Development of collaborative spirit indices: The case of South Korea's maritime industry

Kim, Chang Soo; Roh, Saeyeon; Seo, Young Joon

Published in:
The Asian Journal of Shipping and Logistics

DOI:
10.1016/j.ajsl.2022.01.001

Publication date:
2022

The Asian Journal of Shipping and Logistics xxx (xxxx) xxx–xxx

Contents lists available at ScienceDirect

The Asian Journal of Shipping and Logistics

journal homepage: www.elsevier.com/locate/ajsl

Development of collaborative spirit indices: The case of South Korea's maritime industry

Chang-Soo Kim[a], Saeyeon Roh[b], Young-Joon Seo[c,*]

[a] Department of International Trade, Pusan National University, South Korea
[b] Plymouth Business School, University of Plymouth, United Kingdom
[c] School of Economics & Trade, Kyungpook National University, South Korea

ARTICLE INFO

Article history:
Received 9 December 2021
Accepted 28 January 2022

Keywords:
Collaboration
Cooperation
Marine transport
Empirical study
South Korea

ABSTRACT

This study aims to evaluate the extent of collaboration between shippers and shipping companies in South Korea. Bespoke cooperative and collaborative spirit indices (CCSIs) reflect the conceptual differentiation between cooperation and collaboration, as well as a more comprehensive conceptualisation. Shipping companies registered in South Korea returned 167 usable responses. CCSIs were developed through exploratory factor analysis weighting methods, and differences among CCSIs by vessel type and contract period were examined using multivariate analysis of variance. CCSIs indicate that powerful supply chain members resist two-way communication, mutuality, distributive fairness, and long-term relationships. This is one of the first studies to operationalise the key concepts of cooperation and collaboration in terms of the maritime industry, providing the basis for future research in other supply chains despite a single informant attribute. Based on the CCSI scores, managerial and political initiatives are discussed to reduce barriers to interaction and ameliorate the CCSI level between supply chain members. The research provides insights into the extent of cooperation and collaboration by initially establishing CCSIs in the maritime industry, which will support strategic approaches to supply chain members.

1. Introduction

Supply chain management (SCM) improves customer service and competitiveness by combining inter-firm cooperation and inter-functional coordination of major business processes (Min & Mentzer, 2004). Supply chain (SC) competitiveness is predicated on supply chain collaboration (SCC); however, despite numerous definitions, cooperation is rarely differentiated from collaboration (Hudnurkar, Jakhar, & Rathod, 2014; Thomson, Perry, & Miller, 2009). Piecemeal research has hampered a comprehensive conceptualisation, precise understanding, and measurement of the extent of cooperation and collaboration (Barratt, 2004; Cao, Vonderembse, Zhang, Ragu-Nathan et al., 2010; Simatupang & Sridharan, 2005).

The relationships between suppliers and manufacturers or retailers are typically highlighted in consumer goods retailing, computer assembly, and automobile manufacturing (Hudnurkar et al., 2014), which occasionally also includes shippers and logistics companies (Fugate, Davis-Sramek, & Goldsby, 2009; Golicic, 2007; Zsidisin, Voss, & Schlosser, 2007). After applying SCM principles, carriers were transformed from product distributors into SC integrators, disseminators of information, and transport service advisers, all of which are essential to SC service performance. Supplier-customer relationships depend on shipper-carrier relationships, which are often reported anecdotally (Golicic, 2007; Zsidisin et al., 2007). Furthermore, reliable and accepted SCC measurement instruments are rare in maritime logistics (Seo, Dinwoodie, & Roe, 2015).

Exhaustive analysis of each instance of cooperation and collaboration in the complex multiple inter-firm relationships that SC goods movements have is infeasible. Accordingly, this case study highlights the relationship between shippers and shipping logistics

Production and hosting by The Korean Association of Shipping and Logistics, Inc.

* Corresponding author.
E-mail addresses: kcs4194@pusan.ac.kr (C.-S. Kim), saeyeon.roh@plymouth.ac.uk (S. Roh), y.seo@knu.ac.kr (Y.-J. Seo).

https://doi.org/10.1016/j.ajsl.2022.01.001

Please cite this article as: C.-S. Kim, S. Roh and Y.-J. Seo, Development of collaborative spirit indices: The case of South Korea's maritime industry, The Asian Journal of Shipping and Logistics, https://doi.org/10.1016/j.ajsl.2022.01.001

companies. Most SC members that require shipping logistics services can function as shippers (Fransoo & Lee, 2013; Frémont, 2009).

As the global economy becomes more open through the World Trade Organization (WTO) and free trade agreements (FTAs), the shipping industry repeatedly undergoes periodic crises similar to the repetitive cycle of the global financial crisis. Global container carriers have struggled to survive the ordeal caused by a sluggish economy and overcapacity since the crisis, and the current shipping environment features complexity and unpredictability (Kamal, Kara, & Olgay, 2021; Kuo, Lin, & Lu, 2017).

In terms of the relationship between shippers and logistics companies, excluding a few exceptional cases such as the recent COVID-19 pandemic, shippers have had a dominant advantage over shipping lines during most shipping cycles, which have reduced from 14.9 years to 8 years over the last 22 cycles (Stopford, 2009). As buyers (shippers) can easily change suppliers (shipping companies) in highly competitive industries such as logistics, customers (shippers) are typically regarded as having more power in supplier-customer relationships (Golicic, 2007). Liner shipping companies confront powerful shippers, such as multinational corporations, and powerful shippers tend to severely reduce their budget for transport (Stopford, 2009). Midoro, Musso, and Parola (2005) also note that shippers' contractual power has increased under the imbalance between supply and demand as well as fierce competition in container shipping in the following ways. The globalisation of manufacturers has meant that carriers have had to cope with new demands from shippers to deliver goods globally and faced chronic fleet overcapacity on the supply side. Shipping companies have had to cope with the increased costs arising from providing globalised services; the entrance into shipping markets of new carriers has heightened competition in shipping markets globally (Slack, Comtois, & McCalla, 2002). In this vein, the main carriers had to adopt strategy enhancing economies of scale such as increase of vessel size and mergers and acquisitions because of the extreme difficulty in maintaining stable freight rates in a considerably competitive business environment (Midoro et al., 2005). In other words, economies of scale have created pressures to fill ships with freight, and shipping lines subsequently had to accept whatever price the shipping market provides and have emphasised cost reduction (Notteboom, Rodrigue, & De Monie, 2010).

Simultaneously, the carriers have sought new forms of cooperation, such as global alliances, which are different from former conferences and consortia (Midoro et al., 2005). It is generally agreed that globalisation and competition have effected a type of grouping among shipping lines (Slack et al., 2002). The alliances made carriers accentuate a price advantage rather than adopting a differentiation strategy for their services and capabilities (Maloni, Gligor, & Lagoudis, 2016). Outperforming their competitors by overcapacity has caused fierce competition and reduced profitability, which has had a destructive effect on the recovery of shipping markets (Kou & Luo, 2016). In this regard, many authors have addressed the cooperation and competition between parties related to ocean transportation.

Typically, as shipping companies offer easily duplicated services and are revenue-reliant on powerful shippers, adversarial relationships are universally known to exist between the two (Golicic, 2007; Heaver, 2015). Meanwhile, even when shippers predominate, logistics companies must create and maintain cooperative and collaborative relationships with shippers to outlive. The shipping firm's survival in the languishing economy plagued by overcapacity may depend on shippers' willingness to guarantee reasonable profits, sharing additional costs, and long-term contracts. Conversely, a cooperative and collaborative spirit also benefits shippers, consumers of logistics services dependent on carriers' tariffs, by ensuring that more carriers offer high-quality, cost-effective delivery systems (Talley & Ng, 2013). Facing unfettered competition, risks, and uncertainties caused by globalisation, as a way of balancing self-interests with interdependency to improve overall performance, dominant partners have adopted strategies such as collaboration, better visibility, reliability, and agility (Heaver, 2015; Richey, Roath, Whipple, & Fawcett, 2010).

In this context, this paper aims to reveal the extent of cooperation and collaboration in SC using cooperative and collaborative spirit indices (CCSIs) to assist policymaking in South Korea's maritime industry. Addressing the research gap in SC cooperation and collaboration, this South Korean case study presents CCSIs to quantify relationships between shippers and shipping companies.

Generally, an index presents an intuitive and well-defined understanding of a situation or state. It might be possible to measure and compare changes in the index over time and among countries when a credible and trustworthy index is developed. To date, many indices have been developed by international organisations, such as the Logistics Performance Index (LPI) by the World Bank, Global Competitiveness Index (GCI) by the Global Competitiveness Forum, and Corruption Perceptions Index (CPI) by Transparency International.

Regarding collaboration indices, Simatupang and Sridharan (2005) introduced a collaboration index to measure the level of collaborative practices between retailers and their suppliers. The index measures collaborative practice based on decision synchronisation, information sharing, and incentive alignment using the mean score of the three dimensions in the sample (Simatupang & Sridharan, 2005). Supply chain collaboration index (SCCI) was introduced by Kumar, Banerjee, and R (2014)). Six dimensions were used to conceptualise an instrument for measuring SCC and calculate SCCI: joint planning for increasing market share, executing schedule, problem-solving and performance measurement, sharing of operational resources, market-based information, and collaborative culture. Relevant data were collected from SC members in diverse industries, and the instrument was tested with partial least squares methods. However, the abovementioned studies were not relevant to the maritime context and did not comprehensively and synthetically examine collaboration.

Therefore, this study intends to examine a methodology that measures the overall level of cooperation and collaboration in an SC comprising shipping companies and shippers as a case study of collaboration in SCs. Furthermore, through the development of CCSIs, this research also attempts to provide criteria to test whether cooperation and collaboration between the parties exist and diagnose the current state of cooperation and collaboration.

2. Literature review

2.1. Theories underlying cooperation and collaboration

The transaction cost theory (TCT) argues that transaction costs shape governance structures, markets, and hierarchies; however, when markets fail, researchers focus on relational governance and alliances rather than on hierarchy (Geyskens, Steenkamp, & Kumar, 2006). Recent theoretical extensions predict cooperation and collaboration as necessary alternatives to transactions (Kim, Park, Ryoo, & Park, 2010). Transactions governance spans spot markets, hierarchies, and long-term hybrid contracts, all of which are relevant to SCM (Williamson, 2008). Surmounting constricted rationality, securing economic efficiency, and realising transaction stability from opportunistic threats can be achieved through inter-firm cooperation (Kim et al., 2010).

Further, the resource-based theory (RBT) characterises a firm as comprising different resources or a resource bundle and studies their impact on performance (Barney, 1991; Huo, Han, & Prajogo, 2016). Capabilities are treated as the origin of competitive advantage in RBT, which also emphasises intra-firm resources (Dyer & Singh,

1998). Assembling, cooperation, and resource co-ordination—including inter-firm resources—signify capabilities that yield greater productivity and better performance (Huo et al., 2016). The relational theory (RT) complements the RBT (Dyer & Singh, 1998), as it involves 'the application of RBT to inter-organisational relations' (Acedo, Barroso, & Galan, 2006, p. 625). The RBT traces the origin of competitive advantage from intra-firm resources, whereas RT emphasises that competitive advantage can be acquired through inter-firm dyads or networks (Dyer & Singh, 1998). The underlying cooperation and collaboration theory can be derived from RBT if resources, particularly intangible resources or capabilities, could extend to embrace the cooperative and collaborative relationship network. Arguably, the RBT might assist in framing complex dimensions of SC relationships that involve new product development and process issues therein (Ahmed, Kristal, Pagell, & Gattiker, 2017).

