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Resource-based Capabilities for Maritime Supply Chain Resilience: Impacts on Customer Satisfaction and Performance during Container Shortages

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Resource-based Capabilities for Maritime Supply Chain Resilience: Impacts on Customer Satisfaction and Performance during Container Shortages

Purpose

The supply chain resilience literature mostly focuses on manufacturing firms in main trading regions often without a specific disruption context. This paper aims to unveil the relationships between resources, integration capabilities, supply chain resilience and firm performance in the maritime supply chain field, based on the specific container shortage disruption context, and in a region that is not a part of the main East-West global trade routes.

Design / methodology / approach

A conceptual model is developed based on dynamic capabilities theory and partial least squares structural equation modelling (PLS-SEM) is applied to test the model. A survey is conducted on 172 maritime transport service providers.

Findings

Supply chain resilience positively impacts customer satisfaction, financial performance, and operational performance. Among supply chain integration dimensions, external integration has a direct impact on supply chain resilience while no direct influence of internal integration is observed. Relations, network complexity, and digital competence significantly affect supply chain integration.

Originality / Value

The study investigates supply chain resilience in an understudied yet critical maritime supply chain context by focusing on a specific disruption. The paper illustrates more granulated firm performance effects of supply chain resilience and reveals more detailed resources of integration capabilities that lead to enhanced resilience.

Keywords: supply chain resilience, supply chain integration, dynamic capabilities, customer satisfaction, performance, container shortage

List of abbreviations

CSD – Container Shortage Disruption
DC – Digital Competence
DCT – Dynamic Capabilities Theory
EI – External Integration
II – Internal Integration
MARSC – Maritime Supply Chains
PLS-SEM – Partial Least Squares Structural Equation Modelling
RBV – Resource-Based View
SCI – Supply Chain Integration
SCRES – Supply Chain Resilience
SEM – Structural Equation Modelling

1. Introduction

Supply chains have been facing major disruptions, often simultaneously, arising from geopolitical conflicts, climate change, and the pandemics. While the Red Sea crisis due to attacks on cargo ships destabilise current and future supply chains and Russia's invasion of Ukraine disrupts raw materials supplies, drought in Panama Canal and extreme weather events around the world rattle manufacturing and flow of goods. COVID-19 caused unprecedented disruptions that lessons taken from them can help supply chains tackle (Fan et al., 2023).

Disruptions experienced during COVID-19 have emphasized the importance of supply chain resilience (SCRES) (Ivanov and Dolgui, 2021). Recent disruptions caused SCRES to be a priority in supply chain strategies of not only global manufacturing organisations but also shipping and logistics industries. The high interdependence of manufacturing and product supply chains on well-functioning shipping and logistics networks call for building resilience strategies at these parts of the chains which have been marked with significant vulnerabilities in the last two years (Bai et al., 2023). Considering that manufacturing supply chains are parts of larger interconnected networks (Singh and Garg 2015), targeted research to specific parts of these networks is required to understand how to build more resilient post-Covid SCs (van Hoek, 2020).

One of the most significant disruptions faced during COVID-19 was the container shortage experienced in maritime supply chains (MARSC) – a global services supply chain providing sea transport and logistics services. Moving over 80% of products and commodities in international trade by volume (UNCTADa, 2022) and up to 70% by value (UNCTADb, 2022), MARSC has a key role in the development and running of the global economy. Any disruption occurring in the MARSC significantly affects all other supply chains' production and delivery abilities (Li et al., 2022; Wan et al., 2022). The 2021 Suez Canal blockage by Evergreen vessel proved this impact by disrupting approximately USD 40 billion in global trade (CIPS, 2021). Most recently, the diversion from Suez Canal due to attacks on cargo ships delayed the manufacturing such as Tesla's manufacturing in Germany (Waldersee et al., 2024).

Despite this critical dependence between manufacturing and shipping, MARSC resilience is understudied in the literature (Gu and Liu, 2023; Liu et al., 2018; Li et al., 2022). While more research is conducted in recent years, most studies do not focus on a particular disruption triggered by COVID-19 except for Gu et al. (2023) who specified disruptions as port congestion, labour shortage, and abnormal freight rate fluctuation. Studying SCRES within a particular disruption is essential as each disruption has different characteristics regarding their magnitude, time span, and geographical coverage, and defining the disruption can help to learn lessons for the future disruptions.

The COVID-19 pandemic-related container shortage disruption (CSD) caused severe effects on MARSC and manufacturing SCs (Cullinane and Haralambides, 2021). The magnitude of this disruption impacted other supply chains so seriously that some global firms such as IKEA and Home Depot chartered their own vessels and containers to minimise the effects (The Washington Post, 2021). In fact, Tailwind Shipping Lines, which was established by the German grocery retailer Lidl, has become the world's 40th largest container shipping line (Alphaliner, 2026). The geographical coverage of CSD was global that MARSCs in different regions and trade routes have been affected by the disruption. In fact, those developing or non-main trade regions such as East Mediterranean or Baltic Sea have been more severely affected by CSD as shipping lines moved empty containers from these regions to more profitable main East-West trade routes. Therefore, although many stories were heard about the negative consequences of container shortage on product supply chains built on Asia-Pacific trade, it is still unknown how MARSCs at other parts of the world tackled this crisis.

Furthermore, CSD was a prolonged one, of which the consequences lasted until 2022. Studying such a disruption is imperative as recent disruptions such as BREXIT and other political tensions and future disruptions such as climate change are likely to have a prolonged characteristic as well (Ghadge et al., 2020). It means that businesses must live with disruptions for a long time and continue to perform well in different business outcomes. The lengthy characteristic of disruptions calls for a particular attention regarding the impact of SCRES on performance outcomes while the disruption continues. Although the impact of SCRES on firm performance is well-studied (e.g. Altay et al., 2018; Chowdhury et al., 2019), it is unknown how SCRES affects various performance outcomes during disruptions such as CSD. Particularly, the literature does not address whether SCRES contributes to customer satisfaction which is severely affected because of the COVID-19 related disruptions (Udofia et al., 2021). Considering that lack of empty containers required the adoption of prioritization strategies by MARSC actors between different customers, customer satisfaction becomes an essential performance outcome of resilience within this context.

In addition, SCRES in this specific context is the outcome of several factors that are combined in a certain way. The recent literature calls for research that investigates the interplay between supply chain complexity, SCRES and performance as well as knowledge management enabled by digital competences and their impact on SCRES (Iftikhar et al., 2021). Christopher and Lee (2004) point out the collaborative relationships between supply chain members that are built for competitive advantage as a potential source of resilience at the same time. Supply chain integration (SCI) which includes such collaborative relationships as well as communication and seamless coordination of processes across the supply chain (Flynn et al., 2010; Frohlich and Westbrook, 2001) is an enabler of SCRES (Wieland and Wallenburg, 2013; Liu et al., 2018). However, considering the resource intensive nature of SCI (Chen et al., 2009), it is important to further investigate how different integration capabilities impact SCRES. Unveiling the significance of internal integration (II) within an organisation versus external integration (EI) across the supply chain would provide insights about where to invest limited resources for building more effective capabilities. Furthermore, integration capability is dependent on different resource sets (Brusset and Teller, 2017) which are configured and reconfigured to tackle with environmental uncertainties. Understanding the combination of those resources that enable building integration capabilities which in turn enhance resilience and consequently organisational performance in times of crisis would point out which resources to acquire or get access to for a more resilient supply chain.

Building on this discussion, the purpose of this study is to unveil the relationships between resources, integration capabilities, SCRES and firm performance outcomes within a particular disruption context. CSD is selected as the disruptor of operations in MARSCs. Dynamic capabilities theory (DCT) is used as the basis for the theoretical model considering the complex adaptive nature of resilience construct. We follow Brusset and Teller (2017) in conceptualizing SCRES as a higher-order capability which is a combination of lower-order capabilities and argue that SCI is one of them. On the other hand, resource-based view (RBV) where DCT departs from groups firm resources under three categories: human capital resources, physical capital resources, organisational and interorganisational resources (Barney, 1991). Acknowledging the existence of diverse resource sets that affect different SCRES capabilities such as physical technology, safety stock, training or contingency plans (Blackhurst et al., 2011), we particularly focus on the potential resource sets of SCI. We investigate relational and informational resources that are required to facilitate communication, collaboration and information sharing within the supply chain which leads to SCI capabilities (Frohlich and Westbrook, 2001). Three research questions are formulated to operationalize the purpose:

1- How does configuration of relational and informational resources affect building II and EI capabilities in MARSCs?
2- How do II and EI affect SCRES in MARSCs?
3- How does SCRES affect performance outcomes for firms in MARSCs?

