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FACTORS THAT INFLUENCE A CONTAINER TERMINAL COMPETITIVENESS FROM THE SHIPPING LINES' PERSPECTIVE: A CASE OF CONAKRY CONTAINER TERMINAL

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ABSTRACT
As technology improves, proximity to markets and raw materials emerge as the elements that, above all else, shape the global economy. The importance of seaports in the global supply chain means that a nation's ability to compete internationally is impacted by port efficiency. Despite the current increase in interest in the African continent on a global scale. The trade and business opportunities abounding throughout the continent provide great potential for all African countries. However, this fact is contradicted by inadequate transportation infrastructure, particularly in the maritime sector. This study investigates the factors influencing a container terminal's competitiveness in Guinea-Conakry from the shipping lines' perspectives. With the aid of literature on seaport competitiveness, five (5) major influential factors were identified, which helped to develop this study's conceptual framework to answer the research questions. Multiple regression analysis was employed to compute the data collected from our survey respondents. The findings indicate that terminal efficiency and the quality of services are the most important factors in selecting a container terminal, followed by port charges, hinterland connections, and port location.

Keywords: Container terminal competitiveness, port efficiency, maritime logistics, shipping lines, supply chain.

INTRODUCTION

As technology improves, proximity to markets and raw materials emerge as the elements that, above all else, shape the global economy. Due to the significance of seaports in the global supply chain, port efficiency has a substantial impact on a country's capacity to compete internationally. It has been noted that a productive port increases the productivity the producing units and of the essential production components, enabling higher levels of output, income, and employment (Bottasso *et al.,* 2013; Xiu & Zhao, 2021). As a result, seaports are crucial to national economies, especially those whose economies rely heavily on foreign trade. Hence, it has become important to monitor and assess a port's overall efficiency in comparison to other ports (Shan *et al.,* 2014; Wang & Wang, 2019). Because seaports serve as a vital hub for maritime and land transport, the significance of the container port and its manufacturing potential cannot be overstated. Port authorities must comprehend the underlying factors influencing port competitiveness to establish and sustain a competitive edge in the global markets. They must regularly evaluate their performance compared with ports in other countries. A port needs to uphold its level of competitiveness to stay ahead of other facilities and maintain its market position. It should adapt to the numerous new needs of shipping lines and other port users to keep up with

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the environment's quick changes. A port may be abandoned or taken over by competitors if nothing is changed. In other words, a port should continuously try to comprehend the elements influencing the ports that shipping lines choose. Even if certain African nations, such as South Africa, Morocco, and Egypt, have made significant strides in recent years, the majority of other African nations are still lagging or undeveloped. The discussion must include the current increase in interest in the African continent on a global scale. The trade and business opportunities abounding throughout the continent provide great potential for all African countries. However, this fact is contradicted by inadequate transportation infrastructure, particularly in the maritime sector. Shipping lines and other port users regard most African ports as inadequate in terms of international competitiveness standards when it comes to productivity, capacity, congestion, and efficient inland distribution system.

Despite being advantageously located at the edge of the Atlantic Ocean, Conakry Container Terminal (CCT) is not immune to this phenomenon. Both of our interviewees, Mamadi Kaba (Maersk Port Captain) and Ibrahima Keita (MSC Operations Manager) argued that the container terminal's productivity is inferior to that of the Dakar Dubai Port (DDP), which is regarded as the major rival container terminal in the region due to sharing borders as well as the strategic location they both enjoy. Furthermore, they also claimed that the terminal cargo handling charges have exponentially increased since it was privatized back in 2011, adding to the terminal's massive congestion due to the port's location being surrounded by government buildings, offices, and even businesses.

This study aims to find ways to improve the competitiveness of the Conakry container terminal regionally and internationally. This study primarily relies on secondary sources to identify the crucial factors that a competitive container terminal should have. Furthermore, the factors identified from the literature helped to develop this study's conceptual framework to answer the research questions and, at the results stage, propose a practical and systematic operational framework to serve as a benchmarking instrument for the terminal operator as well as the Port Authority to improve the terminal's competitiveness.

This research paper is structured in the following sequence: Section 2 examines the literature on the maritime industry, container terminal competitiveness, and the conceptual framework of this study. Section 3 discusses the research methodology i.e., data collection, interpretation, and analysis method; Section 4 presents the results of the data obtained from the respondents and further analyses the data using multiple regression analysis. Lastly, Section 5 discusses the findings, the study's implications, the proposal made, and future research.