Attempts to secure necessary resources from the market arise because trials to obtain all resources within a firm fail, thereby necessitating bilateral relationships. As with RBT, resource dependence theory (RDT) advocates SCC to improve performance and respond to market demand (Hillman, Withers, & Collins, 2009). However, gaining access to inter-firm resources involves a loss of autonomy, and dependency must be avoided, if possible.

Further, social exchange theory (SET) explores how costs and rewards influence actors' interactions in an exchange process, and the difference determines attitudes and behaviours (Griffith, Harvey, & Lusch, 2006). Comparing rewards and costs of an exchange, actors tend to participate in and create relationships to maximise benefits and minimise costs (Nunkoo & Ramkissoon, 2012). In SET, power, commitment, justice, and trust are vital (Morgan & Hunt, 1994).

The social capital theory (SCT) concerns others' 'goodwill' that encourages cooperative behaviour and allows new forms of association and organisation to develop (Adler & Kwon, 2002; Putnam, 1993). High levels of trust, particularly in networks, reduce economic transaction costs and the scope for opportunism and expensive monitoring processes (Putnam, 1993). Actors can utilise social capital as a resource, offering competitive advantages (Adler & Kwon, 2002).

2.2. Cooperation and collaboration in SCM and logistics

Occasionally, cooperation between distributors and manufacturers precedes trust (Anderson & Narus, 1990); however, long-term relationships built on trust and dependence can be found in the case of retail buyer and vendor relationships (Ganesan, 1994). Morgan and Hunt (1994) studied the antecedents and consequences of trust and commitment between tyre retailers and suppliers. Furthermore, the trust and commitment between customers/buyers and service personnel/providers/sellers are represented as 'relationship strength', with information and cooperation as antecedents (Bove & Johnson, 2001). Barratt (2004) identifies openness/communication, mutuality, trust, and information exchange as components of collaborative culture. In parallel with information sharing, Min et al. (2005) include joint planning, joint problem-solving and performance measurement, and leveraging resources and skills to characterise SCC.

Procedural and incentive alignment also positively influence the long-term SC relationship between suppliers and distributors (Griffith et al., 2006). Kim et al. (2010) identify the determinants of cooperation, including technical uncertainty, reciprocity, and trust in the relationships between telecommunication service providers and suppliers. Common knowledge creation and collaborative communication, in addition to information sharing, determine the components of SCC (Cao & Zhang, 2011). Trust and commitment follow quality, information sharing, and availability (Chen, Yen, Rajkumar, & Tomochko, 2011). SCC is also linked with execution, planning collaboratively, and decision-making. Collaborative practices such as incentive alignment, decision synchronisation, and information sharing are implemented by applying a collaboration index using Likert scales to estimate the mean scores for each dimension (Simatupang & Sridharan, 2005). Kumar et al. (2014)) analysed six dimensions of an SCC index using partial least squares analysis. Along with intra-organisational motives, Pradabwong, Braziotis, Tannock, and Pawar (2017) confirm shared common goals and information, incentive alignment, joint activities, and information communication as inter-organisational antecedents of SCC to enhance marketplace competitiveness.

Components of win/win partnerships include long-term anticipation, loyalty, and shared benefits and burdens between shippers and carriers, forming 'relationship extendedness' (Gardner, Cooper, & Noordewier, 1994). The readiness of carriers to commit their assets to shippers is influenced by trust, mutual reliance, and communication (Zsidisin et al., 2007). Using SEM to test the 'relationship strength', Golicic (2007) finds that trust and commitment show a significant difference between shippers and carriers. Fugate et al. (2009) find that environmental changes and capacity constraints, such as regulated driving hours, triggered a better balance of power between shippers and inland carriers, thereby culminating in collaborative relationships. Nassirnia and Robinson (2013) case study of maritime coal SCs reveals that cooperation and integration maximise benefits and SC value increments.

Within maritime logistics, knowledge creation, decision coherence, information sharing, joint SC performance measurement, and goal-likeness can be measured for SSC (Seo, Dinwoodie, & Roh et al., 2015). Competition and globalisation foster widespread collaboration to increase efficiency, which supersedes traditional hostility within the port industry (Heaver, 2015; Seo, Dinwoodie, & Roe, 2016, 2015).

3. Conceptual framework

3.1. Differentiation between cooperation and collaboration and their operational definitions

Most SCM literature defines SSC in different ways and does not differentiate between collaboration and cooperation (Hudnurkar et al., 2014). Differences between collaboration and cooperation relate to the extent of trust, commitment, and mutual reliance; cooperation is lacking in trust and less active than in collaboration (Golicic, Foggin, & Mentzer, 2003). Cooperation is an emergent relationship that involves limited information exchange or advertising of long-term contracts; the transition to collaboration involves free information sharing, solving common problems, and joint planning for the future (Spekman, Kamauff, & Myhr, 1998). Compared to cooperation, collaboration includes higher levels of trust and commitment (Spekman et al., 1998). Among the two concepts, the extent of trust and commitment is discriminated against, and thus, cooperation can be incorporated within the collaboration. Therefore, cooperation can be postulated as a subset of collaboration (Kim, Dinwoodie, & Seo, 2018). In the maritime context, shipping lines settle contracts in various terms, such as temporary, cooperative, or collaborative partnerships with shippers. The types of partnerships can be differentiated depending on the extent of trust and sustainability. Temporary partnerships can be regarded as open market negotiation relationships (Spekman et al., 1998), where shippers are treated as mere customers through spot contracts. The characteristics of cooperation, such as information and resource sharing and financial support, appear when this contract repeats continuously. Cooperative relationships gradually build business trust and develop new projects and contracts to new markets. Eventually, in terms of relationships with shippers, the long-term relationship based on cooperation evolves into collaborative relationships in the future in the maritime sector.

Therefore, in this study, cooperation is considered a business partnership process between shippers and shipping companies with transparency where they work together as partners and treat each other in an equal manner, based on mutuality, for common goals and advantages. Collaboration refers to a business partnership process between shippers and shipping companies, where long-term sustainable cooperative relationships are the main objective among the partners based on mutual trust (Kim et al., 2018). Coordination is not differentiated from cooperation because coordination simply implies cooperation (Morgan & Hunt, 1994).

3.2. Components of collaboration

Through an extensive literature review of cooperation and collaboration, this study postulates that collaboration between shippers and shipping companies comprises cooperation and 'extended relationship strength'. Cooperation is considered to comprise transparency, fairness, and mutuality in the relationship between the two parties. Regarding 'extended relationship strength', relationship strength embraces trust and commitment (Bove & Johnson, 2001), and 'relationship extendedness' includes loyalty and long-term expectations (Gardner et al., 1994). Based on the trust between the shipper and shipping lines, business relationship sustainability increases as commitment (loyalty) and long-term orientation bond stronger. Therefore, this study views 'extended relationship strength' as constructed by sustainability and trust between shippers and shipping line business relationships. Out of the extensive literature, 76 items were compiled for five components of collaboration.

3.2.1. Components of cooperation

3.2.1.1. Transparency. Clear establishment of the relationship, including shared information and straightforward communication through advance agreement for open and transparent relationships with one another, can be taken as transparency. Thus, it can be considered that information sharing, communication, and formalisation compose transparency (Kim et al., 2018).

A primary form of collaboration—a critical component of cooperation in SCM—is information sharing. Private data exchange among partners requires the establishment of an efficient SC (Kumar et al., 2014). A lack of willingness to share appropriate information makes the establishment of SC relationships strenuous (Richey et al., 2010). Conversely, better decision-making and an efficient SC can be achieved through detailed information exchange, thereby providing SC visibility (Min et al., 2005).

The identification of opportunities and requirements for improvement is the main purpose of communication (Min et al., 2005). Collaborative communication refers to the inter-communication procedure between SC members in terms of frequency, means, direction, and influence strategy (Cao et al., 2010). It is two-way directional communication with more frequency and better information modes that enhance indirect influences (Mohr & Nevin, 1990).

Formalisation involves clear-cut rules and procedures that regulate the decision-making process (Dwyer & Oh, 1987). As formalisation is higher, the decisions and working relationships are more influenced by formal standardised policies and rules for longer periods. By removing vagueness and elucidating priorities, formalisation forms the expectations of necessary objectives and sets up standard practices, thereby enhancing transparency (Daugherty et al., 2006).

3.2.1.2. Fairness. Reciprocity (Bensaou, 1997) and justice (Konovsky, 2000) are similar terms for fairness. Managing other partner firms with fairness and justice entails no differentiation among the partners, monitoring of laws and regulations, and assurance of sensible and just profits. The level of cooperation can be affected by reciprocity (fairness) between partners (Kim et al., 2010). Moreover, fairness in a buyer-supplier relationship can be conceptualised within collaborative and long-term SC relationships (Hornibrook, Fearne, & Lazzarin, 2009).

Procedural and distributive justice forms fairness. Supplier behaviour is considered in procedural justice, i.e. treating the partner firm fairly; while distributive justice focuses on reseller outcomes, i.e. costs, risks, and benefits shared among SC members (Griffith et al., 2006; Kumar, Scheer, & Steenkamp, 1995). Procedural justice focuses on decision-making processes and peoples' attitudes that could be influenced by these determinations (Korsgaard, Schweiger, & Sapienza, 1995). Occasionally interchanged with incentive alignment, distributive justice (Griffith et al., 2006; Simatupang & Sridharan, 2005), which requires sharing profits and losses with stakeholders fairly, is a crucial aspect of successful partnerships (Cao, Vonderembse et al., 2010). Moreover, effective SCM implies mutual sharing of risks and rewards. Unless the benefits of cooperation exceed costs, a firm will not cooperate (Nassirnia & Robinson, 2013). Distributive justice, namely incentive alignment, ensure satisfactory levels of cooperation (Harland, Zheng, Johnsen, & Lamming, 2004).

3.2.1.3. Mutuality. Based on interdependence and the RDT, mutuality refers to exchange relationships between two organisations in which partners treat and support each other equally in accordance with mutual understanding (Thomson et al., 2009). Mutuality comprises resource sharing, joint knowledge creation, joint problem-solving/performance measurement, and goal congruence (Kim et al., 2018). Resource sharing involves investing and utilising assets and capabilities with SC partners (Cao et al., 2010). Creating joint knowledge enables promoting a clearer understanding and better reactions to changing markets and environments (Malhotra, Gosain, & Sawy, 2005). Common problem-solving implies an amicable settlement of disputes and disagreements among partners (Kumar et al., 2014), which can achieve mutually advanced process improvement. Building cross-functional/original teams and locating each other's personnel together to solve issues may progress into a virtual integration of SC processes and monitoring, and joint performance measurement can ensure successful collaborative efforts (Lee, Seo, & Dinwoodie, 2016; Min et al., 2005; Seo, Dinwoodie, & Kwak, 2014). Goal congruence applies when objectives are accomplished and satisfied by SC partners, and congruence implies a mutual consensus in company beliefs, practices, values, and features required for SCC (Cao et al., 2010). In addition to the adequate dedication of management time, financial and non-financial investments such as money, training, and technology are crucial for maintaining sustainable collaboration (Min et al., 2005).