The paper's contribution to SCRES research is threefold. First, by studying a context that receives less attention in the literature but that became the root cause of the supply chain disruption during COVID-19, we unfold how the supporting supply chain reacts to specific disruptions and achieve resilience. Second, we build and test a model that explains the relationships between relational, network related and informational resources, SCI, SCRES and performance by adopting a DCT lens. Although the relationship between SCI and SCRES or SCRES and performance are being studied separately, a holistic approach that investigates the antecedents of integration capabilities is necessary to understand the mechanisms for achieving resilience in response to a specific disruption. Finally, we elaborate the relationship between SCRES and firm performance by adopting a more granulated approach to performance outcomes which contributes to the discussion on direct or indirect performance effects of resilience in supply chains.

2. Theoretical background and hypotheses development

2.1. Theoretical background and the conceptual model

Emerging from resource-based view (RBV) that puts organisational resources and their characteristics at the heart of competitive advantage (Barney, 1991), dynamic capabilities theory (DCT) views the markets as dynamic environments where there is non-linear change, conditions are unpredictable and boundaries are unclear (Eisenhardt and Martin, 2000). To achieve competitive advantage in such markets, DCT proposes that the key is not the specific resources that an organisation controls, but it is the capability of configuring these resources to match the requirements of the markets (Teece et al., 1997). According to Helfat (2007, p. 4) a dynamic capability can be defined as "the capacity of an organisation to purposefully create, extend or modify its resource base." Firms that pursue or develop such capabilities can perform better when faced with environmental uncertainties. Hence, the ability to respond to and recover from disruptions through combination, configuration and alignment of resources, or SCRES, is such a dynamic capability (Ponomarov and Holcomb, 2009; Mandal et al., 2016; Mandal, 2017).

SCRES is the ability of SCs to cope with supply chain risks, manage the disruption caused by them and to recover to their original state or even to a more desirable one (Christopher and Peck, 2004).

Looking further into DCT and resilience, Brusset and Teller (2017) view SCRES as a combination of lower-order capabilities which are aligned within or outside the organisation. SCI is one of those capabilities which "refers to the II and EI of business processes to increase customer value" (Kotzab et al., 2021; p 1). In a supply chain context, integration appears as a twofold concept: collaboration, communication and information sharing within organisational functions refer to II whereas the same processes between supply chain partners refer to EI (Cao et al., 2015). It is a resilience capability as effective SCI increases visibility among supply chain partners while decreasing uncertainty (Christopher and Peck, 2004).

These lower-order capabilities or micro-foundations (Teece, 2007) such as SCI are built on the availability of certain organisational, human, informational or relational resources. Although previous SCRES literature has focused on SCI and related factors such as cooperation or communication (e.g. Wieland and Wallenburg, 2013; Liu et al., 2018), the resource set that is required to build such capabilities is rather understudied. Understanding the resource configurations that enable building external and II capabilities which result in resilience and better performance extends the knowledge and ability for building more resilient supply chains.

In this study, we follow Brusset and Teller's conceptualization of SCRES as a multidimensional construct composed of certain lower-order capabilities and we particularly focus on SCI as the dynamic capability that leads to SCRES. The selection of SCI is relevant for MARSC as the integration has been found as a key ingredient of SCRES (Liu et al., 2018; Shi et al., 2023). SCI which is composed of collaboration, communication and information sharing within or across organisations within the supply chain (Frohlich and Westbrook, 2001) informs the choice of the resource set we choose to investigate. For the collaboration and communication perspective, we adopt the relational and network views as the core resources of SCI in the MARSC (Balci et al., 2019; Lee, 2005). Accordingly, relations are selected to reflect the intensity of collaboration and communication (Kumar et al., 2016), whereas network complexity is chosen to reflect number of alternative collaboration and communication points which can improve EI. Digital competence is the third resource chosen in our conceptual model because it helps for a real-time communication and information sharing, which are essential for SCI (Surucu-Balci et al., 2024).

Building on the theoretical discussion, a conceptual model is developed (Figure 1). Two of integration resources, relations, and network complexity, are only hypothesised to have an impact on EI as they are related to interfirm connections. Digital competence, on the other hand, hypothesised to impact both II and EI. The conceptual model also does not measure the relationship between performance outcomes as they are well investigated in previous studies, and it does not fall into the main purpose of our paper. The next section explains the hypotheses.

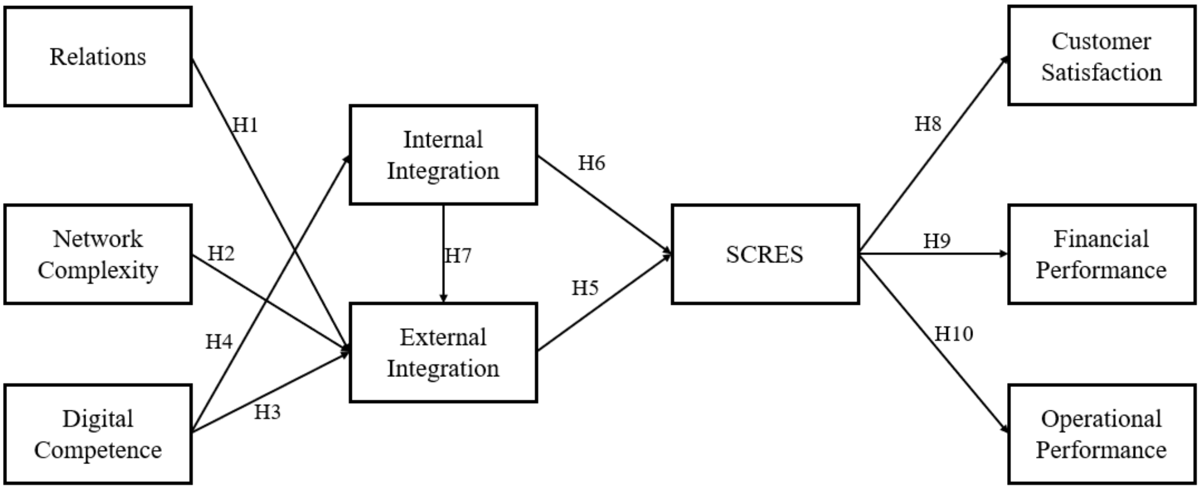

Figure 1. The conceptual model

Source: Authors own work

2.2. Hypotheses development

2.2.1. Resources of SCI

SCI has been considered as the indispensable element of an effective supply chain. The literature has demonstrated the positive influence of SCI on product quality, financial performance, overall firm performance, and operational performance (Shou et al., 2018). Despite the existence of studies pinpointing the positive impact of SCI on various performance indicators, the literature does not adequately examine the resources that SCI is built on (Kotzab et al., 2021). Contingency view on SCI indicates that the degree and necessity of SCI depend on various environmental factors and the context of risk (Flynn et al., 2016; Shou et al., 2018; Wong et al., 2011). Accordingly, our study conceptualizes on SCI antecedents that may change based on the situation. That is, the resources required for SCI may change depending on type of supply chain (i.e. service or manufacturing, fashion or automotive) and the type of disruption and risk (i.e. a natural disaster or COVID-19, driver shortage or container shortage). We investigate the impact of three relational and informational integration resources in the MARSC during the CSD.

Relations

According to DCT, organisations need to modify, extend, reconfigure their resource base constantly to succeed under environmental uncertainty (Teece et al., 1997; Helfat, 2007). This resource base is not always within the boundaries of the organisation and needs to be acquired through interfirm relationships. (Dyer and Singh, 1988). The relational view in supply chains has proven benefits of relationships on supply chain performance (Chen et al., 2013). Previous studies have demonstrated the role of relational view in supply chains in terms of SCRES (Wieland and Wallenburg, 2013), agility of humanitarian supply chains (Dubey et al., 2020), environmental performance (Gölgeci et al., 2019), and innovation performance (Onefrei et al., 2020).

