that of SCI in other areas where the measurement only focuses on the core node itself, i.e. a manufacturer, a port, or a container terminal.

Such structural interdependence intensifies both transaction risks (TCE logic) and the potential for relational capability development (RBV logic). Consequently, measuring integration in this context requires a broader system-level perspective rather than focusing on a single focal firm. Based on the complementary theoretical foundations of TCE and RBV, the proposed conceptual model conceptualises dry port–seaport integration as a multidimensional construct reflecting both governance efficiency and relational capability development.

Based on the literature reviewed and the underpinning theories, a conceptual model to measure the integration of dry port–seaport systems and its effects on seaport customer performance is proposed in Figure 1.

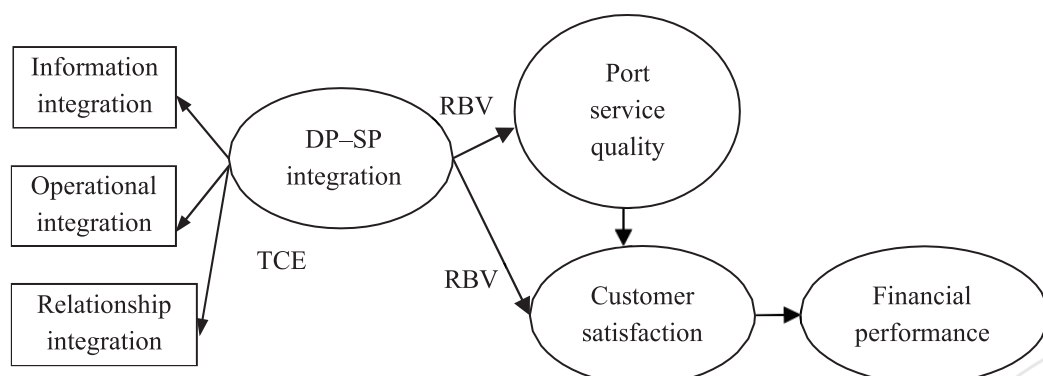


Figure 1. Conceptual model.

A measurement framework for the evaluation of DPSP-I, CS, and PSQ is described in Table 1.

Table 1. Research variables and measurement items.

Construct	Dimensions	Definitions	Measurement	Adopted literature
DP-SPI	Information integration	Information integration refers to the sharing of information, including strategic and operational information, and the way it is shared	Providing the accessibility, accuracy and timeliness of necessary information involved in the planning and operation processes to the partner	Fawcett, Magnan, & McCarter (2008), Seo et al. (2015), Woo et al. (2013), Song and Panayides (2008)
			The seaport's information system is compatible with the dry port's information system	
			The seaport and the dry port share information that may enhance the effectiveness of the integration	
			The seaport and the dry port often work together to improve cooperation in information sharing	
	Operational integration	Operational integration refers to any joint activities, work processes, and decisions that are collectively performed by a group of	The seaport and the dry port work together to recognize and concert joint strategies to match the logistical demands of end customers	Tongzon et al. (2009), Flynn et al. (2010) Cao et al. (2010)
			The seaport and the dry port work together to implement incentive schemes to optimise total supply chain profits	
			The seaport and the dry port work together to implement incentive schemes to meet customer requirements	



Construct	Dimensions	Definitions	Measurement	Adopted literature
		internal departments or firms in the supply chain. (Devaraj et al., 2007)	The seaport shares with the dry port information pertaining to cost, capacity constraints, and demand forecasts The seaport and the dry port support each other to improve operational ability and capability	
		Refers to the adoption of a strategic connection between firms in the supply chain by improving trust, commitment, and long-term orientation (Dyer & Hatch, 2006)	The seaport values the input and output of the dry port in providing quality services that suit supply chain needs The seaport and the dry port have long-term collaborative contracts (e.g. slot-sharing, alliances, and service contracts) The seaport invests in specific equipment, capacity, and personnel to support the relationship with customers and the dry port The collaborative relationship between the seaport and the dry port has conditions to be much better in the coming years	
Operational performance	Outcomes	Involves the services being received by customers, for instance, service performance such as the on-time delivery of a shipment or the price of the	The seaport provides fast service	Thai (2008); Homburg et al. (2013); Thai (2016); Yuen & Thai (2015)
			The seaport provides service in a reliable manner	
			The seaport provides service in a consistent manner	
			The seaport ensures safety and security for ships/shipments	
			The seaport produces error-free invoices and related documents	
			The seaport offers competitive prices for its	

