Digitalization in Container Shipping Services: Critical Resources for Competitive Advantage

Ⓘ **Gökçay Balcı**

University of Huddersfield Faculty of Huddersfield Business, United Kingdom

Abstract

The container shipping market has been transforming into a digital era, in which many operations and marketing facilities are being digitalized. Digitalization offers several benefits to container lines, such as performance improvement, efficiency, and better integration with suppliers and customers' effectiveness. The importance of digitalization is particularly appreciated during the Coronavirus disease-2019 disruption. However, a successful digitalization process requires several resources and capabilities that carriers and forwarders should exploit. It is still not clear what these resources are and which of them is more important. Accordingly, this study aims to identify and rank the critical resources necessary for a successful digital transformation of services to achieve a competitive advantage. Identification of the resources was done using the underpinning theory of resource-based view (RBV) of the firm and conducting interviews. This study then implements an analytical hierarchical process method to rank the relevant digitalization resources. The results indicate that the organizational and collaboration resources are the most important main resources, while the organizational culture for learning and innovativeness, integration of digital services, and collaboration with suppliers are the most important sub-resources. This study aims to contribute to the digitalization literature in the shipping industry by identifying and ranking critical resources within the perspective of RBV of the firm.

Keywords

Digitalization, Competitive advantage, Resource-based view, Container shipping, Digital transformation

1. Introduction

Global competition has been increasing day by day and achieving a competitive advantage is one of the fundamental aims of the companies. Firms need to deliver superior value to their customers to sustain their competitiveness. Philip and Gary [1] emphasize the importance of creating competitive advantage and consider it as the extension of marketing. Porter [2] suggests that the right utilization of technology is considered as a source of creating competitive advantage. Day [3] also indicates the creative use of information technology as one of the dynamic capabilities that firms need to have if they are to be market-driven. In today's competitive business environment, digitalization is the key enabler for value creation [4].

Maritime transport plays a significant role in international trade as over 80% of the cargoes, in terms of volume, are carried by sea. Container shipping, in which mostly finished and semi-finished products are transported, has been a significant enabler of international logistics alongside bulk vessels carrying vital raw materials, such as iron ore and coal, which is the key to deliver customer value globally [1]. Despite its vital role in international trade and logistics, the container shipping market has been facing turbulent times in recent years due to the low profitability rates and increased competition. Differentiation has also become more challenging due to strategic alliances between shipping lines [5]. On the other hand, the expectations of shippers and forwarders, i.e., customers of the container lines, are getting more demanding and complex due to increasing global competition and advancing consumer demands [6]. Hence, creating value, and thereby achieving competitive

advantage have become crucial for container lines to survive in such a dynamic environment.

The digitalization of services is considered to be a vital source for the differentiation and competitive advantage in logistics services [7]. The literature indicates numerous benefits of digitalization and information technologies (IT) in the logistics and freight transport industry. For instance, Lam and Zhang [8] applied a quality function deployment method in the liner shipping industry and found that the dimensions of digital innovative solutions have a significant impact on customer value. Similarly, Poulis et al. [9] also suggested that a digital transformation in shipping can enhance the value among ecosystem members. The effective utilization of IT can help logistics firms achieve efficiency and increase their performances in reverse logistics [10], enable them to innovate [11], and achieve sustainability [12]. Digitalization may help minimize the barriers in the application of intermodal transportation [13]. Digitalization also plays a key role in the improvement of performance and inter-organizational relationships in land-sea supply chains [14], which is crucially important considering the increasing attention by the container lines on door-to-door services.

Besides the proven advantages of the digital transformation in the shipping and logistics market, shipping lines are also surrounded by pressures for digitalizing their services. This has become especially evident in the Coronavirus disease-2019 (COVID-19) pandemic process. Digital solutions offered by companies have been helpful in the continuation of supply chains. For instance, some courier services were disrupted due to lockdown measures in the beginning of the COVID-19 pandemic and many importers were not able to release their cargoes from ports as they could not get the printed bills of ladings. For non-negotiable bills of ladings, electronic seaway bills allowed shippers to avoid this disruption and continue their logistics operations. Similarly, online bookings helped shippers to sustain and carry out shipments smoothly. In line with this, several container lines have reported that their online booking tools have been used significantly more than the pre-pandemic period. Apart from the disruptions such as COVID-19, global supply chains have started to put more emphasis on the traceability of their shipments. The increase of investments in last-mile deliveries and the boost in the fast fashion market have led to sensitivity in traceability. Supply chains such as Zara and IKEA are also investing a lot in their digital transformation, which could only be achieved if shipping companies also transform their services into a more digital format. The recent examples of digitalization in container shipping include online bookings, online freight quotations, digital documentation, real-time tracking, and live chat customer services [15]. These services might be implemented through the traditional web and electronic data interchange applications or through more advanced recent technologies such as blockchains and internet-of-things (IoT). Digitalization may also involve autonomous operations such as unmanned vessels but this will not be covered in this paper [9].