The relational view in supply chain considers that SCI is indispensable to performance improvement (He et al., 2017) and relationships with buyers and suppliers are essential to SCI (Wang et al., 2016). Stronger relationships among supply chain members can enable a better communication, closer collaboration, and more effective information sharing, which eventually allow a higher integration within the supply chain (Chae et al., 2005; Wang et al., 2016). Although not many papers exist to investigate the impact of relational resources on SCI, few papers have indicated the positive influence of relationships on SCI. Wang et al. (2016), for instance, indicate the impact of interpersonal and interorganisational relationships on SCI. Yumurtacı Hüseyinoğlu et al. (2020) verify that relationship quality lead eventually helps improve the supply chain processes, supply chain performance, and eventually firm performance. The importance of relational view has also been demonstrated in MARSC (Balci et al., 2019). Yuen et al. (2019), for instance, demonstrate that relationship management is one of the critical success factors of internal and EI in MARSCs. Yuen and Thai (2017) find that trust, an important element of relational view, is a prerequisite for the SCI in maritime transport. Accordingly, the following hypothesis is built.

H1: Relational resources positively influence external SCI.

Network Complexity

SCI, by definition, has a relational structure (Chen et al 2009) and it builds on availability of relational resources. On the other hand, as a dynamic capability SCI can be defined as the ability to create, extend or modify this relational resource base which increases the complexity of the network that the relationships are built within. The impact of network complexity on resilience is debated in the literature where some argue for a negative impact (e.g. Chowdhury et al. 2019), and some argue that different complexity dimensions might lead to different and positive performance or resilience outcomes (Wiedmer et al., 2021). The network view of Wang et al. (2018) suggests that a wider network can improve the proactive SCRES of organisations. Similarly, Chowdhury and Quaddus (2017) consider network complexity as an important resource for SCRES. The risk of single sourcing in supply chain disruptions is well demonstrated by Chopra and Sodhi (2014). A wide network and dynamic supply base allow collaborating with different supply chain partners in times of disruptions where quick action is needed. Having access to a wide network is expected to enhance ability to coordinate supply chain processes with multiple supply chain partners when needed to deal with crisis situations.

MARSC is a complex one that members of it often work with several suppliers and customers. Although committing to one or few suppliers might be a common practice in product supply chains (Chopra and Sodhi, 2014), that is not the case in MARSC. For instance, a freight forwarder should purchase ocean carriage services from multiple container lines to ensure they receive the best service offering for different destinations. Similarly, container lines also need to target a large variety of cargo owners and forwarders to diversify their customer portfolio and maximise capacity utilisation. The need to diversify suppliers and customers, coordinate, communicate and collaborate with different ones constantly allows a higher integration to the MARSC. Thus, our research hypothesizes that the more complex network MARSC organisations have access to, the higher EI they achieve.

H2: Network complexity positively influences external SCI.

Digital competence

Digitalisation in supply chains is progressing rapidly and its impacts are profound (Seyedghorban et al., 2020). The MARSC – despite being a conventional industry in terms of technology adoption – is also no exception that digitalisation is changing the course of interactions, communications, and document exchanges (Balci, 2021). The role of digitalisation in maritime operations management is also evident in the literature (Agrifoglio et al., 2017). Adoption to open platforms powered by blockchain technology further expedites digitalisation of communication and information sharing (Balci and Surucu-Balci, 2021). An effective communication and information sharing is the key for SCI (Zsidisin et al., 2015). Particularly, digitalised communication and information sharing is inevitable for SCI (Buyukozkan and Gocer, 2018). Thus, is of utmost importance that organisations possess sufficient digital competence, i.e., digital infrastructure and trained personnel, to carry out digitalised communications and information sharing. Accordingly, since digitalisation leads to an efficient and effective communication between organisations and integration requires an effective information sharing, communication, and collaboration, our study proposes that digital competence significantly affects SCI. Since digitalisation improves both internal and external communication and information sharing, we hypothesize that digital competence positively influences both internal and external SCI.

H3: Digital competence positively influences external SCI

H4: Digital competence positively influences internal SCI

2.2.2. The Impact of SCI on SCRES

SCI is the extent to which organisations orchestrate resources and processes between internal functions and external network partners to deliver customer value during changing environmental conditions (Frohlich and Westbrook, 2001; Flynn et al., 2010). The concept relates to multiple factors such as information-sharing, collaborative communication, joint relationship effort and joint knowledge creation (Scholten and Schilder, 2015) and is studied frequently as an important enabler of SCRES (Wieland and Wallenburg, 2013; Liu et al, 2018; Liu and Lee, 2018). Pettit et al (2010; 2013) identify collaboration in the supply chain as an important capability for SCRES. Similarly, Christopher and Peck (2004) and Jüttner and Maklan (2011) underline the importance of collaborative relationships in improving resilience and reducing uncertainty. Recently, building on a meta-analytic study, Iftikhar et al (2021) find out that SCI is the most important supply chain capability for resilience. The relationship between SCI and resilience is characterized by the former's ability to generate other resilience capabilities such as agility, visibility and flexibility (Scholten and Schilder, 2015).

SCI is widely studied in two main dimensions such as EI and II (Flynn et al., 2010; Li et al., 2020; Liu and Lee, 2018) where the former refers to the organisational coordination, information sharing, process alignment capabilities with network partners such as suppliers or customers and the latter refers to similar capabilities between organisational functions and departments. EI enables the coordination of tasks with upstream and downstream supply chain partners (Wong et al., 2011) through aligned processes and routines for responding to disruptions (Liu and Lee, 2018). Integrative practices with key suppliers and service providers enable the development of a dynamic supply base that can support continuous supply during times of crisis (Schoenherr and Swink, 2012). Collaboration with suppliers and customers enable access to interfirm resources and relationships. During CSD, MARSC actors needed to switch between different providers, get real-time information about availability from vendors, have access to rapidly changing needs of their customers. Consequently, external SCI has been a crucial enabler when responding to this disruption which leads to our fifth hypothesis:

H5: External SCI positively influences SCRES

On the other hand, II facilitates boundary spanning activities that require cooperation between two or more departments (Poberschnigg et al., 2020) which, in turn, enable a joint response to potential disruptions. Integrative processes within the organisation result in seamless circulation of information (Liu and Lee, 2018) and efficient and quick decision-making based on that information (Swink and Schoenherr, 2015). II is a significant predictor of SCRES (Mandal, 2017). Li et al (2020) do not only emphasize the positive role of II on SCRES but they further prove that II strengthens the positive relationship between SCRES and financial performance of organisations. The required connectedness between sales, operations and documentation departments of MARSC firms for responding to changing customer demands and operational conditions during CSD exhibits a typical case of II. These supply chains needed to shift containers between ports or inland locations, prioritize orders based on availability information which all required effective internal collaboration. We build our sixth hypothesis on these conditions.

H6: Internal SCI positively influences SCRES

II and EI are not independent dimensions of SCI. The availability of internal communication linkages and integrative processes enable the establishment of external coordination practices and SCI (Zsidin et al., 2015). Established II processes are aligned with an organisational culture that allows information sharing, communication and cooperation with external network partners as well (Braunscheidel et al., 2010). Studying a similar setting, Liu and Lee (2018) find out that II positively affects EI of logistics service providers. We, therefore, hypothesize that MARSC actors' II will lead to enhanced external SCI.

H7: Internal SCI positively influences external SCI

2.2.3. The Impact of SCRES on firm performance during the CSD

SCRES is propounded to enhance several performance indicators. The previous literature has documented that SCRES positively affects the supply chain performance (Iftikhar et al., 2021;

Chowdhury et al., 2019). However, more granulated analysis is required to understand which performance outcomes SCRES has influenced during the container disruption. The CSD has affected MARSC members particularly regarding three main performance indicators: Customer satisfaction, operational performance, and financial performance.