Construct	Dimensions	Definitions	Measurement	Adopted literature
		services offered	service	
	Process	Relates to factors regarding the interaction between employees and customers	The seaport provides a professional attitude and behaviour	
			The seaport quickly responds to customers' enquiries and requests	
			The seaport has a good knowledge of customers' needs and requirements	
			The seaport has a level of ICT applications in customer service	
	Management	Involves the selection and deployment of resources in the most efficient way so as to ensure (meet, or even exceed) customer needs and expectations	The seaport has a level of ICT applications in port operations and management	
			The seaport has a level of efficiency in operations and management	
			The seaport's leaders have good knowledge and competence in management	
			The seaport has an understanding of customers' needs and requirements	
			Improvement through customers' feedback	
CP&FP	Cost	- Cost satisfaction	The customers are satisfied with the cost of the service	Thai (2008); Homburg et al. (2013); Thai (2016); Yuen & Thai (2015)
	Timeliness	- Timeliness satisfaction	The customers are satisfied with the timeliness provided by the seaport	
	Goods integrity	- Goods integrity satisfaction	The customers are satisfied with the integrity of goods through the seaport	
	Information	- Information satisfaction	The customers are satisfied with the information provided by the seaport	
	Management	- Management satisfaction	The customers are satisfied with the management of the seaport	



Construct	Dimensions	Definitions	Measurement	Adopted literature
	Revenue	Overall financial performance related to revenue	Revenue is increasing	
	Cost	Overall financial performance related to cost	The extent of cost efficiency	
	Profit	Overall financial performance related to profit	Profit is increasing	

4 METHODOLOGY

4.1 Sampling and Data Collection

A research approach depends on the nature of the research purpose (Creswell, 2015). In this research, based on the proposed conceptual model, face-to-face in-depth interviews were conducted with 14 port operators and their customers in the maritime supply chain, i.e. shipping lines, freight forwarders and logistics service providers, in which they were asked to elaborate on the current status of dry port–seaport integration and how it has/may impacted/impact seaport performance aspects, namely service quality and customer satisfaction. Findings from the interviews would help revise the conceptual model and make recommendations to port managers to enhance the impact of DPSP-I on SP's performance and facilitate their policy and strategy formulation accordingly. Interviews were conducted at the participants' workplace and lasted for about thirty minutes to one hour. They were tape-recorded with the participants' prior consent. Upon completion, the interviews were transcribed and analysed using content and thematic analyses.

This paper explores the integration between dry ports and seaports and its effects on seaport performance in Vietnam via in-depth interviews; thus, the unit of analysis in this research is the stakeholders of the maritime supply chain, including seaport operators, dry port operators, shipping lines and logistics service providers.

In this research, the snowball sampling method has been used. The population targeted in the current study is top management and/or operations managers working at dry ports, seaports and their customers, i.e. shipping lines, freight forwarders and logistics service providers. The geographical boundary for these participants is within the container port groups in Hai Phong and Ho Chi Minh City, given their importance and dominant cargo throughput contribution to the country's total. Table 2 shows the profile of the 14 interview participants.

Table 2. Profile of the interview participants.

No.	Organisations	Respondents' position	Years in current position	Years of experience
DP01	Dry port	Director	6	26
DP02	Dry port	Vice director	6	18
LC01	Logistics company	Vice director	4	14
LC02	Logistics company	Head of operations department	8	14
SP01	Seaport	Operations director	3	18
SP02	Seaport	Director	4	15
SP03	Seaport	Director	5	18
SP04	Seaport	Director	5	14
SP05	Seaport	Vice manager	4	18
SP06	Seaport	Vice director	4	19
SP07	Seaport	Director	1	18
SC01	Shipping line	Vice director	10	20
SC02	Shipping line	Director	9	18
VPA1	Vietnam Seaport Association	General director	10	25

The first interview participants were approached through the introduction and recommendation from the Secretariat of the Vietnam Seaports Association, and the subsequent participants were snowballed following the recommendation of the first ones. Based on the proposed conceptual model, and the dimensions and measures described in Table 1, a set of semi-structured questions in the interview protocol was designed accordingly and then used to conduct face-to-face interviews with 14 participants in Vietnam. Because all participants and the researcher are Vietnamese, all interviews were conducted in their first language. Prior to this, the interview protocol, which was originally designed in English, was translated into Vietnamese, then back-translated into English. The back-translated English version was compared with the original one to ensure thematic consistency. Next, the Vietnamese version of the interview protocol was piloted with 14 senior executives who are working in various shipping lines, logistics companies and ports in Vietnam. Only when this was done was the Vietnamese version of the interview protocol administered for the interviews.