There exist remarkable potential benefits of digitalization and several application areas in container shipping. Some of these digital solutions have already been applied by the leading global container lines. However, the successful implementation of digital products in container shipping services depends on several factors, and the companies that offer these services should be aware of these factors. For instance, Vogelsang et al. [16] indicated that there are three dimensions of critical success factors in the digital transformation of a manufacturing company: collaboration, technology, and the environment. Technology and environment, together with organization and cost factors, were also emphasized by Yeh and Chen [17] who investigated the success factors of 3d printing adopted by Taiwanese manufacturers. Cichosz et al. [18] investigated the success factors of the digital transformation in the logistics industry and identified eight different facets such as leadership, process standardization, employee training, skills development, and leveraging internal and external knowledge. Since the logistics industry usually lags behind others such as banking in terms of digitalization, it is of critical importance for container lines to pay attention to these factors [18].

It is of significant importance that container shipping lines should understand the factors affecting the successful implementation of digital services. More importantly, they should figure out which resources play a more important role in the digital transformation of services. This is vital as the resources of the companies are heterogeneous in the market [19]. Despite the existence of some articles investigating the success factors of digital transportation in related areas, the subject has not been studied sufficiently in the shipping context. Besides, very few studies have attempted to find out the importance degree of these factors. Moreover, to the best knowledge of the authors, no study in the shipping domain has approached this problem with a resource-based view (RBV) and employs the ranking of critical resources necessary for the digital transformation. Accordingly, this paper aims to identify and rank the critical resources for the successful implementation of digital services to achieve a competitive advantage in container shipping. The theoretical lens of the research is underpinned by a RBV and applies an analytical hierarchy process (AHP) methodology to rank the critical resources. The paper also presents implications to both literature and practice in the discussion section.

2. Literature Review and Theoretical Background

The theoretical background of this study is underpinned by a RBV. RBV is a competitive advantage theory that posits that firm resources and capabilities are heterogeneous and suggests that the resources of a firm are the key sources for achieving and sustaining a competitive advantage [19,20]. The theory proposes that it is the resources and not the products that give edge to firms in regard to competitive advantage. Resources may involve brands, personnel, machinery, financial assets, procedures, know-how, business relations, and many different tangible and intangible assets as well as processes. The RBV theory postulates that the resources of firms should be valuable, rare, inimitable, and non-substitutable to be able to achieve a competitive advantage.

The theory has been widely acknowledged and utilized in different aspects of business strategy. Maritime transport literature has also used the RBV theory to anchor the theoretical basis of studies. The theory has been utilized in the supply chain integration in container shipping [21], sustainable shipping management [22], logistics performance in the shipping industry [23], and several other topics such as innovation capabilities of shipping lines, the competitive advantage of ports, and market orientation [24]. In terms of digitalization in shipping, very few papers have adopted the RBV theory to justify the theoretical background of the study [25].

The RBV theory suits very well to explain the theoretical background of this research as well. The competition among container lines as well as freight forwarders is getting fiercer day by day. Container lines particularly have been suffering from low profitability rates in recent years. They have ordered mega vessels to reduce their unit costs and have signed strategic alliance membership contracts to fill the capacity of those mega vessels and operate them more efficiently. However, these cost reduction and operational efficiency measures have not been sufficient to let them increase their profitability rates [26]. They need to differentiate themselves from other lines and create value for their customers to gain a competitive advantage [5], which can be achieved through the digitalization of services they provide [27]. In parallel to the groundings of the theory, it is observed that the container shipping market is heterogeneous [26]. It is not only heterogeneous of customers but also the resources of the container lines, since a notable gap exists between the container lines in terms of digitalization of services.