Customer Satisfaction

The CSD has caused extreme delays in shipment and delivery of cargoes. The unprecedented delays have resulted in global shippers failing to keep their promise to customers. Global shippers such as IKEA, Walmart, and Home Depot were so dissatisfied with their suppliers' service due to failure in shipping containers, they acquired their own containers and chartered their own vessels to ensure their supply chains continue running (The Washington Post, 2021). The literature indicates such service failures lead to a poor customer satisfaction (Sengupta et al., 2015). Yeo et al. (2015) also indicate that failure of service in port operations result in unhappy container lines and shippers. Our research propounds that achieving SCRES can mitigate the impacts of CSD, and thereby increase the customer satisfaction. Very few studies have investigated the impact of SCRES on customer satisfaction. Wong et al. (2020) has found that SCRES positively impacts market performance construct which involves customer satisfaction as an indicator. Similarly, Piprani et al. (2020) has utilized customer satisfaction as a variable of customer service performance and revealed that it is positively influenced by SCRES. In MARSC context, Liu and Lee (2018) conducted a SEM method and has found that SCRES positively impacts service performance (one of the indicator variables is customer satisfaction). As the literature also signals, we hypothesize that SCRES positively affects the customer satisfaction.

H8: SCRES positively influences customer satisfaction during the CSD

Financial performance

One of the intrinsic outcomes of SCRES is to maintain or improve monetary firm performance level during disruptions. That is, SCRES helps firms perform well in financial performance indicators such as profitability, market share, and sales volume. Cao et al. (2024) have conducted a survey on supply chain professional and found a positive impact of SCRES on firm performance. Similarly, Li et al. (2020) confirmed the positive impact of SCRES on financial performance by a survey study in Taiwan. Yu et al. (2019) too validated positive role of resilience on financial performance. Golgeci and Kuivalainen (2020) has indicated a positive impact of SCRES on organisational performance, which consists of financial indicators such as level of costs, sales, and profitability. Liu et al. (2018) found that elements of SCRES including agility, re-engineering, and integration do not directly affect the firm performance but instead indirectly affect it through the mediation of risk management performance. Similarly, Abeysekara and Want (2019) have measured the impact of SCRES on firm performance by using financial variables. Their results indicate that only agility has a direct positive impact on firm performance among other SCRES constructs. We expect a direct positive impact of SCRES on financial performance as our study measures the impact of SCRES in a specific real-world practical disruption in which firms' performances have been dependent on how much they can maintain their supply chains as close as to normal operations. We acknowledge that profitability levels of shipping companies have soared significantly because of the capacity shortage. However, it does not mean that the relative financial performance between competitors is homogenous. Thus, we hypothesize that SCRES performance plays a key role in financial performance.

H9: SCRES positively influences financial performance during the CSD

Operational Performance

The container shortage has significantly disrupted the operations of MARSC members. Reliability scores of shipping lines have plummeted while port congestions have reached an unprecedented level (Cullinane and Haralambides, 2021). Freight forwarders and container lines have had difficulties to offer empty container or space on vessels to cargo owners. Terminals have not been able to complete loading and unloading operations on time. Being resilient can help companies mitigate the effects of these issues and offer solutions to operational problems experienced. Parallel to our view, Yang and Hsu (2018) have stated that resilience capability positively influences cargo operations performance of maritime firms. Lotfi and Saghiri (2018) have also found that resilience positively affects the delivery performance, which can be considered as an operational concern. Alkalha et al. (2021) has indicated that SCRES has a mediating role between absorptive capacity and operational performance. Accordingly, we hypothesize that SCRES positively affects the operational performance in MARSCs.

H10: SCRES positively influences operational performance during the CSD

While the direct relationship between SCI and performance metrics is well-established in the literature (Shou et al., 2018; Flynn et al., 2010), our study does not retest these links. Doing so would duplicate extensively validated findings without yielding substantial theoretical advancement. Instead, we focus on the underexplored relationship between SCRES and distinct performance outcomes, and how SCI contributes to SCRES by examining whether internal or EI contribute more to SCRES. This approach is also in align with dynamic capabilities view as SCI is considered as an operational capability that leads to a higher order dynamic capability, which is SCRES in our context.

3. Methodology

3.1.Survey design, sampling and data collection

To test the research model, a survey was implemented on container lines and freight forwarders – two major members of MARSC – in Turkey. The self-administered online survey consists of two main sections: The first section includes profile and firm demographics questions while the second section includes the five-point Likert type questions (strongly agree / strongly disagree) for construct measures. The MARSC in Turkey was selected purposefully as we aim to investigate SCRES in a region which is not part of the main West-East trade movement, i.e., between North America – Far East and Europe – Far East. This region is targeted because COVID-19 related container shortage was felt more severely in non-main trade locations as shipping lines have moved empty containers from these locations to the more profitable East-West trade (Wackett, 2021). Non-main trade regions have received limited attention in SCRES research despite evidence that disruptions such as the container shortage create disproportionate challenges in these markets, making them theoretically valuable settings for extending the resilience literature beyond the dominant focus on main trade corridors and developed economies. Several examples exist in developing and non-main trade routes across the globe. For instance, allocated container shipping capacity in Africa decreased by 6.5% in 2021 compared to one year ago (Chambers, 2022). According to Maritime Executive, MSC, the largest container line in the World, shifted 13.000 TEU capacity from African trading routes to Pacific trade route (The Maritime Executive, 2022). A similar situation existed in intra-Asia trade as well. The freight rates surged significantly because of capacity shortage caused by shifting capacity to more lucrative main east-west trade routes (Wallis, 2022).

Turkey also suffered from similar issues due to shift of capacity to main trade routes. Exporters using Port of Mersin, for instance, struggled finding empty containers (News2Sea, 2022). The problem is recognised so widely in Turkey that, one of the first academic articles about container shortage issue in the literature is published by authors in Turkey (Toygar et al., 2022). Turkey is an ideal location as it is not on the main East-West trade route yet has an established MARSC. A total of 11.6 million TEU containers were handled in 2020, increased from 5.7 million in 2010 (UAB, 2021). Global container lines including MSC, Maersk, COSCO, CMA CGM; global terminal operators such as DP World, PSA, and APM; and global forwarders such as DSV, Kuehne-Nagel, and DHL are actively operating in Turkey. The findings of this study are expected to be benchmarked by similar settings not only at the same geographical location but also at other parts of the world that remain peripheral to main trade routes.

We used the member list of UTIKAD (Association of International Forwarding and Logistics Service Providers) for sampling freight forwarders. Among 704 members, we have identified a total of 536 freight forwarders and logistics service providers (LSP) dealing with the movement of sea containers. However, this number should be regarded as an approximation, as the classification was based on information obtained through internet webpage screening and has not been independently verified with the companies themselves. We detected a total of 23 container shipping lines or liner agents in Turkey (When we refer to "container lines" in this paper, this may include the companies themselves or their agents (e.g., liner agents or branch offices). We decided to collect responses from different branches and hinterlands to reach a larger sample and to ensure a wider representation in sampling. A total of 100 container line branches were contacted. The survey was distributed by e-mail to the identified MARSC members, and a total of 172 responses were received (27.0% of total population). This response rate is found adequate in similar studies (Li et al., 2020; Liu and Lee, 2018). The respondents represented their companies which are MARSC members, so the firm is set as the unit of analysis. Among 172 responses, 123 responses were collected from freight forwarders and LSPs and 49 responses were collected from container shipping lines or agents. To examine whether the responses of container lines and freight forwarders differed significantly across the measurement items, an independent samples t-test was conducted. Levene's test for equality of variances show that no significant difference exists between container shipping lines and freight forwarders in relation to their response in measurement items ($p>0.1$).

Non-response bias is measured by comparing early and late responses. It is unlikely to suffer non-response bias problem if there is no significant difference between early and late responses in terms of value of some variables (Armstrong and Overton, 1977)). An independent samples t-test is conducted by using first 30 and last 30 respondents as two categories of grouping variables (early and late) and by using an indicator from our nine constructs. The results indicate that no statistically significant difference exists between early and late responses regarding nine testing variables.