4.2 Interview Administration

Interviews were conducted face-to-face at the participants' workplace and lasted for about thirty minutes to one hour. They were voice-recorded with the participants' prior consent. Upon completion, the interviews were transcribed and analysed using content and thematic analyses.



5 ANALYSIS AND FINDINGS

5.1 Dry Port–Seaport Integration Practices in Vietnam

5.1.1 Information integration

Sharing of information was apparent in most of the interviews; however, there was a difference between the low level and the higher level of integration of dry port–seaport dyads. With the low-level integration ones, information sharing was seen as unnecessary because some seaports assumed that their responsibility was concluded whenever cargoes exit their ports. This was seen in the statement of a seaport operator (SP02) about his seaport's responsibility:

There is no sharing now. Ports only manage until a container gets out of the port gate ... (SP02)

This was echoed by another port operator (SP03) when he was not too concerned about who would be in charge of making the containers flow smoothly from the dry port to the seaport and vice versa:

Actually, we do not care about that; we also do not have information to inform the ICD about the content ... normally, when the cargoes arrive at the port ... then the customer can hire certain transportation at any given time ... it is up to the customer ... (SP03)

It was, however, different for the ports which saw themselves as nodes of a supply chain, as sharing necessary information between players in the supply chain is seen as a must-do job of each player. This viewpoint was emphasized in an interview with another seaport operator.

The port plans to receive ships and notify ICDs via an email system, informing the ICDs about the time of arrival and departure of the ships so that the ICDs can be proactive in receiving export cargo and set the closing time (SP06)

The sharing of information could be about the cargoes, their customers' needs and requirements, and any information that could be helpful to the other parties in the supply chain. This is illustrated in the quote by a port operator below:

... then all the information about the customer, about the schedule, about the operation plan of the two parties and about the needs of the customers. (SP01)

The level of information sharing could be seen through the ways of sharing, i.e. emails, phone calls, direct meetings, or shared software. This was seen in some interviews with both dry port and seaport operators.

... like other businesses, the information is mainly exchanged via email and phone ... (DP02)

... inform directly ICDs and shipping lines ... and shipping lines also know their route through data reporting systems. The port interacts with the carrier's system through the EDI data exchange system (SP06)

Ways to improve the sharing of information were mentioned in an interview with a dry port operator when he explained the reason for cooperation as follows:

In order to serve the shipping lines well, these two [dry port and seaport] must discuss how to do it, which is mandatory. (DP01)

In summary, it was found from the interview data that there are different levels of dry port–seaport integration in Vietnam. This can be seen in the type of information and the ways of information sharing between players in the maritime supply chain. For a port that does not see itself as a node or a player in a supply chain, it is likely that the responsibility of each port is constrained by its physical border. However, the type of information and the way that information is shared between dry ports and seaports will probably be enhanced together with the change of dry port–seaport integration levels. In the context of supply chain competition, information sharing has increasingly become a necessity for collaboration of dry port–seaport dyads.

5.1.2 Operational integration

To cooperate with each other, working together to enhance the collaboration between dry ports and seaports in a supply chain was found in the participants' working practices; however, there are different levels of collaboration. There was a limited level of collaboration between the dry port and the seaport when the seaport operator, such as SP02, considered it unnecessary. For another seaport, this collaboration was seen as a one-way connection where this seaport sees itself as the decision-making centre while dry ports are followers:

No, we make a request, and they follow because they don't know the peculiarities of port work, so how can they can give an opinion ... (SP04)

It was different in the case of another dry port, in which the relationship with their counterpart in the supply chain is highly appreciated, as described specifically in the collaboration of daily operational activities:

... the scheduled plan is sent first, ... then the schedules, running hours, and arrival times are sent after the barge has departed and when the ship is close to the port, we contact them again to report that we have arrived and are waiting for permission as stipulated in the contract. (DP01)

This view was echoed by another seaport operator (SP01) who emphasised that the cooperation between seaports and dry ports is apparent in every stage of cargo transportation between them:

... The detailed information of operations takes place every hour. Sometimes we have a specialised department to work with ICDs, to supervise the barges' schedules, to inform vendors ... and to make contracts for cargo storage ... (SP01)

When it comes to their responsibility in sharing the risks in their supply chain, a seaport operator was of the view that this depends on each party's rights and responsibilities in the cooperation contract; however, collaboration in risk sharing is necessary. This is illustrated as follows:

In terms of responsibilities, when risks occur, the port and the ICD will distinguish their rights and responsibilities to share risks. (SP06)

It is apparent that the collaboration between dry ports and seaports in a supply chain varies from almost nothing to highly collaborative in the existing operational practices in Vietnam. To meet their common customers' needs, the cooperation between these nodes in a highly integrated dry port–seaport dyad happens daily and involves a lot of collaborative activities in every stage of cargo transportation.