RBV is also a very appropriate theory for this paper as the main aim is to investigate the internal resources of container lines at the firm level. Successful implementation of digitalization can be possible as long as different resources are utilized effectively. These resources do not have to be tangible, such as information technology equipment, but also include the intangible ones, including organization skills and customer orientation capabilities. As indicated in the study of the adoption of blockchain in the supply chain using RBV by Latha et al. [28], a successful implementation of digitalization also requires the collaborations among the suppliers, customers, and other branches. RBV is also an appropriate theory regarding the explanation of collaboration capabilities.

The literature in shipping digitalization is limited and ample space exists to fill in this area. Among the few studies conducted about digitalization in shipping, Lambrou et al. [25] conducted a qualitative study and discussed several digitalization applications in the shipping industry, such as IoT, blockchain, and artificial intelligence. The authors listed the drivers of digitalization in shipping as process improvements, cost efficiency, customer and business partner expectations, data monetization models, radical innovations, market share, innovation push, and institutions. Vaio and Varriale [14] studied the sea-land supply chain in the port operations in the Italian context. They investigated digital platforms on the business process of seaport organizations and indicated several benefits of digitalization such as paper reduction, cost reduction, quick access to information, and reduction of errors in information sharing. Poulis et al. [9] conceptually discussed how digital transformations in shipping would create value in the industry. The focus of the paper is the automation of unmanned vessels.

One of the recent digitalization trends in the shipping literature is the application of blockchain technology and smart contracts. Blockchain offers great opportunities for the digitalization of procedures such as customs clearance and documentation, even including the original bill of ladings. Yang [27] conducted a survey study about the blockchain application on Taiwanese maritime stakeholders, indicating that the customs clearance, digitalizing and easing paperwork, and the standardization and platform development positively influence the intention to use the technology. Bavassano et al. [29] also critically discussed the application of blockchain in the shipping industry and stated that the regulators and public authorities present the main barrier to the application. Pu and Lam [30] also conceptually discussed the adoption of blockchain in the shipping industry. These recent studies in shipping digitalization present great value to the literature. However, the digitalization of services, such as bookings and freight quotations, are not discussed in detail in the literature. Particularly, how

these digital services can be successfully implemented is not studied.

Borrowing the success factors of the digital transformation literature in other industries may help us deduct some understanding on the topic. Liu et al. [31] investigated the resources fit for the digital transformation with an application in e-banking services. The authors have divided the resources and capabilities into four by sorting both dimensions as internal and external. The study revealed that the most important external resources are the historical path and embedded trust, while a dedicated liaison device and a highly authorized team are the most important internal resource fits required. The study also found that the most important external capability fits are collaboration and customization, while IT integration and reconfiguration ability are found to be the most important internal resource fits required [31].

Vogelsang et al. [16] studied the success factors for fostering digital transformation in manufacturing companies. In their results, the success factors consisted of three main dimensions: Organization, environment, and technology. The organization dimension involves 10 variables such as autonomy, employee qualification, culture, management support, and usability. Meanwhile, the environment dimension encompasses connectivity, collaboration, transparency, standards, and hybrid value creation. The technology dimension, on the other hand, involves infrastructure, reliability, adaptability, security, and completeness. Another recent study [32] studied digital servitization and identified some management initiatives such as engaging internal and external stakeholders, establishing digital service centers, focusing on customer value, and changing the employee structure.

3. Methodology

This study aims to identify and rank the importance of critical resources for the successful digitalization of services to achieve a competitive advantage in container shipping services. Accordingly, the study first identifies the critical resources for digitalization in the literature review. Qualitative interviews are then conducted with experts in the container shipping industry to validate the content and appropriateness of the variables identified in the literature. After, an AHP survey, which is the main methodology in the paper, is conducted with experts working in the container shipping industry.

This study has implemented AHP to find out the importance weight and ranking of critical resources for the successful digitalization of services in the container shipping market. AHP is a "theory of measurement through pairwise comparisons and relies on the judgments of experts to derive priority scales" [33]. AHP method simplifies complex problems by involving the judgments and experience of experts in the context of the problem. In AHP methodology, the decision makers are able to use their objective and subjective judgments. AHP has been implemented in many different research areas owing to its easiness in use and ability to handle multiple criteria whether they are qualitative or quantitative [34]. The AHP method has been applied by many studies in selection problems between alternatives, but it has also been widely used to determine the weight importance and ranking of a set of criteria without a selection of an alternative [35]. For instance, the method has been used by several studies to identify critical success factors or barriers in the implementation of a service, competition, and adoption of a new strategy. Several examples exist within the domain of shipping and digitalization literature as well [36-39].