On the other hand, common method bias, which refers to the unwillingness or incapability of respondents in providing accurate answers, is addressed by following MacKenzie and Podsakoff (2012). To avoid this bias, we have created items that are not lengthy and complex. Clarity of questions and appropriateness of survey length were approved by 10 industry experts in the initial, pilot interviews. To increase respondents' motivation to answer accurately, first we ensured respondents that the survey is anonymous, and responses will only be used for academic purposes. Second, respondents' interest in the survey was increased by indicating the importance of questions for the container shortage problem that affects the industry they are working in. Third, following Weijters et al. (2009) and Kock et al. (2021), we applied a proximity separation method and located variables of independent and dependent constructs in different locations. Finally, Harman (1967) single-factor test was applied and the first factor explained less than 50% of the total variance that the whole model explained. This was further ensured with collinearity test (Kock, 2015) where inner VIF values were calculated, and they were all below 3.3 threshold level.

3.2.Measurement Items and Instrument Development

Measurement scales in this research are obtained from the literature and adapted to the MARSC services (See Table 1). The content validity of measurement scales is ensured through interviews conducted with 10 industry experts (from five freight forwarders and five container lines) who are working at a managerial level and have a minimum of 10-year experience in shipping industry. These interviewees also responded the final version of the survey which was used as a pilot test. No alteration was needed as the clarity, relevance, structure, and the length of questions and survey were found appropriate by experts. Utmost effort is paid to utilize scales validated in previous SCRES studies. One exception is the customer satisfaction scale, which is tested in a B2B services context (Lam et al, 2004), similar to maritime services.

Following the RBV and dynamic capabilities which refers to those capabilities created by configuration of available resources for adapting to a rapidly changing environment, resources in the model – relations, network complexity, and digital competence – are asked in a generic way whereas SCI and SCRES are asked in relation to the CSD. This has allowed us to mimic three main components of DCT: Readily available resources, a rapidly changing environment, and dynamic capabilities created to adapt to this change. Performance outcomes are also asked specific to the disruption, yet respondents are also asked to answer these items by comparing to their competitors. The first reason behind this approach is that asking the relative performance reflects a more accurate outcome as profitability levels of companies have increased while customer satisfaction scores have decreased at industry level. Therefore, a comparison with the past performance of firms would be fallacious. Second, since the paper adopts a RBV and dynamic capabilities view which refer to competitive advantage, it is more appropriate to ask the relative performance compared to competitors.

Items of the relations construct are adopted from the literature. The phrase "with our suppliers and customers" are borrowed from Wieland and Wallenburg (2013). Consideration of relations with both suppliers and customers is essential as solutions are co-created with suppliers and buyers in MARSC context (Vural et al., 2019). The first item is adopted from Balci et al. (2018) while the third item is borrowed from Wieland and Wallenburg (2013) while the second item about trust is modified from Chowdhury et al. (2019). Items of network complexity are adopted from Chowdhury and Quaddus (2017) with a modification of involving the third item about "contracts", importance of which is mentioned in expert interviews and validated in resilience context by Liu and Lee (2018). Items of digital competence are adopted from Zouari et al. (2020) underlined the necessity of utilising both digital skills of supply chain members and digital tools by using different constructs such as competence, governance, and value creation. In the second item, we modified "my company" as "our team" as it may not be possible for respondents to know all employees in their company but would know their team members. The modification with "our team" is also supported by expert interviews.

II and EI items are adopted from the scales of Adams and Graham (2017), Flynn et al., (2016), and Shou et al. (2018). These constructs are considered as dynamic capabilities that are created during the CSD. Hence, items are modified by including the phrase of "during the disruption". The term "effective" is used in our items as it was included in both Adams and Graham (2017) and Flynn et al.'s (2016) adaptations. The use of "effective" is also suggested by experts in interviews as the dimensions of integration such as information sharing, collaboration, and communication are the basic requirements that each company in the MARSC must have. Effectiveness of these is the one that brings competitive advantage to firms.

SCRES items are adopted from Liu and Lee (2018) and Gölgeci and Kuivalainen (2020). Four items adopted from these sources are selected for their relevance to the prolonged CSD. While other SCRES studies include dimensions such as agility or re-engineering, our chosen items focus on capabilities most critical in this specific disruption context. Interviewees also found these items relevant to CSD. We modified items by asking them in relation to CSD instead of a generic way. Thus, items are asked in present perfect tense "we have managed to" and "to or by CSD". The same approach is implemented for customer satisfaction scale. We modified items of Balci et al. (2019) and Lam et al. (2004) in relation to CSD. Operational performance items are adopted from the study of Munir et al. (2020) by including one more item based on suggestions in expert interviews: flexibility in provision of empty container. According to experts, this is the main operational issue that plays a key role during the disruption. Similar to resilience and customer satisfaction, we have also modified items specific to CSD. Each performance indicator was measured using a comparative scale ("compared to your competitors"), consistent with prior research in firm and supply chain performance where objective competitor data is not available (Morgan et al., 2004; Hallikas et al., 2021). This approach captures managers' informed perceptions, which are typically based on a combination of market intelligence, customer feedback and professional experience.

Table 1 Measurement scales and items

Measurement Items	Source(s)
Relations (RL)	
1) We have good relations with our suppliers and customers (i.e., shippers, container terminals, container shipping lines, forwarders)	(Balci et al., 2018) Chowdhury et al., 2019; Wieland and Wallenburg, 2013)
2) Our relationships with suppliers and customers are based on mutual trust	
3) We do not mind owing each other favours with our suppliers and customers.	
Network Complexity (NC)	

1) Our company has various alternative suppliers 2) Our company has various logistics collaborators and strategic partnerships 3) Our company has various contracts with suppliers and buyers	(Chowdbury and Quaddus, 2017; Liu and Lee, 2018)
Digital Competence (DC)	
1) We have advanced digital tools for data sharing inside and outside the organisation. 2) Our team has an advanced level of understanding of digital tools. 3) Digital tools we have allow a better management of customer orders and operations.	(Zouari et al., 2020)
Internal Integration (II)	
1) We have had an effective communication between departments within our organisation during the disruption. 2) We have had an effective collaboration between departments within our organisation during the disruption. 3) We have had an effective information sharing between departments in our organisation during the disruption	(Adams and Graham, 2017; Flynn et al., 2016; Shou et al., 2018)
External Integration (EI)	
1) We have had an effective communication with our suppliers and customers during the disruption. 2) We have had an effective collaboration with our suppliers and buyers during the disruption. 3) We have had an effective information sharing with our suppliers and buyers during the disruption.	(Flynn et al., 2016; Shou et al., 2018)
Supply Chain Resilience (SCRES)	
Considering our supply chain 1) We have managed to cope with challenges brought by the CSD 2) We have easily managed to adapt to changes caused by the CSD 3) We have managed to quickly respond to CSD 4) We have managed to achieve a superior state compared to its original state after the CSD	(Liu and Lee, 2018; Gölgeci and Kuivalainen, 2020))
Customer Satisfaction (CS)	
Compared to our competitors during the CSD, 1) ..our customers have been satisfied with services they received from us 2) ..we have met our customers' expectations 3) ..our customers have been satisfied with the relationship they have with us	(Balci et al., 2019; Lam et al., 2004)
Financial performance (FP)	
Compared to our competitors during the CSD 1) ..our profitability has improved 2) ..our sales volume has improved 3) ..our market share has improved	(Abeysakara et al., 2019; Yu et al., 2019)
Operational Performance (OP)	
Compared to our competitors during the CSD, 1) We have been more flexible in provision of empty containers. 2) Our operations have been more reliable. 3) Our operations have been more punctual (on-time). 4) We have solved operational problems effectively.	(Munir et al., 2020)

Source: Authors own work

The paper considers company size and company type as control variables which might affect the hypothesised relationships in the conceptual framework. Company size is selected as larger firms have more extended resources and higher capital that can have an impact on SCRES and its capabilities (Mubarik et al., 2021). The literature also suggests that the industry sector might have an impact on the supply chain risk management and different type of companies might have different perception regarding SCRES capabilities (Belhadi et al., 2021). Company type is chosen as a control variable as container lines and freight forwarders have different set of tangible and intangible resources that might influence SCRES and integration capability perceptions.

3.3.Profile of Respondents

The descriptive results (Table 2) illustrate that around 70% of respondents are freight forwarders while almost 30% of them are container lines. This distribution is reasonable considering higher number of freight forwarders in the market. Around 37% and 39% of respondents are working in the operations and sales & marketing departments respectively while 16% are top managers (i.e., general manager, country manager) and founders. Majority of the respondents have a long experience in maritime transportation industry. The size distribution of companies is representative to reflect opinions of different size of companies.

