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## Management of Service Quality of the Maritime Container Terminal in the Post-COVID-19 Era

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**Abstract:**

**Purpose:** The study aims to develop the model of service quality management in the maritime container terminal in the post-COVID-19 era.

**Methodology:** The above-stated purpose is carried out through a research process, which covers stages as the identification of the state-of-art maritime container terminal service quality evaluation, and based on the findings, an original method of perceived service quality evaluation is to be developed within the second research stage. Therefore, some general research methods are proposed as critical literature review and methods of logical reasoning, and some system construction methods in the form of business process engineering.

**Findings:** In the context of perceived service quality, the ongoing COVID-19 pandemic has led to growing attention to the issues concerning security and safety at the maritime container terminal.

**Practical implications:** The results of the study could be considered an interesting source of information for maritime container terminal operators in the context of evaluating service quality.

**Originality:** This research is the first that attempted to develop the model of service quality in the post-COVID-19 era in maritime container terminals.

**Keywords:** Maritime container terminal, service quality evaluation, COVID-19, perceived service quality.

**JEL codes:** B27, M00, R40.

**Paper Type:** Research study.

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## 1. Introduction

Maritime trade always had a significant impact on the global economy. This is expressed in the increasing value and volume of transported cargo in the last decades (UNCTAD, 2021). The maritime container trade is an essential part of creating global GDP, and the maritime container terminals, which can be perceived as an integrator of various transport modes, play a crucial role in this chain.

From the global perspective, the maritime container terminals are homogenous entities, in which all provided services are similar. Even though, the competitiveness level of various terminals can vary. There are a few reasons for such a situation, and it is possible to divide these reasons into two sets: one contains activities that are developed and managed directly by the terminal operators, and the other, which are outside of the jurisdiction of the terminal (Bartosiewicz, 2020; Charłampowicz, 2021; Kaliszewski *et al.*, 2020). The service quality is the key element, which can be solely developed and managed by the terminal itself (Charłampowicz, 2021). Moreover, service quality is perceived as a crucial component of competitiveness (Kaliszewski *et al.*, 2020).

The ongoing COVID-19 pandemic had a significant impact on the maritime container cargo flows and maritime container terminals (Notteboom *et al.*, 2021), forcing terminal operators to adapt to the new even more volatile market conditions. One of the ways to do so was to implement suitable service quality improvement methods (Agatić and Kolanović, 2020).

In the literature, there is a research gap concerning the assessment of the perceived service quality of the maritime container terminal in the face of COVID-19. Therefore the purpose of this study is to develop a model for evaluating the perceived service quality of the maritime container terminal. The paper is divided as follows: section 2 is dedicated to the maritime container trade during the COVID-19 pandemic. The next section provides the brief characteristics of maritime container terminal service quality evaluation. The fourth section presents the proposed model for the assessment of the maritime container terminal service quality. The last section contains a discussion and conclusions.

## 2. Maritime Container Trade During COVID-19 – Selected Issues

Even though the maritime container supply chains are resilient, the COVID-19 pandemic has tested their resilience (Notteboom *et al.*, 2021). Although the disruption caused by the pandemic was unprecedented – it is estimated that during the second quarter of 2020 global trade has fallen by 27% (WTO, 2020). This means that the current crisis hit even stronger than the financial crisis in 2008-2009 (Notteboom *et al.*, 2021; UNCTAD, 2020).

During the first part of the pandemic in 2020, there were numerous problems regarding vessel calls – globally ports have faced a rapid drop in vessel calls (Notteboom and Pallis, 2020). During the pandemic most liner shipping operators change their operational model – the service cancellations were made as a response to the disruption caused by the pandemic and then due to decreasing demand – more than 40% of worldwide container terminals experienced blank sailing (Charłampowicz, 2021; Dirzka and Acciaro, 2022). This disrupted supply chains.

The widespread travel restrictions, lockdowns, market crashes, and fast-rising unemployment caused a decrease in economic activity (Notteboom and Pallis, 2020). Moreover, it also changed the spending patterns of consumers. Lockdowns induced the shift from services to goods, therefore the increased demand for maritime traffic resulted in a high level of port congestion in the USA (west coast as well as east coast) and Europe. Another problem was widespread lockdowns in China – e.g., in Shanghai, which greatly influenced the transportation problems. To slow down the spread of COVID-19 countries have partly or completely closed their borders, thus the flow of goods, capital, and people was delayed, which disrupted the global supply chains (Narasimha *et al.*, 2021).