5.1.3 Relationship integration

Similar to the dry port–seaport integration in terms of information and operations, the relationship integration of this dyad in Vietnam was also at different levels in practice. For those who were of the view that dry ports and seaports are entirely independent players in their business, the collaboration or support from the other party is considered unnecessary. A seaport operator, SP07, vividly illustrated this assumption, stating that dry ports are just places to store containers and that:



There is no need to contact him [dry port] because that guy does not share his profits with us. (SP07)

The perception is quite different for those that realise the benefits from the collaboration between dry ports and seaports in a supply chain. In this connection, appreciating day-to-day cooperation to improve the dry port–seaport relationship is very essential, as described in the interviews with DP01.

The coordination is supportive, and very important. If the two parties rigidly do not have reciprocal support, this cooperation will collapse immediately because the actual loading and unloading depend on many objective factors such as the weather, rain and wind, machinery and everything, so it cannot be rigid. (DP01)

To assure a sustainable relationship, some of the dry ports and seaports participating in this study highly appreciated the cooperation with their counterparts through long-term contracts. As far as these contracts are concerned, an interviewee (DP01) confirmed that his dry port had collaboration contracts with many seaports. Meanwhile, it was also emphasised in the interview with another dry port (DP02) that the purpose of such cooperation is to meet their common customers' requirements. This is illustrated as follows:

The nature of the job is to support the customers' shipments being exported and imported smoothly, as quickly as possible, and safely, without loss or damage. (DP02)

This 'symbiotic relationship' was mentioned repeatedly in the interviews with DP02, SP02, and SP06 to describe the relationship between dry ports and seaports.

The relationship between the ICD and the seaport ... it is a relationship of resonance and mutual symbiosis. (SP06)

Through their practical experiences, these dry ports and seaports realised that such a symbiotic relationship had brought both the seaport and the dry port remarkable benefits and advantages, as illustrated by a seaport operator interviewee:

Symbiosis here ... the ICDs located close to manufacturers, so a large number of cargoes can be gathered in the ICDs before being transferred to seaports. (SP02)

It is clear that the cooperation between seaports and ICDs will bring many mutual profits, bringing benefits. (SP05)

Besides, for the dry ports and seaports in a well-integrated supply chain, they all highly appreciated their counterparts' contributions to the collaboration, which has led to an increase in their annual revenue, as elaborated by an interviewee (SP01) as follows:

The combination of ICDs and a seaport will increase the competitiveness of the seaport ... increase the number of customers using the service at the seaport, increase the shipment throughput of the seaport, and this means an increase in revenue from port operations. (SP01)

It was found through the interview data that seaports and dry ports which believe in the symbiotic relationship of dry port–seaport dyad often want to build long-term collaboration. This collaboration is not only documented in their cooperation contracts but also in their daily joint operational activities and improvements.

Operational information is mainly exchanged via email and phone. After a contract is signed, the information, including goods delivery notes, inventory, ... is exchanged daily by phone. (SP02)

5.1.4 Geographical integration

The connection between dry ports and seaports in terms of geographical location was found through the interview data as a factor that could reveal the level of dry port–seaport integration in Vietnam. Those seaports that found no reason for the collaboration with dry ports perceive the location of dry ports, which they use simply as a temporary solution to a problem they face at a certain time. This can be illustrated in a response of an interviewee as follows:

... it is very congested at the port, and ... a 2-hectare site next to the port will be constructed to accommodate the goods ... and it is called an ICD ... but I just call it ... well, a container yard. (SP07)

However, this view differs for those seaports that appreciated the collaboration between dry ports and seaports, as they believe that the reason for customers' selection of dry ports as the cargo delivery and receipt location is due to cost-saving. This can be seen through the explanation of a dry port operator (DP01) about the advantage of the dry port's geographical location.