3.2.5. Components of 'extended relationship strength'

3.2.5.1. Trust. Ganesan (1994) defines trust as the extent to which partners view each other as believable with respect to dependability, honouring obligations, and good faith. Trust is recognised as hard to obtain but essential (Fleming et al., 2020). The components of trust are credibility and honesty (Eyuboglu, Ryu, & Tellefsen, 2003), as are reliability and benevolence (Wang, Siu, & Barnes, 2008). Credibility is a company's credence of sincerity towards its partner in terms of the fulfilment of promises and obligations (Anderson & Narus, 1990). Trust can result in reduced costs in relation to prior negotiation, concluding contracts, and subsequent transactions. It can lead to lessening concerns, variability, and reduced transaction costs (Ganesan, 1994; Kwon & Suh, 2005; Wang et al., 2008).

Trust may constrain a partner's opportunistic behaviour and deter dominant partners from exercising power over fragile partners (Ganesan, 1994). Trust also makes partners believe that long-run idiosyncratic investments can be feasible with minimal risks

(Ganesan, 1994). The extent of trust depends on relative power; shippers may trust carriers but are not committed to them because other alternatives are available (Golicic, 2007). If a powerful partner trusts a vulnerable partner, the former is less likely to seek alternative suppliers and will be more tolerant towards short-term inequities (Kumar et al., 1995). However, it is difficult to establish trust, and the other party must prove its ability to solve problems as well as its loyalty (Min et al., 2005).

3.2.5.2. Sustainability. Sustainability continuously strengthens a cooperative relationship with another partner, embedding notions of devotion and a long-term orientation, which extend relationships, thereby stipulating allegiance and long-term expectations (Gardner et al., 1994). A high level of trust and commitment is required to implement SC performance successfully.

Commitment is an indirect or direct promise of continuing a relationship between partners that enables them to tolerate each other's insufficiencies (within reason) and coordinate rather than taking advantage of the circumstances (Dwyer & Oh, 1987; Min et al., 2005). Organisational commitment within SCs is akin to the weaker party being willing to conduct a long-term relationship, and quality increases with the level of commitment (Nyaga & Whipple, 2011). Long-term orientation indicates the longing of a partner to build a long-term partnership (Ganesan, 1994). Effective SCM requires the creation, continuation, and strengthening of long-term partnerships with SC partners (Kim, Dinwoodie, & Roh, 2020). As partners begin to trust each other because of the success of their collaborative arrangements, collaborative relationships and cooperation are likely to be reinforced (Min et al., 2005).

3.3. Concept construction

Fig. 1 illustrates the construction of cooperation and collaboration in this study. This study postulates that collaboration comprises components that represent cooperation and other components such as trust and sustainability that denote 'extended relationship strength'. As mentioned above, cooperation comprises sub-constructs such as transparency, fairness, and mutuality, which have their own indicators, and 'extended relationship strength' comprises trust and sustainability, which also have their own indicators.

3.4. CCSI definitions

CCSIs are indices based on a survey to measure and intuitively understand the current cooperative and collaborative relationship between shipping lines and shippers.

A measurement of collaboration is required for collaboration performance evaluations (Kumar et al., 2014). The collaboration index allows partners to find desirable collaborative practices (Simatupang & Sridharan, 2005). 'The index would impart knowledge regarding the depth of collaboration and would assist collaborative alliance in identifying and improving the areas that may need improvement' (Kumar & Banerjee, 2014, p. 185).

This study develops CCSIs according to types of shipping registered (seagoing and coastal), vessel types or sub-industries of shipping (container, bulk, tanker, and others), and overall CCSIs of the shipping industry of South Korea. The calculation of several different CCSIs is based on the proposition that the shippers would be different according to the sub-industry of shipping; accordingly, the attitudes of distinct shippers towards shipping companies would not be the same. The CCSIs are expected to be able to analyse and assess the overall experiences of shipping companies in relation to shippers. In addition, some policy tasks to improve the relationship between them can be derived.

3.5. Hypothesis development

The types of vessels according to traffic can be grouped into liners, tramps, and specialised vessels. Liners—containers—refer to vessels plying routes between ports at fixed prices regularly, whereas tramps do not have a regular operating schedule (Branch, 2007). Liner shipping operations are analogous to a bus line service and tramp shipping to a taxi service (Windeck & Stadtler, 2011). The tramp shipping industry is composed of dry bulk carriers and oil tankers (Thai, Tay, Tan, & Lai, 2014). Thus, broadly speaking, the types of vessels can be divided into containers, bulk, tankers, and others.

The container SC includes various parties in terms of transaction, logistics, and oversight layers, such as the government (Willis & Ortiz, 2004). More specifically, the parties in container SC include buyers and suppliers, logistics service providers, distributors, terminal operators, non-vessel operating common carriers (NVOCCs), freight forwarders, shipping companies, and hinterland transport

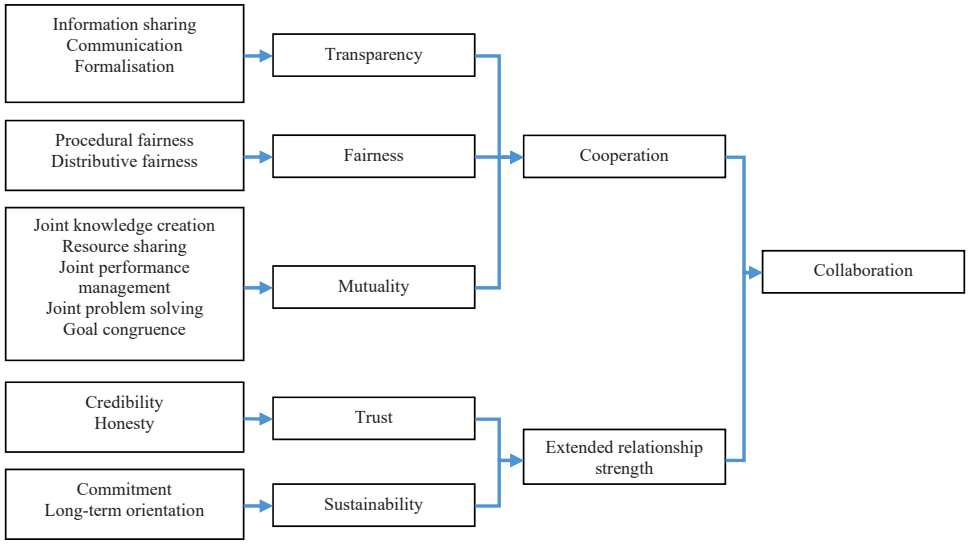

Fig. 1. Construction of cooperation and collaboration.

operators. Coordination among multiple players is crucial for overall SC performance (Fransoo & Lee, 2013). As users of logistics services, shippers experience the prices or logistics costs imposed by carriers (Talley & Ng, 2013). Freight forwarders, specialists for less than container load (LCL) containers, most of their revenues are earned from the consolidation of goods and managing customer's operations (Frémont, 2009). Ocean carriers contract with terminal operators, logistics service providers, hinterland carriers, and shippers (Fransoo & Lee, 2013). Unlike in North America, where shipping lines subcontract with inland transport providers, most shippers and freight forwarders contract with inland transport companies in Europe and Asia (Frémont, 2009; Lin, 2015). Dry bulk trade constitutes a main component of the SC for steel plants, metal producers, aluminium, and agro-food industries (Comtois & Lacoste, 2012). The five main bulk commodities are coal, iron ore, bauxite and alumina, grain, and phosphate rock (UNCTAD, 2016).

Shippers—users of transport services or cargo owners (Stopford, 2009)—can differ because of the complexity of international transport transactions (UNCTAD, 2016) and vessel types. Shippers contract with ocean shipping lines directly or with a third party, such as NVOCCs and logistics service providers, to handle their container shipments by selling reserve spaces to them (Fransoo & Lee, 2013). For full container load (FCL) cargo, both shipping lines and freight forwards have direct relationships with shippers (Frémont, 2008). Conversely, regarding LCL cargo, freight forwarders act as the main customers of shipping companies by contracting with shippers (Frémont, 2009; Lin, 2015). In the Asia-North America ocean container route, direct contracts between shippers and shipping lines account for approximately 70%, whereas around 70% of contracts belong to the contract between freight forwarders on behalf of shippers and shipping companies in Asia-Europe (Fransoo & Lee, 2013). Thus, freight forwarders and NVOCCs function as *de facto* shippers to shipping lines. Trade agreement terms such as cost insurance freight between sellers and buyers also determine the shippers, along with the cargo owner types (Lin, 2015). Exporters and importers are also considered shippers (Kent & Parker, 1999). Manufacturers tend to assign all the logistics processes to freight forwarders, while branders and large retailers usually exert their bargaining power and prefer to make separate contracts with freight forwarders and shipping carriers (Lin, 2015).

Regarding bulk carriers and tankers, companies in industries such as mining (iron ore, coal, and others), building materials (cement, steel, and others), grain, oil, petroleum, and chemicals, as well as traders are also regarded as tramp shipping shippers (Thai et al., 2014). Fundamental industries such as oil refineries and steel producers sometimes develop their own transport systems (Stopford, 2009), and tramp cargo buyers with their own ports tend to act as shippers and terminal operators (Lin, 2015).

As of late May 2016, there were 183 oceangoing and 723 coastal shipping companies in South Korea (MOF, 2016). The total gross tonnage (GT) and numbers of vessels are listed in Table 1. The number of coastal shipping companies is four times that of oceangoing companies, whereas the total GT of coastal shipping companies is merely 3% of that of the seagoing companies. The average GT and number of vessels per company in the seagoing shipping were 344,181 GT and 8.7, whereas those in the coastal shipping were 2645 GT and 2.9, respectively. Thus, we ascertain that compared to oceangoing shipping, coastal shipping mostly consists of small businesses.

Table 1
Present condition of the shipping industry in South Korea.
Source: Adapted from MOF (2016).

	Number of companies	%	Total GT	%	Number of vessels	%
Ocean-going	183	20.2	62,985,058	97.1	1596	43.6
Coastal	723	79.8	1,912,111	2.9	2063	56.4
Total	906	100	64,897,169	100	3659	100

In general, coastal shipping supplies logistics services between domestic ports, whereas oceangoing shipping delivers commodities between domestic and foreign ports or between foreign ports. Differing business scope and sizes imply different kinds of shippers, cooperation, and collaborations, thereby suggesting the following hypothesis:

H1. A difference exists in the extent to which shippers in oceangoing and coastal shipping cooperate and collaborate with their shipping companies.

As mentioned above, over time, shippers have handled different types of cargo, and consequently, various vessels have evolved. Eventually, shippers began contracting with shipping companies possessing specialist vessels. Accordingly, different types of vessels have particular shippers, and idiosyncratic shippers have different attitudes towards shipping companies regarding cooperation and collaboration. Thus, we posit the following hypothesis:

H2. There is a difference in the extent to which shippers of various types of vessels cooperate and collaborate with their shipping companies.

Similarly, contract periods with shippers may vary by vessel type. In liner shipping, direct shippers purchase freight services from container shipping companies typically on a one-year contract, but freight forwarders contract for less than three months (Frémont, 2015; Fransoo & Lee, 2013). Long-term contracts between shippers and shipping companies underpin the tramp shipping of iron ore, forest products, motorcars, and oil and LPG tanker transport (Stopford, 2009), thereby leading to the following hypothesis:

H3. Different contract periods indicate different levels of cooperation and collaboration between shippers and shipping companies.

H4. Different types of vessels combined with different contract periods indicate different levels of cooperation and collaboration between shippers and shipping companies.