The pandemic has made more inequities on the container market. First, there was a problem with the container shortage connected with the restrictions in hinterland trucking services. Another issue was connected with the workforce shortage and global port congestion. All of these elements have resulted in the dramatic rise of container freight rates, even higher than during 2003's Chinese boom (Leng, 2021).

Due to the above-mentioned circumstances, many ports have faced a decrease in the total cargo volume, but only a few have noted growth. The busiest container port in the world was Shanghai, where more than 43 million TEUs were handled. This result is comparable with the previous, 2019 year (Charłampowicz, 2021). The rapid recovery of domestic trade and demand in China influenced the slight growth of cargo volumes at major Chinese ports. Most of the top ports have noted a decrease, e.g. the only non-Asian port from the top 10 busiest container ports in the world, Rotterdam, has noted a drop of 3,2 % (Charłampowicz, 2021). In Europe, among the top 15 ports, only two of them: Antwerp and Gioia Tauro, have noted growth in 2020 compared to 2019.

Due to the significant drop in 2020 results in 2021 compared year-to-year are almost always exceptional. For example port of Rotterdam has noted a growth of 7,8% in the period 2020-2021 – although if these results are compared with 2019, then its growth is only 3,2% (Notteboom, 2022). Even higher growth has been noted in the port of Gdańsk, where growth in the period 2020-2021 was 10,1%, although the two years growth was only 2,2% (Notteboom, 2022).

The decrease in container volumes and increase in safety and security issues influenced the decrease in the time efficiency of maritime container terminals, which

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is also directly connected with the cost (Charłampowicz, 2019). Growing attention on the safety and security issues also produced new protocols and procedures in the terminals, as well as shipping lines, additionally increasing the time of transportation and creating new disruptions among global supply chains.

### **3. Service Quality of the Maritime Container Terminal During the COVID-19 Pandemic**

The problem of capturing and evaluating the maritime container terminal service quality is an important problem, which is expressed in studies carried out by many researchers (Charłampowicz, 2020; Hemalatha *et al.*, 2018; Le *et al.*, 2019; Thai, 2008; Yeo *et al.*, 2015). There are also a few methodologies for service quality evaluation. The most popular is the SERVQUAL-based method, in which it is possible to capture the service quality of the maritime container terminal based on a few categories – namely, reliability, tangibles, assurance, empathy, and responsiveness (Hemalatha *et al.*, 2018; Parasuraman *et al.*, 1988).

Another method of service quality evaluation divides the criteria of service quality into six categories, quickness of the service, availability, security, reliability, commonness, and environmental issues (Kaliszewski *et al.*, 2020). In this perspective, it is essential to notice that some of the categories are not feasible in the context of global homogenous maritime container terminals. One of the categories which can be neglected is availability, similarly to commonness – all major terminals are competing on the open market, therefore all of them are available for any consumer.

A different point of view has been presented in the ROMPIS model (Thai, 2008, 2015; Yeo *et al.*, 2015), where the service quality is developed by six major factors: resource-related, outcome-related, management-related, process-related, and image and social responsibility-related. During the research, it was proved that only two of the proposed factors have a positive correlation with customer satisfaction (Yeo *et al.*, 2015).

The majority of the most important maritime container terminals are operated by shipping lines, container operators, or financial institutions. Moreover, all of the major container terminals are complex, yet homogenous. Therefore, most processes, procedures, outcomes, resources, and management methods are similar to other terminals in the world (Mańkowski and Charłampowicz, 2021). There are only a few differences between various terminals. Most of the issues connected with reliability, availability, and commonness are similar, if not the same, in all of the major container terminals (Charłampowicz and Mańkowski, 2022).

Therefore it is possible to highlight factors that are directly developed and managed by the terminal operators, such as quickness of the services and safety issues. Other aspects, which are out of the terminals' control – like issues connected with nautical

access or connectivity in the context of global supply chains, are not part of this study.

Based on one of the methods for evaluation of the service quality of the maritime container terminals it is possible to highlight three factors: quickness of the service, security, and price (Charłampowicz and Mańkowski, 2022; Shen and Yahya, 2021). In the context of the causal relation between the above-mentioned factors quickness of the service is perceived as an effect, while security and price as a cause (Charłampowicz and Mańkowski, 2022).

Research regarding the impact of COVID-19 on the service quality of the maritime container terminals indicated that the ongoing pandemic caused a decrease in the quickness of the service and a slight increase in the price and security (Charłampowicz and Mańkowski, 2022). Moreover, in general, enterprises that participated in the research have increased their market share expressed in the number of orders (Charłampowicz and Mańkowski, 2022).