Customers also do not want to go straight to the Cai Mep area because it is far, and transportation costs are high; people want to unload in ICDs here to save costs ... For example, a container transported (by road) from Binh Duong to Cai Mep will cost VND 7–8 million, which is a significant cost increase. But using waterways (from the ICD), it will be much cheaper; customers recognise that it is cost-saving, that's important, and time-saving as well. (DP01)

The location of dry ports, e.g. in the centre of an industrial processing zone or next to a river transport network, has brought these dry port–seaport dyads certain competitive advantages. Such advantages can be mutual for both seaports and dry ports. Indeed, if a dry port is located close to a cargo base, e.g. an industrial zone or adjacent to convenient transport networks, its connection to a seaport will be convenient as an extended gate for the seaport and help extend its market catchment area. Meanwhile, the advantageous geographical location of a seaport will also be seen by a dry port as a facilitating factor if they want to attract more cargoes to use services at the dry port.

The location of the port ... is very convenient; firstly it is in Ho Chi Minh City, with the regional customs office No. 4, and it is located at the eastern gateway of the city, connecting with some neighbouring provinces with many industrial parks and manufacturing areas. (DP02)

ICDs in the city are also in the right position, i.e. near the manufacturers, and they are located to take advantage of the waterway for transportation. (SP01)

It is apparent that the selection of location for setting up these dry ports was strategically considered and assessed. The consideration of this factor during the construction of a dry port can decisively contribute to their lifelong integration, thus providing a competitive advantage later.

The interview data showed that the geographical location of a dry port or seaport may enhance or inhibit the collaboration between dry ports and seaports. In other words, by examining the relationship between dry ports and seaports in a supply chain in terms of geographical location, the integration tendency of each dry port–seaport dyad could be addressed.

5.1.5 Other findings

Through the interview data, it was found that Vietnam's customs procedures significantly influence the collaboration between dry ports and seaports. It appears that some seaports and dry ports collaborate so as to get an 'easy-through customs procedure' because these ports could get more customers than the others. This was explained by an interviewee (DP01) as follows:



And going to any port depends on customs procedures, open government agencies, it is very important; in Ho Chi Minh City, there are many ports, but why is the port ... always full, always full of customers while other ports do not have customers? It is also due to ... more convenient location and customs procedures. (DP01)

With the same experience as the interviewee in DP01, both interviewees in DP02 and SP02 stated that their customers tend to select dry port–seaport dyads with 'good customs' where 'simple and neat customs procedures, customs' sub-departments are ... flexible in supporting customers' (DP02).

However, the influence of Vietnam's customs procedures was the result of the interaction between dry ports and seaports, with the customs system acting as the third party or an outsider of the dry port–seaport dyad. Therefore, it is argued in this study that customs procedures should not be incorporated as one of the criteria to measure dry port–seaport integration.

5.2 The Impact of Dry Port–Seaport Integration on Seaport Service Quality

5.2.1 Price

Almost all interviewees who are seaport and dry port operators emphasized service price as an important criterion to evaluate seaport service quality because, from their experience, a competitive price often brings them advantages in attracting more customers. This is illustrated as follows:

The port with good price, good service will attract customers day by day. (P01)

Most people still consider the price factor; although the port does well, if the price is not good, it is impossible to attract customers. (DP02)

This view is also shared by other participants, i.e. logistics and shipping companies. For example, both interviewees who are from logistics (LC01) and shipping (SC01) companies affirmed that among many criteria to evaluate seaport service quality of a port, service price is an important criterion in the eyes of seaport customers.

Therefore, in line with other sectors, service price should be used as an important criterion to measure seaport service quality.

5.2.2 Speed and timeliness

Service time is the first factor that most participants in this study mentioned in the interviews when it comes to seaport service quality. In this connection, they all wanted to reduce the time of cargo handling and transporting through their supply chains because this helps customers, dry ports, and seaports participating in the dry port–seaport supply chain save money. Several interviewees elaborated on this as follows.

The quicker the turnaround time of the ship, the more operating cost savings the ship has ... and the shipping line can shorten the turnover time of ship operations. It means that their profit will be likely to increase. (SP06)

They [seaports] just want to release ships quickly so they can receive others next. (DP01)

It is apparent that, apart from service price which is often seen as an important criterion to evaluate seaport service, service time is also perceived as an essential element in the context of dry port–seaport integration. Indeed, port turnaround time for ships and dwell time for cargoes have always been included in the list of criteria for evaluating port service quality and port selection in the literature. In the context of supply chain competition, service time is therefore naturally appraised when evaluating dry port–seaport integration as a whole.