These hypotheses were tested by comparing the CCSIs between different shipping types, vessel types, and contract periods.

4. Methods

To reduce human errors and increase content validity in developing questionnaire items, shipping experts' review, two rounds of Q-sorting, and a pilot test were utilised as follows. After refining the items, 24 questionnaire items overall were distributed for a large-scale survey.

4.1. Development of the measurement instrument

Seventy-six initial items and relevant sub-constructs indicating a cooperative and collaborative spirit were compiled through a literature review. Item listings were emailed to 11 shipping experts with over 20 years of experience in the shipping industry in South Korea. To develop industrially bespoke measures, experts were requested to sort and discard items that were inappropriate or irrelevant to SCs. The sorting yielded 40 items. Finally, after deleting redundant items and merging similar items into a new item with a common meaning, 24 items remained. A qualitative Q-sort technique was employed to ensure transparency, mutuality, and sustainability. The Q-sort technique can be utilised to identify concepts that have not been firmly established in the literature or in developing new scales. Two rounds of Q-sorting of the 24 items and five

Table 2
Description of sub-constructs and their items.

Sub-constructs	Item code	Item description	Reference
Transparency	TRA1	Shippers exchange relevant and timely information with our firm	Cao et al. (2010), Daugherty et al. (2006), Dwyer and Oh (1987), Kim et al. (2018), Kumar et al. (2014), Min et al. (2005), Mohr and Nevin (1990) and Richey et al. (2010)
	TRA2	Shippers and our firm communicate smoothly with each other	
	TRA3	Shippers make communication with our firm open and two-way	
	TRA4	The relationship between shippers and our firm is understood clearly and transparently through prior agreements	
Fairness	FAI1	Shippers do not discriminate our firm against other shipping companies	Bensaou (1997), Griffith et al. (2006), Harland et al. (2004), Hornibrook et al. (2009), Kim et al. (2010), Konovsky (2000), Korsgaard et al. (1995), Kumar et al. (1995), Nassirnia and Robinson (2013) and Simatupang and Sridharan (2005)
	FAI2	Shippers try to comply with the regulations related to business transactions	
	FAI3	Shippers make an effort to guarantee reasonable and just profits for our firm	
	FAI4	Shippers make an effort to bear reasonably and justly any additional risks, burden, and costs related to delivery with our firm	
Mutuality	MUT1	Shippers understand our firm's services well and are willing to assist us	Cao et al. (2010), Kumar and Nath Banerjee (2014), Kim et al. (2018), Malhotra et al. (2005), Min et al. (2005) and Thomson et al. (2009)
	MUT2	Shippers are willing to provide their facilities and equipment for our firm	
	MUT3	Shippers are willing to provide financial support for our firm	
	MTU4	Shippers are willing to assist our firm in overcoming any difficulties we face	
	MUT5	Shippers and our firm agree common implementation plans and objectives	
	MUT6	Shippers and our firm, as equal business partners, decide together the availability level of our facilities and equipment	
	MUT7	Shippers and our firm identify together customer needs related to delivery	
	MUT8	Shippers and our firm identify together customer needs related to delivery	
Trust	TRU1	Overall, shippers are trustworthy	Anderson and Narus (1990), Eyuboglu et al. (2003), Fleming et al. (2020), Ganesan (1994), Golicic (2007), Kumar et al. (1995), Kwon and Suh (2005), Min et al. (2005) and Wang et al. (2008);
	TRU2	We believe the good faith offered by shippers	
	TRU3	We believe that shippers fulfil their contractual obligations	
	TRU4	We believe that shippers benefit our firm	
Sustainability	SUS1	The relationship between shippers and our firm is stable	Dwyer and Oh (1987), Ganesan (1994), Gardner et al. (1994), Hornibrook et al. (2009), Kim et al. (2020), Min et al. (2005) and Nyaga and Whipple (2011)
	SUS2	The relationship between shippers and our firm will last and strengthen	
	SUS3	Shippers try to develop new business plans or ideas together with us	
	SUS4	Shippers enhance their relationship with our firm by expanding markets jointly	

sub-constructs were conducted with 25 experts in the spring of 2016. The second round demonstrated a solid overall agreement rate of 97%, thereby verifying the existence of the research sub-constructs. Following Q-sorting, pilot testing was conducted and included 3 academics and 31 practitioners representing coastal and oceangoing shipping, container, bulk, tanker, and other ships, and different-sized organisations. Experts were invited to complete all the questions to test for reliability and internal consistency. All scale scores exceeded 0.900, ranging from fairness (= 0.919) to mutuality (= 0.972) (Kim et al., 2020). Table 2 lists the 24 items obtained through the pilot test. A 7-point Likert scale was used to measure the extent to which managers agreed or disagreed with each item, where 1 = *strongly disagree*, 2 = *disagree*, 3 = *slightly disagree*, 4 = *neutral*, 5 = *slightly agree*, 6 = *agree*, and 7 = *strongly agree*.

4.2. Data collection

As mentioned in Section 3.5, there are 183 oceangoing and 723 coastal shipping companies in South Korea's shipping industry (MOF, 2016). Among the coastal shipping companies, private companies were excluded from this study because a private company represents a relatively small portion of GT in coastal shipping. In practice, most of them are small businesses that are almost impossible to contact; it is also considerably difficult to identify whether the companies actually manage their business. Therefore, a census was considered impossible, and the sample was restricted to corporations (420) among all coastal shipping companies (723). In the summer of 2016, 183 oceangoing and 241 coastal shipping companies for which contact information could be acquired were contacted via Korea ship-owners' associations. Two emails and two telephone reminders produced responses from 89 oceangoing and 85 coastal companies; only 167 of these were usable because one response had missing data, and six showed unengaged attitudes. Only one response per company was collected to avoid biased results. All respondents were restricted to management and staff who were in charge of contracts with shippers. After excluding ineligible and unreachable responses from a sample, the total response rate of this research was 25.5%, and the active response rate was 39.0%. Based on the hypothesis that non-respondents' views probably mimic those of late respondents, independent-sample *t*-tests for non-response bias compared the central tendency of 30 early and 30 late responses (Armstrong & Overton, 1977). The outcomes showed that non-response bias for the 24 variables was unlikely ($p < 0.05$).

Table 3 illustrates the respondents' representation with various types of shipping, vessels, work experience, roles, and contract period. Moreover, job titles affirmed sufficient knowledge to ensure authoritative responses (Kim et al., 2018).

Table 3
Demographic data (167 responses).

Variables	Frequency	Percentage
Shipping registered		
Coastal	78	46.7
Oceangoing	89	53.3
Vessel type		
Container	16	9.6
Bulk carrier	66	39.5
Tanker	51	30.5
Others	34	20.4
Work experience		
< 5 years	18	10.8
5–9 years	28	16.8
10–19 years	90	53.8
≥20 years	31	18.6
Job title		
(Senior) Director/CEO	36	21.6
Department manager	58	34.7
Manager/Deputy department manager	54	32.3
Staff/Assistant manager	19	11.4
Employee		
< 10	18	10.8
10–49	60	35.9
50–99	43	25.7
100–199	21	12.6
≥200	25	15.0
Contract period		
< 1 year	55	32.9
1–2 years	56	33.5
3–9 years	28	16.8
≥10 years	28	16.8

4.3. Exploratory factor analysis

After the initial judgemental Q-sorting, exploratory factor analysis (EFA) was conducted for further purification by utilising maximum likelihood (ML) and direct oblimin (DO). A principal component analysis enables data reduction but fails to distinguish between shared and unique variance and may inflate the estimates of the variance explained by factors, thereby frustrating generalisation. ML is less problematic and maintains consistency with confirmatory factor analysis tested by AMOS. Further, oblique rotation was selected because a certain factor inter-correlation is common in social sciences (Costello & Osborne, 2005; Pedhazur & Schmelkin, 2013).

The EFA of 16 items presumed to represent cooperation detected no cross-loadings, but one free-standing indicator variable (Table 4: MUT2) was deleted. The ratio of observations to variables (167:16) was acceptable (Hair, Black, Babin, & Anderson, 2014). Bartlett's test results were highly significant (χ^2 = 2868.796, *df* = 105, p = 0.000); the Kaiser-Meyer-Olkin (KMO) measure of sampling accuracy scores (0.945) revealed that the EFA was appropriate. Furthermore, variables with factor loadings exceeding 0.45 were selected as the sample size, and all variable communalities exceeded 0.5 (Hair et al., 2014). Three factors were selected for analysis, each with eigenvalues exceeding 0.7; together, these explained 82.5% of the total variance. Variables MUT1 to MUT8 loaded highly on Factor 1, and Factor 2 was characterised by variables FAI1 to FAI4, while Factor 3 had four distinctive characteristics (TRA1 to TRA 4). Items with sufficient factor loadings on the same factor indicated mutuality (Factor 1), fairness (Factor 2), and transparency (Factor 3).

The EFA of 24 items initially indicating collaboration yielded no cross-loadings, but two free-standing items (Table 5: MUT2 and SUS1) were eliminated. A 7:1 ratio of observations to variables was acceptable. For the remaining 22 items, the adequacy of EFA was identified using the KMO measure (0.944) and Bartlett's test (χ^2 = 4195.77, *df* = 231, p = 0.000). Five common factors with initial eigenvalues exceeding 0.7 explained 83.3% of the total variance.

Table 4
EFA result for cooperation.

Item	Factor			Communality
	1	2	3	
MUT6	0.958			0.902
MUT3	0.882			0.657
MUT7	0.829			0.759
MUT4	0.806			0.732
MUT5	0.803			0.889
MUT8	0.762			0.822
MUT1	0.566			0.767
FAI3		−0.874		0.937
FAI4		−0.760		0.839
FAI1		−0.699		0.571
FAI2		−0.687		0.670
TRA3			0.827	0.879
TRA2			0.819	0.644
TRA1			0.653	0.720
TRA4			0.627	0.818
Eigenvalues	10.422	1.081	0.872	
% of Variance	69.477	7.205	5.811	
Cumulative %	69.477	76.683	82.494	

Extraction Method: ML Rotation Method: Oblimin with Kaiser normalisation.
Factor 1: Mutuality, Factor 2: Fairness, Factor 3: Transparency.

Twenty-two items with factor loadings exceeding 0.45 were retained, and the factor correlations from +0.435 to +0.695 and −0.543 to −0.690 indicated that oblique rotation was preferred (Pedhazur & Schmelkin, 2013). Items with sufficient factor loadings on the same factor suggested fairness (Factor 1), sustainability (Factor 2), mutuality (Factor 3), transparency (Factor 4), and trust (Factor 5).

4.4. Confirmatory factor analysis

Validity and reliability methods using a two-step SEM procedure were used to test the measurement accuracy (Hair et al., 2014). For cooperation, the overall model indicated a good fit: χ^2 = 273.066 (87 degrees of freedom [*df*], p = 0.000). Given that n = 167, the standardised root mean squared residual (SRMR, 0.0395) was an appropriate absolute fit index with significance < 0.05, which is a conservative threshold. The comparative fit index (CFI, 0.935) and Tucker-Lewis index (TLI, 0.922) both exceeded the critical values (> 0.90). Regarding convergent validity, all standardised factor loadings were > 0.7 and corresponding squared factor loadings > 0.5. TRA2 had the lowest factor loading of 0.752, and its squared factor loading was 0.566. The values and statistical significance of the critical ratio implied that all factor loadings were reasonable and statistically significant (p < 0.01). The average variance extracted (AVE) estimates ranged from 0.745 (transparency) to 0.779 (mutuality), exceeding the critical threshold of 0.5 (Hair et al., 2014). Composite reliabilities (CR) between 0.921 (transparency) and 0.961 (mutuality) represented adequate reliability (> 0.7; Hair et al., 2014). In all cases, the value of Cronbach's α exceeded 0.7. The overall model fit indices for the cooperation measurement model supported convergent validity and discriminant validity, given that all square roots of AVE estimates exceeded the corresponding pairwise correlation estimates among the sub-constructs.