This research led to another important aspect of maritime container terminal service quality evaluation, which is the importance of security and safety. In the literature, there is a gap concerning the suitable model for service quality for the maritime container terminal.

#### **4. The Proposition of the Service Quality Management Model for Maritime Container Terminals in the Post-COVID-19 Era**

The ongoing COVID-19 pandemic has led to growing attention to the issues concerning security and safety. These two factors have become one of the major factors influencing the perceived service quality. Therefore, it can be stated that the perceived service quality is influenced by three categories, safety, service quality, and security.

In the context of safety, which is connected with risk control and protection of people from accidents, it is possible to distinguish three elements that are influencing this category. The first one is climate conditions, which are affecting the efficiency and performance of operations. Another aspect is connected with evacuation procedures and protocols and the last one is dedicated to the dangerous goods protocols. The more elaborated the safety aspects are, the efficiency of the operations is worse. On the other hand, comprehensive safety issues can secure people from accidents, which improves the total service quality.

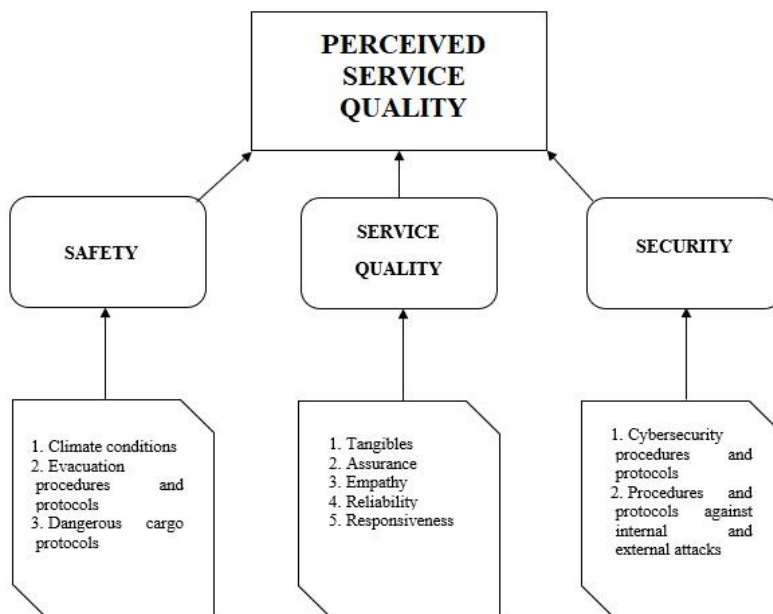
Another category is service quality, which can be divided into five main criteria based on the SERVQUAL methodology. Therefore, there is assurance, tangibles, responsiveness, empathy, and reliability. In the context of this category, it is essential to mention that earlier mentioned quickness of the service can be connected with various categories, for example, tangibles, because the quickness is connected

with the quality and availability of the physical infrastructure. Another one is responsiveness, in which it can be stated that all services should be made in a reliable matter – in the context of quality and time, etc. In the context of the proposed model for perceived service quality of the maritime container terminal, it is essential to mention that the higher the level of any elements of the service quality, the higher the total level of perceived service quality would be.

The third module of the proposed model is connected with security issues. In this category, it is possible to distinguish two factors: cybersecurity procedures and protocols, and protocols and procedures against internal and external attacks. In this context, these procedures and protocols are connected with the cargo and the transport means.

Nowadays aspect of security has become extremely important – there is more automatization on the terminals, which leads to being more vulnerable to any cyberattacks. The possibility to utilize suitable procedures and protocols in the face of such events has important meaning for all beneficiaries and stakeholders. The ability to be prepared for unforeseen cyber-attacks is essential for providing a suitable level of security, which has a direct influence on the total perceived service quality.

**Figure 1.** *Perceived service quality model for maritime container terminal*



*Source: Own elaboration*

## 5. Conclusions

Maritime container terminals are the crucial link of global supply chains. Moreover, they are extremely complex and homogenous entities, which can compete with each other only with a few factors. Some of them, like nautical access or hinterland connections, cannot be directly developed and managed by the terminal. On the other hand, there are some factors, such as service quality, safety, and security, which can be developed and managed directly by the terminals' authorities. These factors have an impact on the overall perceived service quality of the terminal, which is one of the most important aspects of competitiveness.

This paper is the first that attempted to develop a model for evaluating the perceived service quality of the maritime container terminal. Due to the methodological aspects presented in the paper, it is essential to confront the model with the business reality. The empirical validation of the model, which is the further research direction, needs to provide the weight of each criterion and category. Knowledge about the importance of each factor would be beneficial for stakeholders of the terminal in the context of improving various elements of their service.

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