The AHP methodology consists of eight steps in our study. First, the goal of the research is determined, which is the ranking of the critical resources of companies for successful digitalization of services in the container shipping market for this paper. The second step is to determine the criteria and create a hierarchical structure. As for the critical resources, five main resources (main criteria) are identified from the literature review and expert interviews as shown in Table 1: organizational, technological, reputational

Table 1. Critical resources for digitalization of services to create a competitive advantage in container shipping

Main criteria	Sub-criteria	Sources
Organizational resources	• Support from top management for digitalization • Knowledge/experience of employee in digital services • Organizational culture for learning and innovativeness	[16,18]
Technological resources	• IT infrastructure of the company • Investments for cybersecurity • Integration of digital services	[17,31]
Reputational and power-related resources	• Brand reputation of the company • Financial strength of the company • Global presence and connections	Interviews
Collaboration resources	• Collaboration with customers in digital service development • Collaboration with suppliers in digital service development • Collaboration with other branches and regions in digital service development	[16]
Market orientation resources	•Value creation strategies for customers • Strategies for customer satisfaction • Commitment to service quality	[40] and Interviews
IT: Information technologies		

and power-related, collaboration, and market orientation resources. Each of the main criteria has a total of three sub-criteria. Interviews for identifying the critical resources were conducted with five managers who have at least 10 years of experience (three from container lines and two from freight forwarders). Purposive non-probabilistic sampling has been utilized to ensure that respondents are correct people to evaluate the appropriateness of variables utilized in AHP method. These interviews were conducted over Zoom online meetings in July 2020 and lasted between 25-40 minutes. The interviewees were asked to comment on the list of the critical resources identified from the literature review. They agreed with the content of the critical resources and also added one more main resource with three sub-resources.

The third step of the AHP is to construct a pairwise comparison matrix using a 9-point scale as suggested by Saaty [33]. Table 2 illustrates the AHP survey that is created by designing 9-point scale comparisons.

The fourth step of the AHP is to collect the data. This study has adopted a judgmental sampling method. The respondents are carefully selected through the LinkedIn social network by considering their positions and role in the companies. Although the container shipping's ecosystem involves several members such as shippers, terminal operators, port authorities, and customs, this research has focused on the freight forwarders and container lines. Container lines are the main providers of container shipping services and have also been recently transforming their operations digitally. Freight forwarders are the customers of container lines and are also the freight transportation providers for shippers. Thus, they are both the users and suppliers of the digital services in a shipper's perspective. Experts with a managerial working level these types of companies are targeted for the sampling. Twenty-six experts have responded to the survey. Fourteen of these respondents comprise of container lines and 12 of them are freight forwarders. All the selected experts are at a managerial level and have at least 10 years of container

Table 2. AHP scale

Intensity of importance	Definition
1	Equal importance
3	Moderate importance
5	Strong importance
7	Very strong importance
9	Extreme importance
2, 4, 6, 8	Values in between
AHP: Analytical hierarchy process	
Source: Adopted from [33]	

shipping industry experience with an average of 15 years. The experts are located in Turkey.

The fifth step is to create a pairwise comparison matrix. However, before creating a pairwise comparison matrix, it is important to take the geometric mean of each respondents' final ratings [33,41]. We let the criteria be a1, a2, ..., an and the weights be w1, w2, ..., wn. Thus, after taking the geometric mean of the experts' opinions, the pairwise comparison matrix for the 5 criteria is shown below.

$$A = \begin{bmatrix} 1.00 & 1.98 & 1.52 & 0.62 & 1.31 \\ 0.51 & 1.00 & 1.12 & 1.09 & 1.11 \\ 0.66 & 0.89 & 1.00 & 1.35 & 1.03 \\ 1.61 & 0.92 & 0.74 & 1.00 & 1.76 \\ 0.76 & 0.90 & 0.97 & 0.57 & 1.00 \end{bmatrix}$$

The sixth step of the AHP is to estimate the relative weight of the elements with the utilization of the following formulas. a_{ij} becomes $\frac{1}{a_{ji}}$ because of the reciprocity feature. Similarly, a_{ij} becomes $\frac{a_{ik}}{a_{jk}}$. In real problems, the result of the equation of $\frac{w_i}{w_j}$ is unknown. Thus, in AHP, the a_{ij} value is expected to be calculated [42]. The demonstration of the normalized matrix is shown below.