Furthermore, the measurement model for collaboration includes 22 measured indicator variables and 5 latent variables, with the subconstruct of trust represented by four items and that of sustainability by three. The overall model fit was good (χ^2 = 507.879; *df* = 199; RMR = 0.0426 [p < 0.05]; TLI = 0.914; CFI = 0.926). Regarding convergent validity, all standardised factor loadings were > 0.7, and the corresponding squared multiple correlations were > 0.5. Item TRA2 had the lowest factor loading (0.754) and squared multiple correlation (0.568). All factor loadings were reasonable and statistically significant (p < 0.01). All AVE estimates (0.746–0.814) were > 0.5. The CRs ranged from 0.914 to 0.961 and Cronbach's α

Table 5
EFA result for collaboration.

Item	Factor					Communality
	1	2	3	4	5	
FAI3	0.703					0.942
FAI4	0.576					0.837
FAI1	0.523					0.577
FAI2	0.496					0.675
SUS3		0.861				0.923
SUS4		0.774				0.879
SUS2		0.541				0.722
MUT6			−0.969			0.907
MUT5			−0.848			0.901
MUT3			−0.787			0.658
MUT7			−0.785			0.765
MTU4			−0.717			0.742
MUT8			−0.683			0.830
MUT1			−0.585			0.772
TRA3				−0.841		0.890
TRA2				−0.777		0.648
TRA4				−0.646		0.819
TRA1				−0.641		0.718
TRU3					0.858	0.686
TRU2					0.834	0.873
TRU1					0.733	0.742
TRU4					0.672	0.656
Eigenvalues	14.263	1.354	1.10	0.877	0.725	
% of Variance	64.83	6.154	5.024	3.987	3.296	
Cumulative %	64.83	70.985	76.009	79.996	83.291	

Extraction Method: ML Rotation Method: Oblimin with Kaiser normalisation.
Factor 1: Fairness, Factor 2: Sustainability, Factor 3: Mutuality, Factor 4: Transparency, Factor 5: Trust.

Table 6
Comparison of the model fit.

Null (M0)									
Cooperation					Collaboration				
χ^2	DF	SRMR	TLI	CFI	χ^2	DF	SRMR	TLI	CFI
2973.2	105	0.6335	0	0	4412.8	231	0.6077	0	0
One factor (M1)									
χ^2	DF	SRMR	TLI	CFI	χ^2	DF	SRMR	TLI	CFI
633.0	90	0.0679	0.779	0.811	1228.1	209	0.0695	0.731	0.756
M0–M1									
χ^2	DF	SRMR	TLI	CFI	χ^2	DF	SRMR	TLI	CFI
2340.2***	15	SI	SI	SI	3184.7***	22	SI	SI	SI
Second order factor (M2)									
χ^2	DF	SRMR	TLI	CFI	χ^2	DF	SRMR	TLI	CFI
273.0	87	0.0395	0.922	0.935	525.2	204	0.0471	0.913	0.923
M1–M2									
χ^2	DF	SRMR	TLI	CFI	χ^2	DF	SRMR	TLI	CFI
360.0***	3	SI	SI	SI	702.9***	5	SI	SI	SI

Note. ***: significant at the 0.001 significance level, SI: Significantly Improved.

from 0.914 to 0.960, exceeding the minimum criterion (0.7). In addition, measures taken overall strongly supported the convergent validity of the measurement model for collaboration and discriminant validity. All correlations among sub-constructs that explained collaboration were significant ($p < 0.01$), and all values of square roots of AVEs exceeded the corresponding pairwise correlations among the sub-constructs (Kim et al., 2018). For a better understanding, the thresholds of model fit and criteria for construct validity are provided in the appendices.

The target coefficient (*T*-coefficient) assessed the efficiency of the second-order factor model. The *T*-coefficient (T) is the relative ratio of χ^2 in the first-order and second-order models, where $T \geq 0.8$, a second-order construct exists, and the second-order structure is efficient (Cao & Zhang, 2010). Cooperation was measured indirectly using first-order factor indicators that load on the second-order factor. Further, standardised factor loadings of measurement items on respective first-order factors (0.75–0.96) were all significant ($p < 0.01$). The standardised factor loadings of first-order factors on second-order factors (0.90–0.93) and strong paths demonstrated statistical significance ($p < 0.01$), explaining 81% (transparency), 87% (fairness), and 81% (mutuality) of the variation in the second-order construct. The *T*-coefficient between the first- and second-order factor models was 1, which shows good evidence of the existence of a higher-order construct—cooperation. The estimates were strong and significant ($p < 0.01$) in testing the existence and efficiency of the collaboration second-order factor model. The second-order factor explained 76% of the variation in transparency, 68% of sustainability, 72% of trust, 85% of mutuality, and 86% of fairness. The model fit indices satisfied the recommended thresholds. The *T*-value (0.967) indicated that an efficient and valid second-factor model and first-order factors were sufficiently explained by the second-order construct—collaboration (Kim et al., 2018).

A comparison of the three models identified the possibility of common method bias, convergent validity, and discriminant validity. Significant $\Delta\chi^2$ statistics (regarding collaboration, $\Delta\chi^2$ (22) = 3184.7, $p < 0.01$ between the null and one-factor models, $\Delta\chi^2$ (5) = 702.9,

Table 7
Weights of 15 indicators and 3 sub-constructs of cooperation.

Item	Squared factor loading			Weight of item		
	1	2	3	1	2	3
MUT6	0.918			0.100		
MUT3	0.778			0.085		
MUT7	0.687			0.075		
MUT4	0.650			0.071		
MUT5	0.645			0.071		
MUT8	0.581			0.064		
MUT1	0.321			0.035		
FAI3		0.763			0.093	
FAI4		0.578			0.070	
FAI1		0.488			0.060	
FAI2		0.472			0.058	
TRA3			0.683			0.089
TRA2			0.671			0.088
TRA1			0.427			0.056
TRA4			0.393			0.051
EV[a]	9.138	8.196	7.666			
WF[b]	0.366	0.328	0.307			

Factor 1: Mutuality; Factor 2: Fairness; Factor 3: Transparency.
[a] Explained variance implies the variance explained by the factor.
[b] Weight of factor: the proportion of the variance of a factor divided by the sum of the variances explained by the five factors

$p < 0.01$ between the one-factor and second-order factor models) and improved model fit indices from the null model to the second-order factor model (Table 6) revealed that the possibility of common method bias is minimised and of limited concern (Kim et al., 2018).

4.5. CCSI profiles

The weighted averages of the factors and indicators were used to calculate CCSIs (OECD, 2008). Following EFA, items with high loadings on each factor were weight-averaged to calculate each factor's index (Hair et al., 2014; Pedhazur & Schmelkin, 2013). Table 7 presents the computed weights of items and factors. For each item, the variance explained by each factor is represented by the squared factor loading. Item weight is the squared factor loading divided by the variance explained by a factor (OECD, 2008). A factor weight shows the proportion of the variance explained for that factor, divided by the sum of variances explained for all factors. Taking MUT6 as an example for cooperation, the squared factor loading (= 0.918) divided by the variance explained by Factor 1 (= 9.318) generates an item weight of 0.1000. The weight of Factor 1 (0.366) represents the percentage of variance explained by Factor 1 (9.138), divided by the summed variance explained by all three factors (9.138 + 8.196 + 7.666). Factor weights varied from 30.7% (*transparency*) to 36.6% (*mutuality*). The weights of 22 items and 5 sub-constructs of collaboration were calculated through the same process (Table 8).

A factor score is computed as the weighted average of items:

$$\text{Factor score} = \frac{\sum x_i w_i}{\sum w_i},$$

where.

$\sum w_i$ = the summed weights of item i and.

$\sum x_i w_i$ = the summation of each item's average score (x_i) multiplied by its weight (w_i).

CCSIs are calculated using the weighted average of factors:

$$\text{CCSIs} = \frac{\sum f w_f}{\sum w_f},$$

where.

$\sum w_f$ = the weights of each factor, which sum to unity, and.

$\sum f w_f$ = the summation of each factor score multiplied by its factor weight.

Finally, the index is scaled from 0 to 100, thereby enabling the computation of a cooperative spirit index (CSI1 = 55.0) and collaborative spirit index (CSI2 = 57.0; Table 10).

4.6. Comparison of differences in cooperative and collaborative spirit indices

4.6.1. Differences between types of shipping registered

Multivariate analysis of variance (MANOVA) was deployed to examine differences in the groupings of CCSIs. In testing H1, a cursory inspection revealed higher CCSIs for coastal shipping. The assumptions of independence between observations underpinning MANOVA were met through saturation sampling. Multivariate normality was attained because no higher-order moments of dependent variables differed significantly from normality ($p < 0.05$) identified by z-values < |1.96| for skewness (CSI1 = 0.665; CSI2 = 1.16) or kurtosis (CSI1 = −0.909; CSI2 = −1.168). CCSIs both separately and collectively meet homoscedasticity assumptions, as both Levene's test (CSI1, $p = 0.534$; CSI2, $p = 0.140$) and Box's test ($p = 0.158$) are insignificant at $p < 0.05$. Further, Bartlett's sphericity test indicates a significant correlation ($p = 0.000$) between dependent variables (Hair et al., 2014). No multivariate test statistic showed a significant difference between the coastal and oceangoing shipping companies ($p < 0.05$). The following are the main effects and power statistics for Pillai's trace (PT): V (value) = 0.027, F (2, 164) = 2.245, p (0.109) > 0.1, η^2 = 0.027, P (power) = 0.452. The univariate tests for each dependent variable indicated no significant difference ($p = 0.117$ for cooperation, $p = 0.240$ for collaboration), and a post-hoc test was inappropriate with only two groups (Hair et al., 2014). Consequently, H1 is rejected.

4.6.2. Differences among vessel types and contract periods

The possibility of joint effects and the main effects of vessel types and contract periods on CCSIs were examined. Following Box's test (significance = 0.120), a null hypothesis of equality of variance-covariance matrices was accepted ($p < 0.05$). Levene's test for CCSIs showed non-significant values (cooperation = 0.815; collaboration = 0.974). Multivariate and univariate tests indicated compliance with the assumptions of homoscedasticity. Further, multivariate statistics suggest an insignificant interaction effect between vessel type and contract period (PT $V = 0.065$, F (14, 306) = 0.735, $p = 0.738$, $\eta^2 = 0.33$, P (power) = 0.469), thereby implying a rejection of H4. Hence, direct effects were examined without adjustment. In addition, multivariate testing with different group sizes using PT demonstrated significant effects of contract periods and vessel types on CCSIs (for the contract period, V = 0.129, F (6, 306) = 3.512, p (0.002) < 0.01, η^2 = 0.64, $P = 0.948$; for vessel types, V = 0.081, F (6, 306) = 2.166, p (0.046) < 0.05, $\eta^2 = 0.41$, $P = 0.767$). The power measures are good for contract periods and acceptable for vessel types, thereby supporting H2 and H3. The values of η^2 imply that contact periods have a greater effect on CCSIs than vessel types. Similarly, follow-up univariate analyses of variance (ANOVAs) on dependent variables revealed significant effects of contract periods and vessel types on CCSIs. The following are the CSI1 results: contract periods, F (13, 153) = 6.234, $p < 0.01$; vessel types, F (13, 153) = 2.880, $p < 0.05$. The results for CSI2 were as follows: contract periods with F (13, 153) = 6.872, $p < 0.01$; vessel types with F (13, 153) = 2.839, $p < 0.05$. Tests of 'between-subjects effects' generated p-values that indicate significant differences between groups regarding contract periods and vessel types, thereby implying that the CCSIs are significantly affected.