Maritime Literature and the Container Terminal Competitiveness

The tendency towards globalization strengthens the integration of the global supply chain. The seaport, for instance, has gone through periods of change from a traditional facility to a sophisticated link in the world's transportation network and value chain. With its host port city, the seaport functions as a logistical hub that supports the global market. A port city contains both a port and a city. A port's host port city and itself are highly dependent on one another. On the one hand, creating a productive seaport could aid in boosting the economy of the nearby port city. In the end, the port city benefits from the trade, information, financial, and various other value-added services provided by the cargo flows that pass through the harbor.

The government may be compelled by the seaport's presence to build auxiliary infrastructure like railroads and fast roadways, which would promote the growth of the port city's economy. The city's urbanisation and civil buildings are other factors that could

help a port city's economy.

Rationalising Port Efficiency as an Important Element of a Country's Economic Development and Competitiveness

Seaports and other ocean transportation centers frequently grow into major cities with economies that are more developed than those of the rest of the nation. China has served as a good case study in this area. The top cities are mainly port cities that either operate major seaports or are close by. The literature has shown that seaport activities subsidize the economy of the port municipalities in several ways: Growing local employment (Xiu & Zhao, 2021), improving logistics in the city (Shan *et al.,* 2014), reducing production costs, and lastly, attracting international investment (Wang & Wang, 2019).

Shan, Yu, and Lee conducted an empirical study of the economic effects of Chinese seaports on the host port cities in 2014. Using information from 41 prominent Chinese port towns and their local ports between 2003 and 2010, they conducted an econometric analysis of the relationship between port activity and the host city's economic growth. They made an effort to seek answers to queries like: Does a seaport have any effect, favorable or negative, on the economic growth of its host city? How much does the cargo business at a seaport affect the growth of the local economy? As a nation experiencing one of the world's fastest rates of economic development, they are certain that China is a crucial backdrop for a study on the connection between ports and economic development.

There were three key discoveries. First, the throughput of seaport cargo significantly influences the growth of the host city's economy. A 1% increase in port cargo throughput equates to a 0.076% increase in per capita GDP growth. As a result, the cargo flow at the port helps the host city's economy expand. Second, compared to smaller ports, the massive amount of containerized cargo moving into larger ports has a greater impact on the local economy of the port city. Third, a city's economy is positively impacted by the cargo throughput of rival seaports. The findings of their analysis demonstrate how crucial seaports are to expanding a port city's economy. They added that competition from nearby ports might stimulate the local economy. This exemplifies a recently popular idea known as port co-coopetition, wherein port cities in the same region may profit from cooperation in addition to straight competition to increase the total cargo flow of the region. Policymakers would be wise to encourage collaboration amongst nearby ports as a result.

Similarly, Sujeta and Navickas (2014) used a logical and thorough analysis to establish the significance of seaport logistics structures in the economic systems of small countries and their networks with the production and consumption areas regarding the development stages of the concepts of supply chain management and port logistics operations. The importance of port logistics systems for the economies of small nations and their competitiveness were differentiated using a logical and thorough analysis. The many types of competitiveness were developed in response to the competitiveness of the ports and the interdependence and influencing factors between port logistics systems and the economic systems of small countries in the context of the global economy.

The study's findings showed that port logistics systems' activity and the use of their infrastructure for economic growth have become essential in the global economy. In addition, port logistics systems' tasks and measurements must be precise, determined by the economic and political objectives

of the nation, and focused on long-term competitiveness. According to the findings, seaports may be seen as hubs for the flow of goods, money, and information, as well as entry points for the economies of tiny nations.

The findings also revealed that logistics services systems can lower the costs associated with moving flows, improve the metrics of their circulation by speeding up turnaround, increase the efficiency of resource consumption and mobility, reduce the negative effects on the environment, and ensure compliance with security and safety regulations.