5.2.3 Safety and security

Another important criterion of seaport service quality emphasised in the interviews is the safety and security of the cargoes transported through dry port–seaport dyads. This was emphasised by interviewees who are both dry port and seaport operators, explaining that safety and security have always been their main customers' requirement for evaluating seaport service quality. Together with service price and time, there is no doubt that cargo safety and security constitute one of the '7 rights' of logistics management in the context of dry port–seaport integration, and contribute to seaport service quality. This is elaborated by a couple of interviewees as follows:

The next one is the security of goods in the port. Although we commit to our customers that we guarantee 100% of goods quality, ensuring that the customers' goods are not stolen or damaged, how can we control that? We must have good security ... good security system. The second one is safety: we must have good equipment and skilled workers. (SP01)

The first quality of a seaport is operations: safe, fast and scheduled operations. Safety includes the integrity of goods and ships, and the guarantee of correct schedules. (DP02)

It was found through the interview data that, similar to service quality in other sectors, safety and security are also seen as one of the important criteria to measure seaport service quality in maritime logistics.

5.2.4 Management

The participants in this study perceived management quality as part of seaport service quality from different aspects of seaport activities. This could be noticed in what they discussed about management as a criterion to evaluate seaport service quality in terms of how port staff treat customers and help them in solving their problems or use technology in their operations. This is explained as follows:

Warmly welcome customers ... (DP01)

... Talking about port service means talking about technology. (SP06)

When they [customer] encounter a problem, and they can contact the port in an easy way to handle the issues ... that is a good point in the port's service ... So every port has a troubleshooting centre to make sure customer issues can be handled 24/7. That is also a good point of port service. (SP01)

How quickly the seaport responds to the requirements of their customers, the attitude of the seaport's administrative staff, how the seaport provides needed information to customers in a timely manner, how the seaport reacts to and solves an emerging problem, how the seaport supports their customers, the technology used in the seaport, and so on were all associated with the management quality of the seaport in the view of their customers.

The above finding suggests that management quality is a complex criterion containing several aspects, and therefore different indicators should be used to measure this component of seaport service quality.

5.2.5 Other findings

Throughout the interviews, seaport reputation, environmental performance, and social responsibility were mentioned by some interviewees when being asked what their seaport had done in these areas. It is common that many of these ports have been implementing activities to showcase their social and environmental responsibilities. An interviewee from a seaport operator elaborated as follows:



Every year there is a charity program, cleaning, planting trees. We organize all workers in the port to clean the whole port, pick up rubbish and paint; then go to schools like school ... to buy equipment for the children, go to Ba Ria and Tra Vinh to conduct charity activities for orphanages. Every year, my company organizes a drawing contest for employees' children, and family day, outing trips, many things according to the parent company's policy. That I appreciate because they have programs for the community, ... (SP01)

However, none of these factors were used as criteria to evaluate seaport service quality. They were seen mainly as the seaport's independent social activities for their communities only.

Due to the weak connection to seaport service quality in the practical context of Vietnam, image and social responsibility were not considered as criteria to measure seaport service quality in this study.

5.2.6 Impact of dry port–seaport integration on port service quality

The interview data demonstrate that customers differ in their levels of satisfaction with seaport service quality.

With shipping companies, the shipping timetable is the most important, but for customers, they don't care about the shipping timetable; they care about how they can get the goods quickly, conveniently and at a reasonable price. (DP01)

When asked about seaport service quality, some seaport customers, i.e. shipping companies, logistics companies and dry ports, went so far as to equate it with their customers' needs and requirements, and this led to the finding that the criteria by which to measure seaport service quality and those by which to measure customer performance are much the same.

5.3 Impact of Dry Port–Seaport Integration on Customer Satisfaction

5.3.1 Cost satisfaction

It is apparent that a competitive price that a seaport offers to its customers is an important factor to satisfy and attract them. It means that the 'service prices' factor of service quality is in line with the 'cost satisfaction' criterion of customer satisfaction. When asked about customer satisfaction, the interviewee in DP01 firstly referred to it as a 'reasonable price'.

To evaluate customer satisfaction ... shipping lines could do; for example, reasonable price? Good operations? Qualified staff? Modern berths? However, import and export companies only pay attention to where they can receive the goods in order to save costs and to get benefits from simple customs procedures.

This view was shared by another interviewee in a shipping line (SC01) when asked to give his opinion about seaport service quality from the aspect of a customer. For him, the price of the service is important, which contributes to customer satisfaction.