$$W = \begin{bmatrix} 0.22 & 0.35 & 0.28 & 0.13 & 0.21 \\ 0.11 & 0.18 & 0.21 & 0.24 & 0.18 \\ 0.14 & 0.16 & 0.19 & 0.29 & 0.17 \\ 0.36 & 0.16 & 0.14 & 0.22 & 0.28 \\ 0.17 & 0.16 & 0.18 & 0.12 & 0.16 \end{bmatrix}$$

After calculating the normalized matrix, the priority vector is then obtained.

$$w = \begin{bmatrix} 0.24 \\ 0.18 \\ 0.19 \\ 0.23 \\ 0.16 \end{bmatrix}$$

To calculate the priority matrix, A and *w* values are multiplied.

$$A \cdot w = \begin{bmatrix} 1.00 & 1.98 & 1.52 & 0.62 & 1.31 \\ 0.51 & 1.00 & 1.12 & 1.09 & 1.11 \\ 0.66 & 0.89 & 1.00 & 1.35 & 1.03 \\ 1.61 & 0.92 & 0.74 & 1.00 & 1.76 \\ 0.76 & 0.90 & 0.97 & 0.57 & 1.00 \end{bmatrix} \begin{bmatrix} 0.24 \\ 0.18 \\ 0.19 \\ 0.23 \\ 0.16 \end{bmatrix} = \begin{bmatrix} 1\,24 \\ 0\,94 \\ 0\,98 \\ 1\,20 \\ 0\,82 \end{bmatrix}$$

The seventh step of the AHP method is to calculate the eigenvalue (λ) by dividing the priority matrix to the priority vector.

$$\lambda = \begin{bmatrix} 5.17 \\ 5.18 \\ 5.20 \\ 5.21 \\ 5.18 \end{bmatrix}$$

The eighth step of the AHP method is to calculate the degree of consistency ratio (CR) to mainly ensure the consistency of subjective perceptions and the accuracy of relative weights [33]. However, the first consistency index (CI) must first be calculated using the formula 1 below:

$$CI = \frac{(\lambda\text{Maks}-n)}{(n-1)} = \frac{(5.19-5)}{4} = 0.0468 \tag{1}$$

Where λ_{Maks} is the average value of each λ value and n is the number of criteria. The CI value must be equal to or lower than 0.1 to reach a reliable result [42]. CR is then calculated using the following (formula 2) .

$$CR = \frac{CI}{RI} = \frac{0.0468}{1.12} = 0.0418 \tag{2}$$

Where resistive index (RI) means random inconsistency index. RI is the average inconsistency calculated by the randomly generated matrices for the same dimensions. The most commonly used RI values are proposed by [33] and shown in Table 3.

Since the CR value is lower than 0.1, this means that a consistency occurs between the experts' responses [42].

Thus, all priority matrix values are considered as the weights of the criteria. To calculate the weight of the sub-criteria, the same calculations are conducted.

4. Results

Table 4 illustrates the results of the AHP analysis. Among the main criteria, the most important criterion is the organizational resources, followed by the collaboration resources. The weights of these two criteria are quite close to each other. The third most important resource for achieving competitive advantage in digital transformation is reputational power, followed by the technological resources. On the other hand, the least important main criterion is market orientation. Considering the weight of the main criteria, there is no remarkable gap between the main resources. Only the organizational and collaboration resources have relatively higher importance compared to the other three resources. Market orientation resources may also be the least important one, but its importance weight is almost 16%, which cannot be overlooked.

It is necessary to examine the importance of the global weights and rankings of the sub-criteria to reach more refined results. This is important because not all sub-

Table 3. RI values proposed by Saaty [33]

Matrix dimension (n)									
	3	4	5	6	7	8	9	10	11
RI	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49	1.51
RI: Resistive index									