Table 2 Profile of respondents and firm demographics

Profile	Frequency	Percentage %
Age		
18-25	17	9.9
26-34	60	34.9
35-44	52	30.2
45-54	40	23.3
55 and more	3	1.7
Company Type		
Freight Forwarder	123	71.5
Container Line	49	28.5
Department		
Operations	65	37.8
Sales & Marketing	67	39.0
Documentation	12	7.0
Top managerial level*	28	16.3
Experience		
1-3 years	12	7.0
4-6 years	49	28.5
7-10 years	38	22.1
11-14	29	16.9`
15 and more	44	25.6
Employees		
1-24	29	16.9
25-49	36	20.9
50-99	54	31.4
100 and more	53	30.8

* Top level of managers not being a part of a specific department such as country managers, regional managers, or founders,

Source: Authors own work

4. Results

In this research, PLS-SEM – a multivariate statistical method- is used to test the model and the hypotheses. PLS-SEM measures relationships between constructs while allowing a construct to be endogenous and exogenous at the same time. PLS-SEM is particularly considered suitable when the model is complex consisting of many constructs and relations (Hair et al., 2019). Our model is relatively complex including nine constructs, compared to similar studies such as Liu and Lee (2018) and Liu et al (2018) which involve 5 and 6 constructs, respectively. PLS-SEM is also recommended when the sample size is modest, e.g., less than 200 as a rule of thumb, where covariance-based SEM may face identification or convergence challenges (Reinartz et al., 2009). Accordingly, similar to Liu and Lee (2018), PLS-SEM is chosen since the sample size is lower than 200 (172).

4.1.Measurement Model

The measurement model is tested by evaluating several reliability and validity analyses. Internal consistency reliability is checked by Cronbach's Alpha and composite reliability scores. These two scores should exceed 0.7 which is the minimum threshold value (Bagozzi and Yi, 2012). As shown in Table 3, all constructs achieve acceptable internal consistency reliabilities. The convergent validity is checked by evaluating average variance extracted (AVE) values, which should be above 0.50 (Hair et al., 2018). AVE values of all constructs in our model are well above the minimum threshold value. The discriminant validity – which measures whether measures that should not be related are related or not in practice – is checked by evaluating Fornell & Larcker (1981) test which suggests that squared root AVE values of each construct should be higher than their correlation scores with other constructs. Table 4 clearly illustrates that squared root AVE value of each construct is higher than their correlations. Ensuring both convergent and discriminant validities demonstrate the construct validity of our model.

Table 3 Reliability and validity of constructs in the measurement model

Construct	Cronbach's Alpha	Composite Reliability	AVE	Standardized indicator loadings	No of items
Relations	0.917	0.948	0.858	0.914 – 0.940	3
Network Complexity	0.877	0.924	0.802	0.808 – 0.942	3
Digital Competence	0.931	0.956	0.879	0.931 – 0.944	3
II	0.960	0.974	0.927	0.921 – 0.942	3
EI	0.942	0.963	0.896	0.940 – 0.963	3
SCRES	0.833	0.889	0.669	0.719 – 0.879	4
Customer Satisfaction	0.938	0.955	0.843	0.701 – 0.917	3
Financial performance	0.782	0.873	0.698	0.900 – 0.944	3
Operational Performance	0.844	0.897	0.687	0.722 – 0.890	4

Source: Authors own work

Table 4 Fornell-Larcker discriminant validity results

	CS	DC	EI	FP	II	SCRES	NC	OP	RR
CS	**0.918**								

DC	0.406	**0.937**							
EI	0.638	0.456	**0.947**						
FP	0.429	0.316	0.331	**0.836**					
II	0.457	0.448	0.680	0.266	**0.963**				
SCRES	0.679	0.446	0.669	0.633	0.513	**0.818**			
NC	0.511	0.507	0.597	0.465	0.46	0.613	**0.895**		
OP	0.790	0.422	0.554	0.537	0.427	0.671	0.550	**0.829**	
RR	0.553	0.413	0.657	0.279	0.471	0.491	0.522	0.517	0.927

Source: Authors own work

4.2.Structural Model

Path coefficients, their significance levels, and t-values are analysed to test research hypotheses. As shown in Table 5, eight hypotheses are accepted whereas two hypotheses are not supported. The results show that EI has a direct positive impact on SCRES, but II does not significantly and directly influence SCRES. Yet, II has a significant positive effect on EI. Evaluating the influence of resources on the SCI capabilities, relations and network complexity positively affect EI, the former having a relatively higher impact compared to the latter. On the other hand, digital competence does not have a significant impact on EI, but a positive direct effect on II.

The results indicate that SCRES positively influences customer satisfaction, financial performance, and operational performance. This result demonstrates that achieving SCRES can help companies perform better in these indicators during a disruption. Two control variables are tested on two different constructs. As shown in Table 6 and Figure 2, company size and company type do not have a significant impact on SCRES and EI.

Table 5 Hypotheses test and path value results

Hypotheses	Path	Coefficient	t values
H1 (Supported)	Relations → EI	0.341***	4.990
H2 (Supported)	Network Complexity → EI	0.217***	3.943
H3 (Not supported)	Digital Competence → EI	0.036^{NS}	0.534
H4 (Supported)	Digital Competence → II	0.448***	6.853
H5 (Supported)	EI → SCRES	0.603***	8.385
H6 (Not supported)	II → SCRES	0.100^{NS}	1.487
H7 (Supported)	II → EI	0.405***	6.078
H8 (Supported)	SCRES → Customer Satisfaction	0.678***	14.231
H9 (Supported)	SCRES → Financial performance	0.634***	14.464
H10 (Supported)	SCRES → Operational Performance	0.671***	10.773

P < 0.001***, P < 0.01**, P < 0.05*. NS: Non-significant

Source: Authors own work

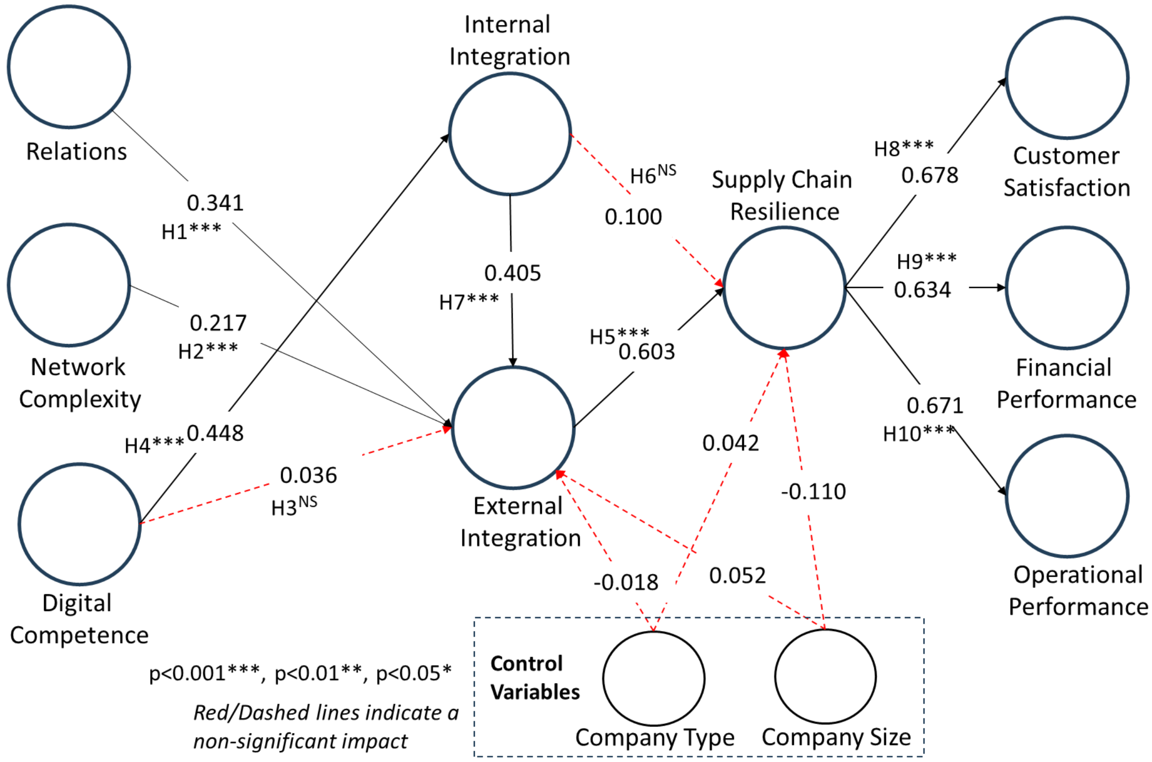

Figure 2 PLS-SEM results and hypotheses results.