Post-hoc tests were applied to compare CCSIs grouped by contract period and vessel type (Table 9). According to Tukey's LSD test, in terms of contract periods for CSI1, the 'less than 1 year' group showed a significant difference from the '3–9 years' ($p = 0.003$) and 'more than 10 years' ($p = 0.000$) groups at the 0.01 significance level.

Table 8
Weights of 22 indicators and 5 sub-constructs of collaboration.

Item	Squared factor loading					Weight of item				
	1	2	3	4	5	1	2	3	4	5
FAI3	0.515					0.059				
FAI4	0.394					0.040				
FAI1	0.288					0.033				
FAI2	0.253					0.029				
SUS3		0.744					0.086			
SUS4		0.597					0.069			
SUS2		0.294					0.034			
MUT6			0.937					0.078		
MUT5			0.721					0.060		
MUT3			0.624					0.052		
MUT7			0.612					0.051		
MTU4			0.516					0.043		
MUT8			0.468					0.039		
MUT1			0.336					0.028		
TRA3				0.706					0.074	
TRA2				0.601					0.063	
TRA4				0.420					0.044	
TRA1				0.410					0.043	
TRU3					0.736					0.073
TRU2					0.696					0.069
TRU1					0.534					0.053
TRU4					0.454					0.045
EV[a]	8.734	8.650	12.008	9.534	10.079					
WF[b]	0.178	0.177	0.247	0.196	0.207					

Factor 1: Fairness; Factor 2: Sustainability; Factor 3: Mutuality; Factor 4: Transparency; Factor 5: Trust.
[a] Explained variance implies the variance explained by the factor.
[b] Weight of factor: the proportion of the variance of a factor divided by the sum of the variances explained by the five factors.

Table 9
Post-hoc pairwise comparison with Turkey LSD.

Dependent variables	Comparison among contract period groups		P	Comparison among vessel type groups		P
CSI1	< 1	1–2	0.188	Container	Bulk	0.213
		3–9	**0.003**		Tanker	0.116
		≥10	**0.000**		**Others**	**0.014**
	1–2	< 1	0.188	Bulk	Container	0.213
		3–9	0.058		Tanker	0.576
		≥10	**0.013**		**Others**	**0.056**
	3–9	**< 1**	**0.003**	Tanker	Container	0.116
		1–2	0.058		Bulk	0.576
		≥10	0.594		Others	0.174
	≥10	**< 1**	**0.000**	Others	Container	0.014
		1–2	**0.013**		**Bulk**	**0.056**
		3–9	0.594		tanker	0.174
CSI2	< 1	1–2	0.157	Container	Bulk	0.416
		3–9	**0.006**		Tanker	0.215
		≥10	**0.000**		**Others**	**0.058**
	1–2	< 1	0.157	Bulk	Container	0.416
		3–9	0.100		Tanker	0.489
		≥10	**0.008**		Others	0.098
	3–9	**< 1**	**0.006**	Tanker	Container	0.215
		1–2	0.100		Bulk	0.489
		≥10	0.380		Others	0.317
	≥10	**< 1**	**0.000**	Others	**Container**	**0.058**
		1–2	**0.008**		Bulk	0.098
		3–9	0.380		Tanker	0.317

The '1–2 years' group showed significant discrimination with the 'more than 10 years' group ($p = 0.013$). The effect of contract periods on CSI2 demonstrated the same pattern as that of CSI1.

By vessel type, only 'container' was significantly different from 'other groups' at the 0.05 significance level ($p = 0.014$) for CSI1. The difference between 'bulk' and 'others' was marginally significant ($p = 0.056$). No other significant differences were detected. For CSI2, the difference between 'container' and 'others' also showed a marginal significance ($p = 0.058$). No other differences in vessel types in CSI2 were revealed.

Table 10
CCSI profiles and the results of hypothesis tests.

The SC	CSI1 55	CSI2 57	Hypothesis -	Reject/Accept -
Shipping types registered				
Coastal	58	59	H1	Rejected
Oceangoing	53	56		
Vessel types				
Container	48	52	H2	Accepted
Bulk	54	56		
Tanker	56	58		
Others	61	62		
Contract periods				
> 1	50	51	H3	Accepted
1–2	54	56		
3–9	62	62		
≥10	64	66		

5. Findings and discussion

Table 10 illustrates the CCSIs computed by shipping registered, vessel types, and contract periods. Indices for coastal shipping exceed those for oceangoing shipping. By vessel type, the indices for 'other' ships exceed those for tankers, bulks, and containers. In terms of contract periods, longer contracts show higher CCSIs.

The cooperation and collaboration between SC members represent a CSI1 of 55 and a CSI2 of 57. According to CCSIs by shipping types registered, it appears that coastal shipping companies (CSI1 = 58 and CSI2 = 59) regard their powerful SC partners as having more cooperative and collaborative attitudes than oceangoing shipping companies (CSI1 = 53, CSI2 = 56). Although it appears that there is a difference between the two types of shipping companies, the difference is not supported by the empirical test, MANOVA, rejecting Hypothesis 1. In other words, it is revealed that Korean shipping companies, regardless of the types of shipping registered, consider the cooperative and collaborative attitudes of their shippers as not high.

Meanwhile, the MANOVA demonstrated statistically significant differences among the CCSIs in terms of vessel types and contract

Table 11
Overall CCSIs and factor score.

	Transparency	Fairness	Mutuality	Trust	Sustainability	Overall
CSI1	58	56	50	–	–	55
CSI2	58	56	50	65	56	57

periods. Thus, Hypotheses 2 and 3 are accepted. The joint effects of vessel types and contract periods do not indicate any significant differences, leading us to reject Hypothesis 4. Nevertheless, as the contract period increases, the CCSIs of vessel types grow steadily, which shows that CCSIs of vessel types can be closely related to those of the contract period. The differences between container (CSI = 48 and CSI = 52) and others (CSI1 = 61 and CSI2 = 62) among vessel types are the most distinctive. More long-term contracts represent higher CCSIs. The differences in CCSIs are noticeable between contract periods of 'less than 1′ and 'over 3 years'.

Although vessel types and contract periods have a relatively close relationship and each shows a significant difference in terms of CCSIs, it is more rational to consider the contract period as affecting CCSIs more closely and consistently than types of vessels. In other words, the contract period, regardless of vessel type, indicates a consistent trend of CCSIs, whereas vessel types considering the contract period concurrently do not show a coherent tendency as much as the contract period. This can be explained by the fact that most container shipping companies unquestionably have short-term contracts with shippers, whereas bulk and tanker carriers show mixed contracts—both short-and long-term contracts.

Further, it can also be more reasonable to deem that although the contract period clearly and coherently affects CCSIs of different kinds of vessels, the contract period is only one of several elements that can affect the CCSI by vessel type. Other elements, such as various characteristics of different shippers, can explain the different CCSIs according to the vessel type.

CCSIs quantify the state of SC cooperation and collaboration and can suggest improvement strategies. On both CSI1 and CSI2, mutuality (50) and fairness (56) components recorded lower factor scores than transparency (58), although trust (65) increased the overall score of CSI2 to 57, two points above CSI1 (Table 11).

The lowest scores of mutuality reveal that shipping companies perceive little financial support or assistance from shippers to overcome difficulties, and common implementation of planning and performance reviews rarely succeeded, thereby implying fundamentally weak exchange relationships in SCs.

Fairness—one of the important components of cooperation and collaboration—represents the second lowest score among the CCSI components. Distributive fairness is deemed less applicable than procedural fairness, as shipping companies regard the reasonable and just sharing of profits and burdens with powerful shippers as insufficient. Further, low attitude scores of dominant partners towards dividing gains and costs decrease satisfaction amongst shipping companies (Harland et al., 2004) and hinder the building of trust and true cooperation between SC members.

Low sustainability scores imply that influential members belittle 'relationship extendedness', which involves the joint development of new business plans or expanding new markets. Hence, the findings show that shipping companies cannot be fully confident of extended relationships with their partners.

Transparency, such as information sharing and frequent contact in the SC, is considered relatively good. However, limited open and two-way communication reflects the superior power of shippers.

Moreover, despite relatively low CCSI scores, weaker SC members show comparatively strong trust towards superior partners. This is because shipping companies firmly believe in the fulfilment of the contractual obligations of shippers, with regulations concerning business transactions and laws governing fair trade being passably well observed by powerful members.

Overall, it is possible to evaluate cooperation and collaboration as being at extremely modest levels. The lack of spirit of mutuality, distributive fairness, 'relationship extendedness', and two-way communication negatively influence the construction of higher levels of cooperative and collaborative relationships between the SC members.

6. Conclusion

6.1. Contributions to theories

This research supports findings from the TCT that benign and credible transactions are realistic (Heaver, 2015), as inter-firm cooperation decreases transaction costs and realises mutual gains. In addition, shipper superiority coupled with modest CCSIs imply that market or 'muscular' transactions predominate. However, long-term contracts and correspondingly higher CCSIs indicate 'benign' and 'credible' transactions as hybrid forms of transactional governance.

From the perspective of the RBT, SC cooperation and collaboration are intangible resources and capabilities that build sustainable competitive advantage. Shipping companies with higher CCSIs can gain a competitive advantage because vulnerable members are revenue-dependent on shippers, and cooperation and collaboration benefits accumulate over time.

Within the RDT, resource exchanges shape inter-firm relationships driven by power relations (Ulrich & Barney, 1984). Firms capable of reducing others' power over themselves, in turn, escalate their power over others (Hillman et al., 2009). This perspective of RDT may partially explain the attitudes of dominant SC members because shippers need to cooperate and collaborate with shipping companies in resources and services and simultaneously switch carriers in a competitive industry (Golicic, 2007). CCSI scores by vessel type highlight shippers' ability to exert power efficiently over weaker SC members. Low CCSIs for containers indicate that shippers have effectively reduced the power shipping lines wielded over them and their dependence on shipping lines.

SET informs the research conceptual model regarding fairness, commitment (Korsgaard et al., 1995), and long-term orientation (Griffith et al., 2006). A highly significant path coefficient for fairness indicates that weaker SC members regard fairness as the pivotal antecedent of trust. Further, SEM supports the proposition that trust has a direct and positive influence on sustainability, which comprises the concepts of commitment and long-term orientation (Kim et al., 2018). Thus, the essential concepts of SET within the context of maritime logistics and relationships among the concepts are strongly supported.

Further, CCSIs can provide a criterion to define the type of relations in SCs and the extent of goodwill. Low CCSIs in container shipping can imply widespread market or hierarchical relations and insufficient or unsatisfactory goodwill from shippers towards shipping.