Table 4. AHP results

Main criteria	Weight	Rank	Sub-criteria	Local weight	Local rank	Global weight	Global rank
Organizational resources	0.239	1	Support from top management	0.335	2	0.080	4
			Experience of employee in digital services	0.213	3	0.050	12
			Organizational culture for learning	0.451	1	0.107	1
Technological resources	0.182	4	IT infrastructure	0.347	2	0.063	9
			Investments for cybersecurity	0.141	3	0.026	15
			Integration of services	0.520	1	0.095	2
Reputational and power resources	0.189	3	Brand reputation of the company	0.403	1	0.076	6
			Financial strength of the company	0.302	2	0.057	10
			Global presence and connections	0.295	3	0.056	11
Collaboration resources	0.231	2	Collaboration with customers	0.339	2	0.078	5
			Collaboration with suppliers	0.363	1	0.084	3
			Collaboration with other branches	0.297	3	0.069	8
Market orientation resources	0.158	5	Value creation strategies	0.448	1	0.071	7
			Strategies for customer satisfaction	0.238	3	0.038	14
			Commitment to service quality	0.313	2	0.049	13
AHP: Analytical hierarchy process, IT: Information technologies							

criteria have the same level of importance within the main criterion. Accordingly, the most important three sub-criteria in order are the organizational culture for learning and innovativeness, integration of digital services, and collaboration with suppliers. Support from the top management for digitalization, collaboration with customers for digital service development, and the brand reputation of the company are also relatively more important compared to the rest of the criteria. The least important criterion is the investments for cybersecurity, while the second and third least important criteria in order are the strategies for customer satisfaction and the commitment to service quality. Compared to the main criteria, the weight gap between the most important and least important resources is relatively higher among the sub-criteria.

Considering the overall results, organizational resources are found to be the most important main resource, while organizational culture for learning is found to be the most important sub-criterion under this resource. Collaboration resource is ranked as the second most important, while the collaboration with suppliers is ranked as the most important sub-criterion in this resource. The reputational and power resource is ranked as the third most important main criterion, while brand reputation is the most important sub-criterion in this main criterion. Technological resources is the fourth most important criterion, while the integration of services under this category is the most important sub-criterion. Finally, the market orientation resources is the least important main criterion in the research, while the value creation strategies are found to be the most important sub-criterion under this criterion.

5. Discussion

The purpose of this study was to identify and rank the critical resources for the successful implementation of digital services to achieve a competitive advantage in container shipping. A total of five main criteria and 15 sub-criteria were identified based on the literature review and expert interviews. Overall, the respondents believe that the most important sub-criterion is the organizational culture for learning and innovation, which is not surprising as digitalization is a significant transformation of the manual services and operations, which are complex and critical procedures in container shipping. Hence, it requires constant learning of employees that can be achieved by an innovative culture that attaches importance to learning. The necessity of constant learning may also be the reason why this sub-criterion is more important than the other two under organizational resources, which are support from top management and experience of employees in digital services. If employees are not experienced in digital services

or no sufficient support is received from the top managers, an organizational culture for constant learning can help the improvement of the other two sub-criterion as well.

It is also not surprising to see that the integration of digital services is the second most important resource. Shipment of a container from its origin to the final destination compels multiple discrete steps. The integration of these separated steps would create a significant value for users. The integration of digital services, such as booking submissions and empty container releasing, would help shippers and forwarders gain a significant amount of time and reduce the possibility of mistakes. Results of the study indicate that a successful implementation of the digital transformation also demands a collaboration with the suppliers, customers, and other branches. This result is logical as the container shipping market often involves close relationships among the industry's members. Particularly, the relationship among the forwarders, container lines, terminals, and lines are very profound. Therefore, it is not surprising to see that the respondents believe that collaboration is an important resource for the successful implementation of digital services to achieve a competitive advantage. The collaboration between ports, lines, forwarders, and shippers allows the successful implementation of digitalization. Similarly, the implementation of a successful digitalization can also enhance the integration and cooperation of these stakeholders more effectively and efficiently, as indicated in previous literature as well [13,14]. The elimination of unnecessary paperwork and the reduction of excessive procedures that need to be approved in a non-automated way such as container releasing can better help in the integration of these stakeholders.

The experts in the AHP survey found market orientation resources as the least important main resource. Within this main resource, value creation strategies are considered to be ranked as 1st in local and 7th in global ranking among 15 criteria. The strategies for customer satisfaction and commitment to service quality are found to be the 14th and 13th ranked resources, respectively. This might be because the experts are not able to relate these criteria to digital transformation, which is usually considered more like an operation or information technology rather than a part of marketing. Although marketing theoretically encompasses digitalization and other processes that add value to customers, it may not be reflected in the same way in practice. Value creation strategies seem to have a more explicit and direct relation to digital transformation, which may be the reason why it is ranked 7th in global rankings.