Source: Authors own work

Table 6. Effects of control variables on SCRES and EI

	Path value to SCRES	Path value to EI
Control variables		
Company type	0.042^{NS}	-0.018^{NS}
Company size (Number of employees)	-0.110^{NS}	0.052^{NS}

NS: Non-significant

Source: Authors own work

5. Discussion and Conclusion

This paper adopted DCT and analysed the relationships between SCRES and its antecedents and outcomes during the COVID-19 related CSD. The results of this study have three main contributions to SCRES research. First, it extends the current dominant manufacturing supply chain focus in SCRES literature to an understudied but important context, MARSCs. Second, by studying the resources that are configured in a certain way during CSD, our results emphasize the necessity of relations and network complexity for achieving EI with supply chain partners during a time of crisis. While these two resource sets can be considered rather intangible, digital competence which is comparatively more infrastructural has no direct impact on EI but is essential in achieving II. Finally, the results not only confirm previous research that underlines the positive impact of resilience on firm performance, but they elaborate this relationship further by differentiating between financial, operational and customer satisfaction performance and thus having a more granulated approach to firm performance. This is particularly important for MARSC context where profitability and financial indicators improved significantly during COVID-19 related disruptions, but reliability diminished sharply due to capacity shortages. Following sections discuss results together with further elaborated theoretical and managerial contributions.

5.1.Theoretical contributions

Diverging from vast SCRES literature which focuses mostly on manufacturing and retail supply chains (Wieland and Wallenburg, 2013; Pettit et al., 2013; Brusset and Teller, 2017) our study investigates the MARSC. As the latest developments show, this context is particularly important because almost all other supply chains are dependent on a seamlessly functioning MARSC. Lack of containers, congestions at ports, blockages of canals or straits result in unstable and inadequate capacity, very high freight rates, unreliable delivery times which all affect business performance outcomes. Therefore, it is essential to understand how MARSCs can become more resilient when tackling with market uncertainties, by configurating which resources and by building which capabilities. In addition, studying this context in a region which is not a part of main global trade and therefore not receiving all resources to respond the crisis enables studying resilience capabilities and resources in a more constrained environment. The results underline the role of relations and diverse networks in case of limited capacity availability and at a region that receives less prompt central response to disruptions.

Moreover, the results present original contributions because the study focuses on a real-life and prolonging supply chain disruption for over a year. This is essential as each disruption varies in terms of the time it lasts, problems it causes, and the magnitude it affects. Different disruptions may require different sets of SCRES resources and capabilities. The importance level of same resources and capabilities may also change depending on the disruption characteristics which is why firms need to develop dynamic capabilities that are required to respond different disruptions. Our results showing the lack of direct relationship between digital competence and EI or II and SCRES are evidence for the specific characteristics of the disruption context.

Looking further into resources that are configured for building SCI capabilities, our results show that relations and network complexity have a positive impact on EI. Positive impact of relations is aligned with previous SCI literature (Wang et al., 2016; Yuen et al., 2019), is considered critical for SCRES (Wieland and Wallenburg, 2013; Brusset and Teller, 2017) but have not been studied as an antecedent in a SCRES research model. Similarly, network complexity is considered critical for resilient SCs considering the variety of alternative supply chain members in such networks (Wang et al., 2018). Chowdhury et al (2019) combine supply chain relations and network complexity and suggest that the two constructs strengthen the relationship between SCRES and firm performance. We take a different position and include network complexity as a resource for building EI. Manufacturing supply chain literature claims "higher-level supplier integration is usually related with fewer suppliers" (Zhao et al., 2013; 119). Although our study did not directly measure the number of suppliers, we examined network complexity as an antecedent of integration, incorporating logistics collaborators and buyers in addition to suppliers within the measurement construct. We found that having alternative suppliers, logistics collaborators, and other strategic partners, as well as maintaining various contracts with them, could enhance the EI. This result is expectable as members of MARSC often work with as many suppliers and customers as possible to be more integrated to the MARSC and deliver an end-to-end integrated logistics service. Furthermore, the access to a wider network of suppliers enabled access to wider container capacity during the shortage. Consequently, the configuration and reconfiguration of these complex networks enabled effective EI and SCRES in response to CSD.

Comparing the path values of relations and network complexity, the former has a higher impact on EI. This suggests that strong relationships with suppliers and customers – characterised by good relations, mutual trust and reciprocal favours – are more influential than merely having numerous alternative partners and contracts for boosting EI. The reason for this result is that although it is essential to have access to a wide network, the strong relations with these diverse network partners is more important in achieving EI capabilities during CSD.

The third resource dimension, digital competence was found to have a direct positive impact on II whereas no such impact on EI. This result diverges from previous literature which advocates the positive impact of digital competence on SCI (Buyukozkan and Gocer, 2018; Zsidisin et al., 2015). This contradictory result may arise from most-recently digitalised operations in MARSC in which most bookings are carried out by automated online tools (Balci, 2021). However, container shipping lines and freight forwarders were undergoing an ongoing transition and experienced difficulties in the digitalization of their sales and operations during the empty container shortage period. Although no container was available for certain shipments, automated digital tools kept confirming booking requests during the CSD, which caused container lines and forwarders to accomplish operations manually. Thus, digital competences may not be perceived to help improve the integration between shippers, container lines and freight forwarders during the disruption. II, on the other hand, is positively influenced by digital competences which is complementing previous resilience literature that underlines the role of information sharing on II for resilience (Poberschnigg et al., 2020). Digital competence is a critical facilitator of intra-organisational information sharing and therefore have a direct impact on II and, as our results suggest, an indirect impact on EI. Thus, considering the impact of II on EI, we suggest that digital competence has an indirect impact on EI.

Looking into the relationship between SCI and SCRES, our findings show that while EI positively affects SCRES, II does not have a direct significant impact. This result contradicts the findings of Liu and Lee (2018) who study the same relationship in a similar context and find that II positively influences resilience of logistics service providers. This contradiction may result due to specific problems related to the CSD. It was mostly those external collaborations and contacts that helped MARSC firms to quickly respond and cope with challenges brought by this disruption. For instance, freight forwarders, who have better collaboration, communication, and information sharing with container lines, could provide more empty containers compared to their competitors. Most of the time, it was not in the hands of branches, shipping agencies or freight forwarder offices to solve the problem, but it required cooperating with external network members. Nonetheless, the absence of a significant direct impact of II should not lead to underestimation of its importance as our results confirm Liu and

Lee’s (2018) findings that show the positive impact of II on EI. We conclude that II acts as an indirect facilitator of SCRES during a specific disruption such as CSD.

Lastly, our results validate the critical role of SCRES on different performance outcomes during a disruption. The significant positive impact of SCRES on customer satisfaction deserves a particular attention as the literature overlooks this link. Only a few SCRES studies indirectly consider customer satisfaction (Wong et al., 2020; Piprani et al.2020) as a part of firm performance or sometimes as an item under non-financial performance (Iftikhar et al., 2019). The impact of SCRES on customer satisfaction is the highest among other performance indicators in our results. CSD has left many shippers unable to ship their products. This is an example of a service failure which causes a significant dissatisfaction among customers. Resilient service providers in MARSC can better handle the empty container problem, hence fulfilling the promised service to customers. Thus, the highest impact of resilience on customer satisfaction is not surprising. Yet, this result is believed to trigger further investigations of marketing-related constructs, i.e., loyalty, service failure, service quality, within SCRES domain where they are not elaborated currently.