Container Terminal Competitiveness from the Shipping Lines' Perspective

There is a clear realisation that services offered to customers and port users must be to a globally competitive standard as a result of nations being more universal and their businesses being exposed to the pressures of global competition. Due to expanding port competition and pressure from shippers for lower port and shipping fees, port authorities, therefore, take measures to increase their port's performance and productivity. In general, ports are a crucial link in the chain of global trade. As a result, a country's capacity for international competition is greatly influenced by the efficiency and performance of its ports. However, a country must comprehend the crucial factors of container terminal competitiveness to gain and maintain a competitive advantage in the global marketplace.

Başтuğ *et al.* (2022) investigated the factors to consider when selecting a container terminal from the perspective of terminal operators and shipping lines in Turkey. The authors conducted a 20-year literature search in peer-reviewed journals to identify the competitiveness standards for terminal operators and shipping lines. Analytic Hierarchy Process (AHP) and Fuzzy are employed as survey methods to answer the research questions. The findings revealed that port operators have different considerations than shipping lines. Port location was ranked as the most critical factor for port operators, while terminal efficiency and productivity are considered the most essential factors for shipping companies.

Similarly, Žgalji (2022) examined the factors influencing the competitiveness of container seaports and applied the findings to the case study of the Port of Rijeka in Croatia. The author used the literature review method to identify the competitiveness factors affecting container seaports. Additionally, the author undertook the Port of Rijeka case study using several identified competitiveness factors. He found that terminal equipment was ranked as the most crucial factor for the competitiveness of the Port of Rijeka, followed by the number of liner services, the transportation infrastructure, the port charges, and the use of quality management systems. Additionally, the findings include other crucial factors, such as the port's geographic location, accessibility to the road, and the rail network, port reputation, and the effectiveness of the customs process.

Likewise, Kaliszewski, Kozłowski, Dąbrowski, and Klimek (2020) gauged the factors that influence a container terminal's competitiveness from the shipping lines' perspective. With the aid of a developed social network instrument, the researchers were able to collect data from one hundred and twenty (120) shipping executives. The data was computed using the Friedman Test and a post-hoc analysis using the Least Significant Difference test (LSD), and two (2) statistical procedures. The results indicate that the quality of services offered by the terminal is viewed as the most important factor for the shipping lines, followed by social harmony with labour and lastly, adequate nautical accessibility.

On the other hand, Gohomene *et*

al. (2015) examined the expansion of a container shipping line's port choice process to investigate the competitiveness of seaports in West Africa. The researchers identified 16 factors with the aid of the literature they examined and their initial discussions with experts in the shipping industry. Using pair-wise comparison matrices in AHP, the fourteen (14) shipping companies and shipping management consultancy companies that serve the container ports in West Africa were found and contacted for the data collection. The assessment covered the top five container terminals in West Africa, according to cargo throughput, which were the ports of Lagos, Abidjan, Dakar, Tema, and Lome. The findings revealed that port infrastructure was the most important factor in selecting a container terminal, followed by port draft, political unpredictability, cargo volume, international network, port security, congestion, service speed, cargo handling safety, privilege terms for carriers, geographic advantage, problem management in the port, port tariff, proximity to major navigation routes and customs.

Conversely, Nazemzadeh and Vanelslander (2015) studied the factors influencing port selection from the users' perspective for the ports of Antwerp, Hamburg, and Rotterdam. Data was gathered using questionnaire surveys, with shippers providing seven responses, freight forwarders providing six responses, and shipping lines providing nine responses. The Analytical Hierarchy Process (AHP) was used to assess how port users prioritised decision factors in port selection. The results showed that shipping lines' terminal choice is influenced by terminal charges, followed by port performance, port location, hinterland connectivity, and cargo throughput.

Likewise, Sayareh and Alizmini (2014) gauged the factors that shipping lines and managers believed to be the most important when choosing a seaport in the Persian Gulf. To reach the objective, the researchers chose and ranked the most important variables influencing shipping companies' port selections using the Analytical Hierarchy Process (AHP) and TOPSIS methodology. The AHP method was used to rank the criteria that will be utilised to select the most practical container seaport, as it was with Shahid Rajaee, Bandar Imam Khomeini (BIK), Bushehr (Iran), Jebel Ali (UAE), Dammam, and King Fahd Port in Jubal. The Persian Gulf region's senior and middle managers in the shipping sector, port operations experts, and marine university professors were given 30 factors, which were discovered with the use of secondary sources. The results revealed that working hours, stevedoring prices, border control, port entry point, operational costs, foreign policies, night route planning, management services, port workforce, custom-required documents, sufficient draft, amount of berths, the potential of port infrastructure, vessel channeling, port location, and port innovation was identified by the respondents as being particularly important and determining the terminal selection.