For the sales department, it is important what price the port applies to the customer. (SC01)

In this connection, an interviewee from a logistics company (LC02) had the same view as the other (SC01); however, he also highlighted the 'hidden costs' besides the published tariff provided by a seaport.

In fact, besides the official price written on paper, such as invoices, there are a lot of other costs, such as commission. That is the issue in the transportation industry in Vietnam. (LC02)

Therefore, in the context of Vietnam, customer satisfaction with seaport service prices should be measured based on the total costs incurred by customers in practice, which include both the price announced officially and those unofficial costs.

5.3.2 Timeliness satisfaction

In maritime logistics, being on time has long been seen as the most important criterion for satisfaction, be it for ports or port users. A shipping company representative, asked about criteria relating to customer satisfaction, mentioned the words 'on time' first in relation to loading and unloading cargo:

Our goal to satisfy customers is to be on time. (SC02)

A logistics company representative went further, emphasising the target of increasing ship 'turnaround':

We measure the average berthing time; the speed of the ship's turnaround [is] the most important, that is, how the ship is turned around quickly, without delay. (LC01)

Having the same viewpoint, a dry port operator also emphasised the speed of container handling when asked about customer satisfaction:

Container delivery must be done quickly and conveniently. (DP01)

Although the ways through which to benefit seaport customers (shipping companies, logistics companies, etc.) differ, seaports and their customers can save money together through the shared goal of reducing scheduled loading and unloading times.

5.3.3 Safety and security satisfaction

The need for cargo safety and security was apparent in all the interviews with shipping and logistics company representatives. This was a seaport operations director's first concern when asked about satisfaction with seaport service quality.

The most important thing is safety, punctuality and productivity ... including the barge service, the arrangement of the port service so that it is efficient, [and] the container diagrams for ensuring that the time the cargo spends in the port is minimised. (SC01)

Both LC01 and DP01 assumed that it was the seaport's responsibility to provide a safe and secure service; this is one of the criteria for satisfying seaport customers.

Second, it is about safety and security. (LC01)

Store [and] manage containers in a safe manner ... avoiding any loss or damage to containers. (DP01)

It is apparent that, in line with findings in other transport sectors, safety and security are common criteria used to evaluate customer satisfaction in the maritime sector, and that seaport service quality is not a special case. The safety and security of cargo transported between dry ports and seaports are enhanced when a seaport collaborates with a dry port close to its warehouse. A director of a seaport gave his opinion:

The customers are pleased because their cargo risk can be transferred from them to seaports at their doorstep ICDs. (SP04)

It is obvious that the safety and security of cargo is a focus for both ports and their customers, and that it is enhanced by the relationship between dry ports and seaports.



5.3.4 Management satisfaction

In a similar manner to cost satisfaction, it was found through the interview data that the management quality of the seaport also contributes to customer satisfaction with their service quality. Essentially, how seaport management plans, implements, controls and improves its operations to assure that ships berthing at their port can be despatched within a short period of time will significantly influence customer satisfaction from the shipping lines' perspective. An interviewee from a shipping line (SC01) explained their expectation of how seaports should arrange to accommodate their vessels.

For example, when our ships arrive, whether the goods will be readily packed, and how many cranes you arrange to handle our vessels. (SC01)

Another aspect of service quality which contributes to customer satisfaction in the context of seaports in Vietnam is how seaports cooperate with customers to solve emerging problems during the process of serving them. This was highlighted by an interviewee in a shipping line (SC02), who provided an example of how seaports could do so as follows:

The marketing department (of the seaport) has a meeting with us once a month. In the meeting, they could raise their voice on how they can support us to handle (issues) immediately. (SC02)

From the perspective of logistics companies, it was emphasised through interviews that the use of technology, especially information and communication technology (ICT), would facilitate the information and data exchange between seaports and their customers. This, in turn, will enhance seaports' understanding of their customers' requirements and expectations, which enables them to serve customers better. Consequently, customer satisfaction with seaport service quality would be increased. An interviewee (LC01) elaborated this as follows:

... related to service quality, such as how to exchange information or how to support them using software systems ... Thirdly, in terms of procedures, we are becoming more and more modern. Online payment (provided by the seaport) is very convenient. (LC01)

It is evident through the interview data that customer satisfaction with management quality contributes to the overall satisfaction with seaport service quality. Besides, this satisfaction may accrue from those of various aspects of seaport management, i.e. operational planning and implementation, help and support rendered to customers' problems, as well as the application of technology in customer service, in line with the management quality dimension of seaport service quality.