Similar to other supply chain contexts Golgeci and Kuivalainen (2020), our results confirm the role of SCRES in financial performance in the MARSC context as well. Our results contradict to Liu et al. (2018) who found that elements of SCRES do not directly affect firm performance in shipping industry. The contradiction may occur as we use a single SCRES construct whereas they indirectly examine SCRES by involving three different constructs. Using a single SCRES construct allowed for a parsimonious model that captures the overall resilience capability without overcomplicating the measurement. Our SCRES items were designed to capture absorptive, adaptive and restorative aspects of SCRES in an integrated manner. This approach provided conceptual parsimony while addressing key components of SCRES. Moreover, using a single construct would reduce number of items in the survey, hence minimise the possibility of respondent fatigue and increase data quality (Birkett, 1986).

Lastly, although operational performance is widely studied in supply chain literature, it receives less attention from SCRES literature as an outcome. In disruptions like CSD which last for a long time, it is crucial for firms to perform well in operations. That is, firms must ensure that their operations are reliable, punctual, and flexible for problem solving and solution creation. Our results approve the significant role of SCRES on operational performance, in addition to those financial performance indicators.

Most SCRES definitions indicate that SCRES helps to maintain the same or even better performance levels after being disrupted (Ribeiro and Barbosa-Povoa, 2018). Our findings move beyond validating this definition and postulate that SCRES helps to achieve better performance outcomes not only after being disturbed by a cross-sectional supply chain disruption, but also during a prolonged disruption such as CSD. This postulation is vital for future SCRES studies as future disruptions such as political tensions and climate change are likely to have long-lasting effects.

5.2.Practical implications

Beside others, empty container shortage was the root cause of many supply chain problems during COVID-19. A quick reaction by large shippers such as IKEA or Walmart was to lease or buy their own containers which meant stepping into a sector where they have no competence.

On the other hand, for MARSC actors such as freight forwarders or shipping lines, it became a hindrance for performing daily operations. Majority of the respondents who participated to the pilot phase of this study indicated that although their financial indicators were the highest of all times, they were working many extra hours and putting all resources in solving daily operational problems caused by lack of containers among others. This resulted in many broken customer relationships, failed contracts and lost sales.

By providing a lens to building SCRES during CSD, our results suggest managers in MARSCs to invest in relational and network-based resources. This requires developing personal relationships with supply chain partners, recruiting new partners into existing supply networks, increasing diversity and number of supply chain partners to create alternative resources in cases of emergency. Digital competences and information technology should not be overlooked either. Such competences are essential in facilitation of information sharing within the organisation. Availability of such resources prevent the problem to grow and indirectly trigger external collaboration links to develop a solution.

On the other hand, relationship building can be more challenging when the network is extended. This also depends on relationship building strategies. Two opposite sides of the continuum were observed during CSD and COVID-19 related crisis in MARSCs. Some actors adopted a long-term relationship building strategy which requires commitment to contracts those secure prices and capacity. On the contrary, others adopted a transactional relationship strategy which allowed very high short-term profits over high freight rates. The latter strategy can bring financial rewards during disruptions, but our results show that investing in relational resources while extending the network would bring better performance outcomes not only in financial terms but also in operational and customer service terms. We tested these ideas through follow-up interviews with three shipping lines, two freight forwarders, and one representative of a freight forwarder association in Turkey. They also confirmed that the two strategies were common in both groups, but the winners of this period were those who kept close, personal and long-term relationships with their supply chain partners. Particularly freight forwarders stated that they succeeded by keeping in continuous contact with their customers and service providers to monitor capacity changes in real time. This was also mentioned by shipping line representatives who fought hard to convince central planners to relocate empty containers to these non-main-route regions. Therefore, we suggest managers in MARSCs to diversify their network partners not only with a transactional approach but by the intention of building strong relationships.

The results also highlight that it is important for MARSC firms to build both internal and EI capabilities which are adaptable to changing environmental conditions particularly during a time of crisis. Collaboration, communication and information sharing should be encouraged both between or across the intra-organisational departments and external supply chain partners such as other branches, agencies, freight forwarders, logistics service providers, shippers and seaports.

Our results can show similar patterns in other supply chain disruption contexts that exhibit similar characteristics. CSD is a prolonged global supply chain disruption that suffers from a shortage of core production factor (container in this case). Other prolonged disruptions such as Ukraine-Russia war, BREXIT, US-China trade issues and global pandemics like COVID-19 have caused similar consequences. Although business operations have continued, daily operational practices have been disturbed for a long time in various industries. The climate crisis is also long-lasting threat that supply chains will have to face and it will cause several prolonging disruptions (Ghadge et al., 2020). In addition to the extended duration, these prolonged disruptions cause shortages in certain production factors. Following BREXIT, staff shortages have been affecting different industries including agriculture (shortage of seasonal labour in harvest) and road freight industry (shortage of lorry drivers). Furthermore, CSD is a global crisis that affected MARSC members in different parts of the world simultaneously. Considering the global structure of modern supply chains, a similar consequence is expected in response to other similar disruptions such as COVID-19 pandemic. Hence, these results can provide insights during disruptions that show similar characteristics with CSD.

5.3. Limitations and future research

We acknowledge that there are capabilities for achieving SCRES other than SCI. Yet, our paper focuses on only SCI as it is a significant capability in the contemporary environment of global supply chains which are more fragmented than before due to COVID-19 and recent trade tensions. Our choice is due to SCI's critical role in facilitating other resilience capabilities such as visibility and flexibility (Scholten and Schilder, 2015). Nonetheless, our focus does not diminish the importance of other capabilities, and they need to be tested by future studies that investigate multiple resilience capabilities and the relationships between them. We also acknowledge that resilience is a complex concept comprising several sub-dimensions and may include more items than used in our study. Future studies may consider other resilience dimensions such as agility, flexibility and re-engineering considering suitability to their context.

Moreover, our study focuses on only freight forwarders and container lines that are the major members of MARSC. This limitation was necessary to be able to implement a single survey. A single survey would not be feasible as other members of MARSC such as container terminals or seaports experience the container shortage problem differently such as e.g., capacity constraints, space allocation, and vessel turnaround times. Future studies may expand the coverage of MARSC members and elaborate on the different resilience practices at different supply chain segments. Another limitation of this study is the use of perceptual, comparative measures for firm performance metrics such as financial performance, which, although validated in prior research, may be subject to manager bias. Future research could complement perceptual assessments with objective performance data by implementing survey in an industry or scale where more public listed companies exist. Moreover, our study focuses on three different performance outcomes. Future studies could also test other performance metrics such as risk management performance.

Our results provide a holistic view on the relationships between antecedents and outcomes of SCRES during CSD. This holistic view is maintained by studying SCRES not in relation to only performance outcomes or buffering strategies such as EI or II but including also their antecedents. This allowed us to illustrate a more comprehensive picture of SCRES within the selected context. However, a closer look is necessary to understand the interplay between and within the constructs introduced in the model. How do supply chain members configure and reconfigure selected resource sets to build integration capabilities? How are EI and II achieved within different organisations and SCs? What are the differences between manufacturing supply chains and transportation networks such as the MARSC when building resilience capabilities? In addition to these questions, further focus on the interface between MARSC actors and manufacturing supply chain firms is required to understand how these partners tackle with transportation network-related disruptions. The CSD between 2020-2022 has proved that we treat our global supply chains almost like pipelines which will flow without an interruption. But the MARSC that they depend upon is prone to many disruptions which increases the vulnerability of the whole network. Therefore, a closer look into how the two supply chains interact in response to a specific disruption deserves further scholarly attention.

Lastly, we believe our study can stimulate future studies to consider characteristics of the disruption while investigating SCRES. We collected our data by focusing on a specific and prolonging disruption. The results of the analysis might change when the responses to short, cross-sectional, regional or local disruptions. Multiple case studies that compare supply chain responses to various disruptions would provide interesting insights to SCRES research. Furthermore, in addition to the contingency approach we adopted in this study where we investigate a certain disruption, a configuration approach that groups different risk contexts which would require different resource and capability constellations would provide valuable insights to understanding SCRES under different conditions. Our paper also suggests future studies to include more marketing-driven performance indicators measured in relation to SCRES considering its highly significant relation to customer satisfaction within the studied CSD context.

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