On the other hand, Saeed and Aaby (2013) investigated the factors considered by shipping companies when choosing European container ports. Data were gathered through surveys that were sent to shipping companies calling at the ports of Rotterdam, Hamburg, and Antwerp. To evaluate the selection criteria for European container terminals, 17 factors were determined from the existing literature. The respondents were asked to rank the significance of the factors on a scale of one (not important) to five (extremely important). According to the study's findings, handling fees, service quality, navigational accessibility, level of congestion, the effectiveness of hinterland transportation, location, switching cost, port investment, logistical services, storage facilities, number of TEUs, value-added

services, the investment made by shipping lines, personal contacts, and several sailed vessels were all found to be significant factors in container port selection.

Similarly, Ng, Sun, and Bhattacharjya (2013) investigated how Australian shippers and shipping lines selected their ports of origin and destinations depending on their supply chain activities. Through interviews with Australian shipping liners and freight forwarders, the choice of port of origin, and destination by shippers and shipping lines was investigated. The respondents were then given a list of 38 factors. The factors' influence on port choice was divided into five categories, and the participants were asked to choose and rank each category from 0 to 5. The results demonstrated that shipping lines' port choice criteria differ from those of shippers. Local exporters' and importers' demand was deemed to be the most crucial factor for shipping lines, followed by the cost of marine transport, docking fees, or terminal handling fees, seaport crowding, distance from the shipper's origin or destination of the consignment, berth-side efficacy, inland transport charges, port system, regional economy, and round-the-clock operation.

However, Chang, Lee, and Tongzon (2008) identified the factors that affect shipping companies' port selection between Europe, East Asia, and the Trans-Pacific shipping routes. A questionnaire was developed, and 21 factors affecting shipping lines' decisions on port selection were identified with the aid of secondary sources. One hundred and sixty (160) businesses made up the sample size, while "Containerisation International" provided the data. The survey results were analysed using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). The findings revealed that six factors are viewed as very important for shipping liners' decisions on port choice. Local cargo volume was given the first rank, and thus the most important determinant selected by shipping lines, followed by the terminal handling charges, berth availability, port location, transshipment volume and feeder connection.

Tongzon and Sawant (2007) evaluated the major port selection variables in Malaysia and Singapore from the perspective of the shipping lines. The researchers looked at the consistency between the reported preferences and those shipping liners revealed for the variables affecting their port choice. A revealed preference approach is a way of valuing the importance of the various factors involved in determining the port choice by observing the behavior of the shipping lines and the decisions they make, as opposed to a stated preference approach, which is based on asking for the shipping lines to state their preferences through some survey or questionnaire. Binary Logistics Regression (BLR) was used to identify the disclosed features that had an impact on shipping lines' port decisions and Boxplot analysis was used to identify the most significant attributes provided by shipping lines. The findings illustrate that the preferences that were revealed and those that were declared are inconsistent. So, according to the stated choice, connectivity and port fees were ranked as the first and second most significant attributes of shipping lines in Malaysia and Singapore, respectively. The third most important element was the location, followed by infrastructure, a large range of port services, and cargo size as the least significant component. The most crucial considerations for shipping lines, according to the revealed preference, were port fees and a wide choice of port services. Other elements did not seem to be as relevant to shipping lines.

Proposed Conceptual Framework

This study adopts Steven and Corsi's (2012) port choice model, which conducted an analytical examination of the port selection decision-making process by port managers

between major and small shippers. However, this research employs exploratory factor analysis to reduce the identified factors compared with the literature so that a coherent conceptual framework can be drawn. Furthermore, a correlation test of 10 factors was run in Statistical Package for the Social Sciences (SPSS), which includes port charges, port location, hinterland connections, quality of services, value-added services, port infrastructure, terminal efficiency, berth availability, cargo volume, and port congestion. The factor analysis results indicate a strong and positive correlation between the factors concerned; thus, of the 10, five factors are extracted to develop the conceptual framework as well as for further analysis (Figure 1). The factors retained include port charges, port location, hinterland connection, terminal, efficiency, and quality of services. Table 1 illustrates the factor analysis results.