The findings of the study have some similarities with the previous literature. Our findings are parallel with [31] who reported the collaboration and integration as the

most important resources and capabilities in the digital transformation of e-banking. Our results are also in line with [16] where the authors found that a successful digital transformation can be achieved only if the provider collaborates with the suppliers and customers. Moreover, they also emphasize the necessity of change in the organizational culture to adapt to a more digital environment. Our results are also in line with [18] that particularly underlines the importance of creating a supportive organizational culture for digital transformations in logistics service providers. However, this study's results are not in parallel with [17] that reported the organizational factors as the least important resource in 3D printing adoption. This dissimilarity may be due to the difference in the topic, industry, and the region where the study was conducted.

6. Conclusion

This study has investigated the critical resources necessary for digitalization in container shipping to create a competitive advantage. Organizational resources and collaboration resources are found to be the most important, while market orientation resource is the least important success factor. Other main criteria involved in the study are the reputational and power resources, technological resource, and market orientation resources. Among the sub-criteria, the organizational culture for learning and innovativeness is found to be most important criterion. The collaboration with suppliers and the ability to integrate digital services are the second and third most important sub-resources, respectively. Digitalization has numerous benefits to the container shipping industry but the process of digital transformation is challenging. This study may help the companies to focus on relatively more important resources to achieve a competitive advantage in their digitalization journey.

This study contributes to the literature by being the first research paper (to the best knowledge of authors) investigating the critical resources required for successful digitalization of services to achieve a competitive advantage in container shipping. This is quite timely as the digitalization literature in shipping has been receiving more emphasis in recent years [14,25]. This study can help authors consider a variety of different resources while conducting their digitalization studies in the shipping domain. The results also open a significant avenue for future studies. For instance, a study using structural equation modeling or a multiple regression analysis can be applied to test the impact of the perceived performance in the critical resources on the overall relative digitalization performance and perceived user satisfaction. Whether these resources are reflected on the perceived usefulness of users remains a question.

The study contributes to theory by confirming the propositions of the RBV because the findings of this study are also aligned with the RBV of the firm. Although the integration of digital services is found to be the second most important sub-resource, technological resources is the fourth important main resource. The low rank of technological resources might be surprising at first but will make sense considering a RBV. The RBV suggests that the companies can achieve competitive advantage only if the resources are imitable. IT infrastructure and investments in cybersecurity are crucial to implement digital services. However, these resources are not imitable and can easily be replicated by competitors. On the other hand, the ability to offer integrated digital services is not imitable as it requires know-how, market knowledge, teamwork, and a great coordination among different departments, suppliers, and customers. These elements are of significant importance to digital transformation but are also difficult to replicate by competitors. This is probably why the respondents ranked this as the second most important resource. Similarly, creating a learning and innovative culture, collaboration with suppliers and customers, and brand reputations are not easy to imitate.

There are also practical implications for container lines and other service providers in the container shipping market. First, all the main resources are shown to somehow play important roles in digitalization. Thus, none of the resources in this study can be overlooked by the container lines. However, rather than focusing only on the product development and investing in IT infrastructure and cybersecurity, this study reveals that the most essential task is to transform the organization into a learning and innovative one. This of course requires a long-term dedication for the companies. Creating such culture would help the container lines to have more knowledgeable personnel and increase the collaboration among other branches. Successful digitalization can also be achieved through mutual effort and collaboration among the partners. Special attention must be given to the voice of both suppliers and customers as well as the employees. This is vital in the shipping industry, which has been traditional for many years but is now transforming into a digital era.

The study is subject to several limitations. For instance, the results of the study can only be generalized after being tested in other regions. This is important especially considering the potential differences within the IT structure and culture between the countries. Other ecosystem members of container shipping such as terminals and shippers are also not involved in this paper. The results of this study might be tested with other ecosystem members considering their perspective in digitalization as well. While doing this,

the maritime logistics concept can be utilized as the main framework to involve the relevant stakeholders. In this case, instead of RBV theory, the network theory and stakeholder theory are ideal in underpinning the theoretical background. Moreover, the digitalization in the shipping industry can be studied through the perspectives of Industry 4.0 and COVID-19. Despite significant benefits of digitalization applications during COVID-19 disruption, the literature has not investigated how and to what extent the digitalization can enhance resilience in the maritime logistics context. Future studies may address these issues while investigating the digitalization in the shipping industry.

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