This research assists in the operationalisation of key concepts. Golicic et al. (2003) and Spekman et al. (1998) differentiate cooperation from collaboration—collaboration comprises cooperation and 'extended relationship strength', which includes trust and sustainability. Furthermore, first-order factors comprising a few

concepts are utilised to measure cooperation and collaboration. Despite representing composite constructs, first-order factors clearly represent and measure the higher-order factors of cooperation and collaboration. Fairness extends beyond 'incentive alignment', which represents distributive fairness. Both procedural fairness and distributive justice in building cooperative relationships are adopted simultaneously (Kim et al., 2018).

6.2. Managerial implications

CCSIs reveal that indifference towards mutuality, distributive fairness, 'relationship extendedness', and two-way communication hamper cooperative and collaborative SCs. The failure of shipping companies also damages SC members, as evidenced by the Hanjin Shipping Company's bankruptcy in 2016. A total of 329 shippers lost USD 120 M and suffered delivery delays, dishonoured contracts, resources squandered in finding capable transport service providers, and rising freight rates (Aydin & Kamal, 2021; Kamal & Aydin, 2021; KITA, 2017; Song, Seo, & Kwak, 2019). Orderly maintenance of cooperation and collaboration with weaker SC members serves the long-run self-interests of powerful SC members, and emergency financial support to hard-pressed shipping companies preserves service provision.

Further, two-way communication between influential and weaker SC members is necessary to establish common cooperative and collaborative implementation plans and review performance jointly. Shippers' endeavours to ensure rationalised and justified contact enhance SC exchange relationships. However, shippers must also avoid overly frequent contact, which can be burdensome to vulnerable partners (Kim et al., 2018; Min et al., 2005).

Shipping companies value fairness most highly in building trust and expect greater distributive fairness from influential SC members (Kim et al., 2018). Moreover, stable, effective channel partnerships with unfair suppliers are unlikely (Kumar et al., 1995).

Shipper-shipping company relationships effectively illustrate the SC relationships. Mutual sharing of profits and burdens between stronger and weaker members develops effective, high-quality relationships and mutual trust, which precedes partnership building. Expectations of reciprocal provision pre-dispose partners to accept short-term hardships, as long-run attitudes of sharing benefits and burdens aid both partners (Gardner et al., 1994). Long-term SC relationships generate improved quality and reduced costs. The reinforcement of long-term relationships with superior members may ensure survival for weaker parties or stable foundations for long-term growth, perhaps through joint expansion of new markets and corporate development of new business plans.

Establishing trust requires sufficient cooperation, and weaker members must develop and implement complex and time-consuming methods to build trust with influential SC partners (Daugherty et al., 2006; Min et al., 2005). Shipping companies must keep delivery promises and satisfy shippers' expectations continuously. Ship-owners must empathise with shippers by offering flexible and responsive innovative value-added services, including integrated logistics services. In addition, to build 'brand loyalty', shipping companies must continuously support the needs of their superior partners (Kim et al., 2018).

6.3. Policy implications

Power imbalances coupled with adversarial relationships, perhaps between shippers and carriers, invite government intervention to foster inter-organisational cooperation through the public governance of an association (Fugate et al., 2009). Shipping operates within complex patterns of agreements that involve shipping companies, shippers and government policies, mediation, and 'order-preserving mechanisms' to maintain cooperation as contracts are enacted (Williamson, 2008).

Sporadic two-way communication within SCs and shippers' dominance may necessitate government intervention to create consultative stakeholder groups to increase cooperative relationships. For instance, in 2010, the Federal Maritime Commission organised voluntary committees to address commercial practices, capacity forecasting, and enhanced collaborative relationships between shippers and carriers (Heaver, 2015). Low CCSIs make liner shipping a prime initial candidate. In parallel, the government must take action to collate, provide, and disseminate best practices of cooperation and collaboration to improve process efficiency, flexibility, business synergy, quality, and innovation (Cao & Zhang, 2010, 2011; Cao et al., 2010), especially where firms misunderstand collaboration and shun formal arrangements (Barratt, 2004). Good practices can be found in 'other vessels' (tugs, barges, and reefers), which record high CCSIs, and the two-fifths of the bulk and tanker sectors with contract periods exceeding three years, thereby allowing sufficient time to develop good practice. The exemplar practice of mutuality and sustainability relates to how common plans are established, performance is jointly measured, and assistance is offered. The development of 'relationship extendedness' by jointly developing new business models and expanding new markets is instructive, as are long-term contract periods, which signify close relationships. Further, detailed execution plans to enhance CCSIs impact logistics, network design, and strategic plans to generate mutual benefits.

To enhance CCSIs, governments must consider institutional strategies to promote fairness as a key component of cooperation and an essential antecedent of trust. Under global competition and heightened uncertainties, government policies and regulatory regimes can encourage new collaborative relationships among international logistics parties to improve efficiency (Heaver, 2015). Interventions can be undertaken to reinforce distribution fairness, such as limiting driver working hours, muffle opportunistic tendencies by shippers, and encourage more collaborative attitudes towards weaker SC members (Fugate et al., 2009).

6.4. Limitations and recommendations for future research

CCSIs diagnose, compare, and evaluate the current state of cooperation and collaboration between SC members. However, as the composite indicator is exploratory (Cao & Zhang, 2010), its limitations indicate recommendations for future research. A detailed taxonomy of shippers as suppliers, manufacturers, distributors, large retailers, and freight forwarders might facilitate more accurate evaluations of CCSIs by shipper type. In this study, CCSI reporting by vessel type assumes that shippers are differentiated within each type, thereby denying a direct link between CCSIs and shippers. A more detailed categorisation would enable the creation of such linkages.

This study highlights the shipping firm's perspective and uses a single informant design, which can lead to common methods variance (Griffith et al., 2006). The views of influential SC members differ from those of weaker partners; future research must consider both sides (Kim et al., 2018).

Can CCSIs be generalised to embrace other SC relationships? The research methods presented are transferable to test other relationships spanning combinations of SC members. Nevertheless, each is distinctive, and research requires advice from expert commentators regarding relevant items. In this research, joint demand forecasts and inventory management between shippers and shipping companies were eschewed; however, suppliers and manufactures or manufacturers and distributors may embrace them.

International comparisons of CCSIs are desirable; nonetheless, there are social, cultural, and legal variations. Where regulations and

contract forms concerning business transactions vary, interviews with shipping experts are required to propose comparable international measurement items; where comparability is attained, each country can identify strengths, weaknesses, and remedial measures to enhance its performance. The data of this study were collected in 2016, which could be viewed as a limitation. However, except for a few unusual cases such as the recent COVID-19 pandemic, shippers always had the upper hand in the relationship between the shipping lines. This study can provide valuable insight by conducting a longitudinal study when the shipping cycle is favourable to shippers.

Funding statement

This work was supported by a 2-Year Research Grant of Pusan National University.

Acknowledgements

Authors express their gratitude to Editors and anonymous referees for their invaluable and constructive comments on the earlier version of this paper.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

Acedo, F. J., Barroso, C., & Galan, J. L. (2006). The resource-based theory: dissemination and main trends. *Strategic Management Journal, 27*, 621–636.
Adler, P. S., & Kwon, S. W. (2002). Social capital: prospects for a new concept. *The Academy of Management Review, 27*(1), 17–40.
Ahmed, M. U., Kristal, M. M., Pagell, M., & Gattiker, T. F. (2017). Towards a classification of supply chain relationships: a routine based perspective. *Supply Chain Management: An International Journal, 22*(4), 341–374.
Anderson, J. C., & Narus, J. A. (1990). A model of distributor firm and manufacturer firm working partnerships. *Journal of Marketing, 54*(1), 42–58.
Armstrong, J. S., & Overton, T. S. (1977). Estimating nonresponse bias in mail surveys. *Journal of Marketing Research, 14*(3), 396–402.
Aydin, M.& Kamal, B. (2021). A fuzzy Bayesian approach on bankruptcy of Hanjin Shipping. *Journal of ETA Maritime Science*.
Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17*(1), 99–120.
Barratt, M. (2004). Understanding the meaning of collaboration in the supply chain. *Supply Chain Management: An International Journal, 9*(1), 30–42.
Bensaou, M. (1997). Interorganizational cooperation: the role of information technology an empirical comparison of US and Japanese supplier relations. *Information Systems Research, 8*(2), 107–124.
Bove, L. L., & Johnson, L. W. (2001). Customer relationships with service personnel: do we measure closeness, quality or strength? *Journal of Business Research, 54*(3), 189–197.
Branch, A. E. (2007). *Elements of shipping* (8th ed.). London: Routledge.
Cao, M., Vonderembse, M. A., Zhang, Q., & Ragu-Nathan, T. S. (2010). Supply chain collaboration: conceptualisation and instrument development. *International Journal of Production Research, 48*(22), 6613–6635.
Cao, M., & Zhang, Q. (2010). Supply chain collaborative advantage: a firm's perspective. *International Journal of Production Economics, 128*(1), 358–367.
Cao, M., & Zhang, Q. (2011). Supply chain collaboration: impact on collaborative advantage and firm performance. *Journal of Operations Management, 29*(3), 163–180.
Chen, J. V., Yen, D. C., Rajkumar, T. M., & Tomochko, N. A. (2011). The antecedent factors on trust and commitment in supply chain relationships. *Computer Standards & Interfaces, 33*(3), 262–270.
Comtois, C., & Lacoste, R. (2012). Dry bulk shipping logistics. In D. W. Song, & P. M. Panayides (Eds.). *Maritime logistics: A complete guide to effective shipping and port management* (pp. 163–176). London: Kogan Page Ltd.
Costello, A. B., & Osborne, J. (2005). Best practices in exploratory factor analysis: four recommendations for getting the most from your analysis. *Practical Assessment Research and Evaluation, 10*(1), 1–9.
Daugherty, P. J., Richey, R. G., Roath, A. S., Min, S., Chen, H., Arndt, A. D., & Genchev, S. E. (2006). Is collaboration paying off for firms? *Business Horizons, 49*(1), 61–70.
Dwyer, F. R., & Oh, S. (1987). Output sector munificence effects on the internal political economy of marketing channels. *Journal of Marketing Research, 24*(4), 347–358.
Dyer, J. H., & Singh, H. (1998). The relational view: cooperative strategy and sources of interorganisational competitive advantage. *The Academy of Management Review, 23*(4), 660–679.
Eyuboglu, N., Ryu, S., & Tellefsen, T. (2003). Current and future interdependence. *Journal of Marketing Channels, 11*(1), 3–26.
Fleming, A., Ogier, E., Hobday, A. J., Thomas, L., Hartog, J. R., & Hass, B. (2020). Stakeholder trust and holistic fishery sustainability assessments. *Marine Policy, 111*, Article 103719.
Fransoo, J. C., & Lee, C.-Y. (2013). The critical role of ocean container transport in global supply chain performance. *Production and Operations Management, 22*(2), 253–268.
Frémont, A. (2009). Shipping lines and logistics. *Transport Reviews, 29*(4), 537–554.
Fugate, B. S., Davis-Sramek, B., & Goldsby, T. J. (2009). Operational collaboration between shippers and carriers in the transportation industry. *The International Journal of Logistics Management, 20*(3), 425–447.
Ganesan, S. (1994). Determinants of long-term orientation in buyer-seller relationships. *Journal of Marketing, 58*(2), 1–19.
Gardner, J. T., Cooper, M. C., & Noordewier, T. G. (1994). Understanding shipper-carrier and shipper-warehouser relationships: partnerships revisited. *Journal of Business Logistics, 15*(2), 121–143.
Geyskens, I., Steenkamp, J. B. E., & Kumar, N. (2006). Make, buy, or ally: a transaction cost theory meta-analysis. *Academy of Management Journal, 49*(3), 519–543.
Golicic, S. L. (2007). A comparison of shipper and carrier relationship strength. *International Journal of Physical Distribution & Logistics Management, 37*(9), 719–739.
Golicic, S. L., Foggin, J. H., & Mentzer, J. T. (2003). Relationship magnitude and its role in interorganizational relationship structure. *Journal of Business Logistics, 24*(1), 57–75.
Griffith, D. A., Harvey, M. G., & Lusch, R. F. (2006). Social exchange in supply chain relationships: the resulting benefits of procedural and distributive justice. *Journal of Operations Management, 24*(2), 85–98.
Hair, J.F., Black, W.C., Babin, B.J.,& Anderson, R.E. (2014). *Multivariate data analysis*. Essex: Pearson.
Harland, C., Zheng, J., Johnsen, T., & Lamming, R. (2004). A conceptual model for researching the creation and operation of supply networks. *British Journal of Management, 15*(1), 1–21.
Heaver, T. D. (2015). Increased collaborative relationships in international logistics: Canadian and other national and corporate examples. *Maritime Policy & Management, 42*(3), 278–292.
Hillman, A. J., Withers, M. C., & Collins, B. J. (2009). Resource dependence theory: a review. *Journal of Management, 35*(6), 1404–1427.
Hornibrook, S., Fearne, A., & Lazzarin, M. (2009). Exploring the association between fairness and organisational outcomes in supply chain relationships. *International Journal of Retail & Distribution Management, 37*, 790–803.
Hudnurkar, M., Jakhar, S., & Rathod, U. (2014). Factors affecting collaboration in supply chain: a literature review. *Procedia-Social and Behavioral Sciences, 133*, 189–202.
Huo, B., Han, Z., & Prajogo, D. (2016). Antecedents and consequences of supply chain information integration: a resource-based view. *Supply Chain Management: An International Journal, 21*, 661–677.
Kamal, B., & Aydin, M. (2021). Application of fuzzy Bayesian approach on bankruptcy causes for container liner industry. *Research in Transportation Business & Management, 23*, Article 100769.
Kamal, B., Kara, G., & Olgay, O. (2021). An application of fuzzy analytic hierarchy process to overcapacity absorbing methods in container shipping. *International Journal of Maritime Engineering, 162*(A4), 331–344.
Kent, J. L., & Parker, R. S. (1999). International containership carrier selection criteria: shippers/carriers differences. *International Journal of Physical Distribution & Logistics Management, 29*(6), 398–408.
Kim, C. S., Dinwoodie, J., & Roh, S. (2020). Developing measurement scales of collaboration in shipping logistics. *International Journal of Logistics Research and Applications, 24*(5), 495–510.
Kim, C. S., Dinwoodie, J., & Seo, Y. J. (2018). Inter-firm cooperation and collaboration in shipper—shipping company relationships for enhancing sustainability. *Sustainability, 10*(10), 3714.
Kim, K. K., Park, S. H., Ryoo, S. Y., & Park, S. K. (2010). Inter-organizational cooperation in buyer–supplier relationships: both perspectives. *Journal of Business Research, 63*(8), 863–869.
KITA (2017). *The damage of shippers from Hanjin collapse*. Seoul: Korea International Trade Association.
Konovsky, M. A. (2000). Understanding procedural justice and its impact on business organizations. *Journal of Management, 26*(3), 489–511.
Korsgaard, M. A., Schweiger, D. M., & Sapienza, H. J. (1995). Building commitment, attachment, and trust in strategic decision-making teams: the role of procedural justice. *Academy of Management Journal, 38*(1), 60–84.
Kou, Y., & Luo, M. (2016). Strategic capacity competition and overcapacity in Shipping. *Maritime Policy & Management, 43*(4), 389–406.
Kumar, G., & Banerjee, R, N. (2014). Supply chain collaboration index: an instrument to measure the depth of collaboration. *Benchmarking An International Journal, 21*(2), 184–204.
Kumar, N., Scheer, L. K., & Steenkamp, J. B. E. (1995). The effects of supplier fairness on vulnerable resellers. *Journal of Marketing Research, 32*(1), 54–65.
Kuo, S. Y., Lin, P. C., & Lu, C. S. (2017). The effects of dynamic capabilities, service capabilities, competitive advantage, and organizational performance in container shipping. *Transportation Research Part A Policy and Practice, 95*, 356–371.
Kwon, I. W. G., & Suh, T. (2005). Trust, commitment and relationships in supply chain management: a path analysis. *Supply Chain Management An International Journal, 10*(1), 26–33.