5.4 Revised Conceptual Model and Measurement Framework

Based on the findings from the interview data, the proposed conceptual model and conceptual measurement framework were revised accordingly as described in Figure 2.

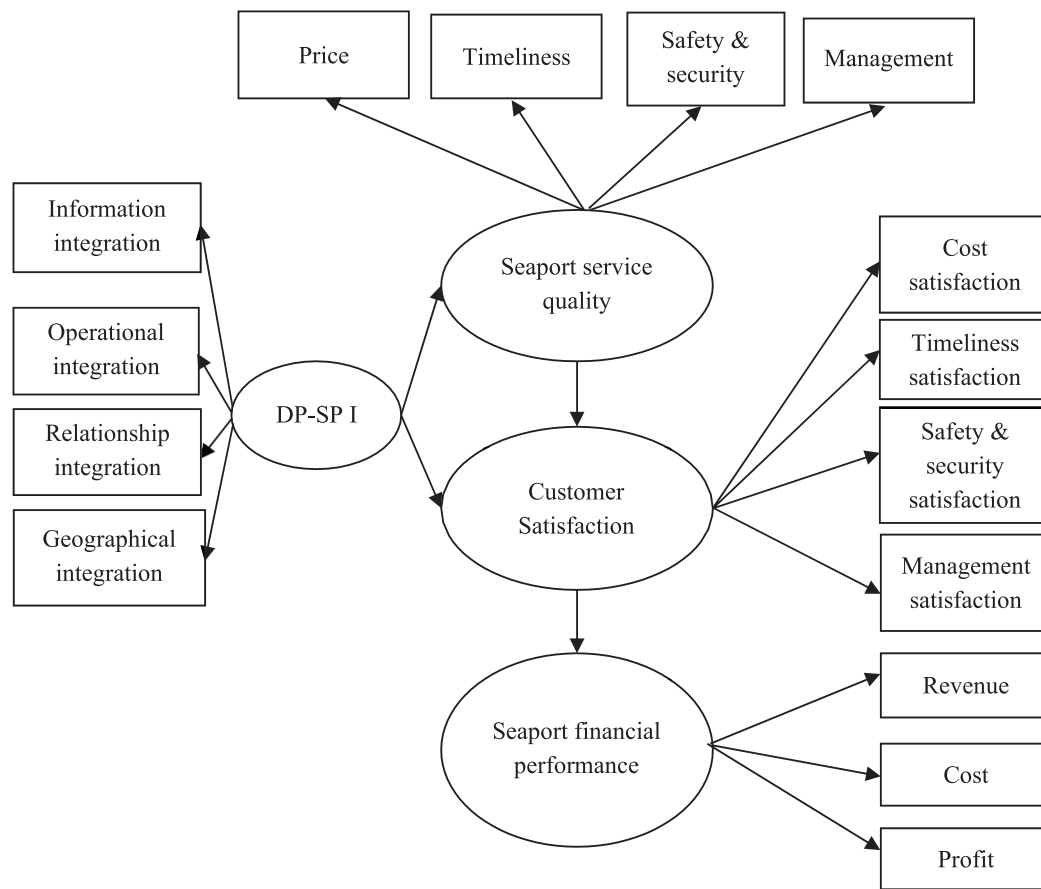


Figure 2. The proposed conceptual model.

6 CONCLUSION

The paper contributes to the existing literature by exploring the construct of dry port–seaport dyads and examining its effects on seaport performance, including seaport service quality, customer satisfaction and financial performance.

Findings from this study in terms of the conceptualisation of the dry port–seaport integration align with those in the general literature. Specifically, this integration can be characterised by information integration, operational integration, and relationship integration. In addition, it was found from this empirical study that the integration between dry ports and seaports, especially in the context of Vietnam, is also characterised by geographical integration, which has not been researched previously in the literature. This finding implies that policymakers and investors should consider this factor when planning the location of future dry ports and seaports, i.e. zoning those which can be strategically integrated so that overall supply chain efficiency can be enhanced due to their strategic integration. Besides, in line with the literature that SCI has positive effects on firm performance, it was found in this research that dry port–seaport integration also positively contributes to seaports' service quality and customer satisfaction as well.

The findings also provide practical implications in helping policymakers, port authorities and operators in Vietnam devise policies and strategies relating to dry port–seaport integration, port service quality, customer satisfaction and financial performance. However, the research only focuses on the integration between dry ports and seaports in Vietnam as the study context. Similar research in other developing countries would provide data for comparison.



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