Lee, H. Y., Seo, Y. J., & Dinwoodie, J. (2016). Supply chain integration and logistics performance: the role of supply chain dynamism. *The International Journal of Logistics Management, 27*(3), 668–685.

Lin, S.M. (2015). *An exploration of relationship structures, their integration and value in maritime logistics networks* (PhD thesis). Cardiff, UK: Cardiff University.

Malhotra, A., Gosain, S., & Sawy, O. A. E. (2005). Absorptive capacity configurations in supply chains: Gearing for partner-enabled market knowledge creation. *MIS Quarterly, 29*, 145–187.

Maloni, M. J., Gligor, D. M., & Lagoudis, I. N. (2016). Linking ocean container carrier capabilities to shipper–carrier relationships: a case study. *Maritime Policy & Management, 43*(8), 959–975.

Midoro, R., Musso, E., & Parola, F. (2005). Maritime liner shipping and the stevedoring industry: Market structure and competition strategies. *Maritime Policy & Management, 32*(2), 89–106.

Min, S., & Mentzer, J. T. (2004). Developing and measuring supply chain management concepts. *Journal of Business Logistics, 25*(1), 63–99.

Min, S., Roath, A. S., Daugherty, P. J., Genchev, S. E., Chen, H., Arndt, A. D., & Richey, R. G. (2005). Supply chain collaboration: what's happening? *The International Journal of Logistics Management, 16*(2), 237–256.

MOF (2016). *Internal data*. Sejong, South Korea: Ministry of Oceans and Fisheries.

Mohr, J., & Nevin, J. R. (1990). Communication strategies in marketing channels: a theoretical perspective. *Journal of Marketing, 54*(4), 36–51.

Morgan, R. M., & Hunt, S. D. (1994). The commitment-trust theory of relationship marketing. *Journal of Marketing, 58*(3), 20–38.

Nassirnia, P., & Robinson, R. (2013). Supply chain integration and chain efficiency: the importance of changing perspective toward whole chain integration. *Journal of Applied Sciences and Engineering Management, 1*(1), 13–23.

Notteboom, T., Rodrigue, J.-P., & De Monie, G. (2010). In P. Hall, R. McCalla, C. Comtois, & B. Slack (Eds.). *The organisational and geographical ramifications of the 2008-09 financial crisis on the maritime shipping and port industries* (pp. 31–46). Integrating Seaports and Trade Corridors: Ashgate Publishing Ltd.

Nunkoo, R., & Ramkissoon, H. (2012). Power, trust, social exchange and community support. *Annals of Tourism Research, 39*(2), 997–1023.

Nyaga, G. N., & Whipple, J. M. (2011). Relationship quality and performance outcomes: achieving a sustainable competitive advantage. *Journal of Business Logistics, 32*(4), 345–360.

OECD(2008). *Handbook on constructing composite indicators: Methodology and user guided*. Paris: Organisation for Economic Co-operation and Development.

Pedhazur, E. J., & Schmelkin, L. P. (2013). *Measurement, design, and analysis: An integrated approach.* New York: Psycholoy Press.

Pradabwong, J., Braziotis, C., Tannock, J. D., & Pawar, K. S. (2017). Business process management and supply chain collaboration: effects on performance and competitiveness. *Supply Chain Management An International Journal, 22*, 107–121.

Putnam, R. (1993). The prosperous community: Social capital and public life. *The American Prospect, 4*, 35–42.

Richey, R. G., Roath, A. S., Whipple, J. M., & Fawcett, S. E. (2010). Exploring a governance theory of supply chain management: Barriers and facilitators to integration. *Journal of Business Logistics, 31*(1), 237–256.

Seo, Y. J., Dinwoodie, J., & Kwak, D. W. (2014). The impact of innovativeness on supply chain performance: is supply chain integration a missing link? *Supply Chain Management An International Journal, 19*(5/6), 733–746.

Seo, Y. J., Dinwoodie, J., & Roh, M. (2015). Measures of supply chain collaboration in container logistics. *Maritime Economics & Logistics, 17*(3), 292–314.

Seo, Y. J., Dinwoodie, J., & Roe, M. (2016). The influence of supply chain collaboration on collaborative advantage and port performance in maritime logistics. *International Journal of Logistics Research and Applications, 19*(6), 562–582.

Simatupang, T. M., & Sridharan, R. (2005). The collaboration index: a measure for supply chain collaboration. *International Journal of Physical Distribution & Logistics Management, 35*(1), 44–62.

Slack, B., Comtois, C., & McCalla, R. (2002). Strategic alliances in the container shipping industry: A global perspective. *Maritime Policy & Management, 29*(1), 65–76.

Song, D. W., Seo, Y. J., & Kwak, D. W. (2019). Learning from Hanjin Shipping's failure: A holistic interpretation on its causes and reasons. *Transport Policy, 82*, 77–87.

Spekman, R. E., Kamauff, J. W., & Myhr, N. (1998). An empirical investigation into supply chain management: A perspective on partnerships. *Supply Chain Management: An International Journal, 28*, 630–650.

Stopford, M. (2009). *Maritime economics.* New York: Routledge.

Talley, W. K., & Ng, M. (2013). Maritime transport chain choice by carriers, ports and shippers. *International Journal of Production Economics, 142*(2), 311–316.

Thai, V. V., Tay, W. J., Tan, R., & Lai, A. (2014). Defining service quality in tramp shipping: conceptual model and empirical evidence. *The Asian Journal of Shipping and Logistics, 30*(1), 1–29.

Thomson, A. M., Perry, J. L., & Miller, T. K. (2009). Conceptualizing and measuring collaboration. *Journal of Public Administration Research and Theory, 19*(1), 23–56.

Ulrich, D., & Barney, J. B. (1984). Perspectives in organisations: resource dependence, efficiency, and population. *Academy of Management Review, 9*(3), 471–481.

UNCTAD (2016). *Review of maritime transport, 2016 (UNCTAD/RMT/2016)*. Geneva: United Nations Conference on Trade and Development.

Wang, C. L., Siu, N. Y., & Barnes, B. R. (2008). The significance of trust and renqing in the long-term orientation of Chinese business-to-business relationships. *Industrial Marketing Management, 37*(7), 819–824.

Williamson, O. E. (2008). Outsourcing: Transaction cost economics and supply chain management. *Journal of Supply Chain Management, 44*(2), 5–16.

Willis, H. H., & Ortiz, D. S. (2004). *Evaluating the security of the global containerized supply chain.* Santa Monica, CA: RAND CorporationTR214.

Windeck, V., & Stadtler, H. (2011). A liner shipping network design–routing and scheduling impacted by environmental influences. In J. Pahl, T. Reiners, & S. Voß (Eds.). *Network optimization* (pp. 574–576). Springer.

Zsidisin, G. A., Voss, M. D., & Schlosser, M. (2007). Shipper-carrier relationships and their effect on carrier performance. *Transportation Journal, 46*(2), 5–18.