Table 1: Factors analysis of correlation matrix

	PC	PL	HC	QoS	TE	VAS	BA	PI	CV	PC
Port charges	1.000	.305	.253	.337	.474	.765	.054	.107	.202	-.101
Port location	.305	1.000	.478	.170	.209	.115	-.041	.712	.064	.053
Hinterland connections	.253	.478	1.000	.217	.126	.072	-.095	.108	.695	.173
Quality of services	.337	.170	.217	1.000	.487	.229	.583	.154	.067	.016
Terminal efficiency	.474	.209	.126	.487	1.000	.203	.100	.097	.115	.738
Value-added services	.765	.115	.072	.229	.203	1.000	.265	.256	.281	.116
Berth availability	.054	-.041	-.095	.583	.100	.265	1.000	.309	.327	.208
Port infrastructure	.107	.712	.108	.154	.097	.256	.309	1.000	.604	.212
Cargo volume	.202	.064	.695	.067	.115	.281	.327	.604	1.000	.249
Port congestion	-.101	.053	.173	.016	.738	.116	.208	.212	.249	1.000
Sig. (1-tailed)										
Port charges		.000	.000	.000	.000	.000	.182	.037	.000	.046
Port location	.000		.000	.002	.000	.027	.247	.000	.144	.189
Hinterland connections	.000	.000		.000	.017	.114	.056	.036	.000	.002
Quality of services	.000	.002	.000		.000	.000	.000	.005	.131	.396
Terminal efficiency	.000	.000	.017	.000		.000	.048	.052	.027	.000
Value-added services	.000	.027	.114	.000	.000		.000	.000	.000	.026
Berth availability	.182	.247	.056	.000	.048	.000		.000	.000	.000

Port infrastructure	.037	.000	.036	.005	.052	.000	.000		.000	.000
Cargo volume	.000	.144	.000	.131	.027	.000	.000	.000		.000
Port congestion	.046	.189	.002	.396	.000	.026	.000	.000	.000	

*a. Determinant = .134, PC = Port Charges, PL = Port Location, HC = Hinterland Connections, QoS = Quality of Services, TE = Terminal Efficiency, VAS = Value-Added Services, BA = Berth Availability, PI = Port Infrastructure, CV = Cargo Volume, and PC = Port Congestion.

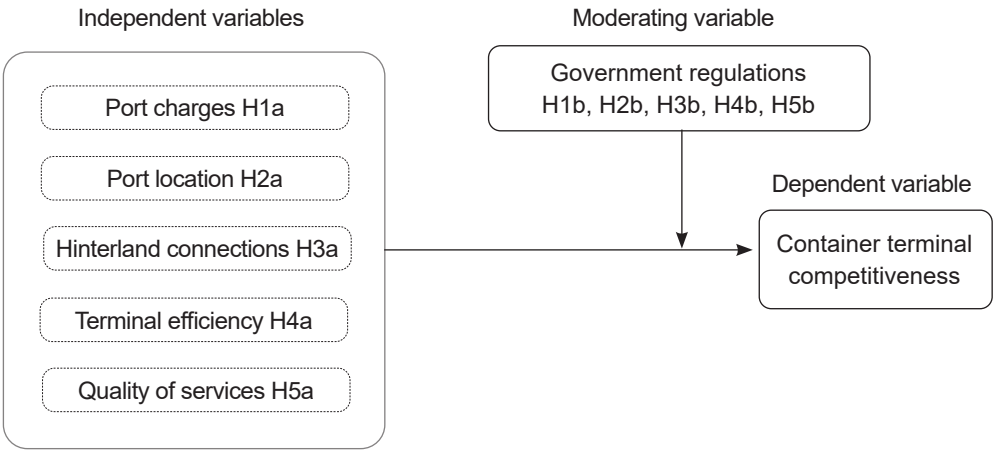


Figure 1: Conceptual framework of the study

Methodology of the Study

According to Bahari (2012), research is a systematic process of gathering, examining, and interpreting information to better understand a phenomenon that interests or concerns us. This study employs a quantitative research methodology to achieve its research goals. Quantitative research, according to Apuke (2017), is "one that works with quantifying and analyzing variables to produce results". It includes the analysis of data using numerical and statistical approaches to answer queries like who, how much, where, what, when, how, and how many. Apuke further argues that quantitative research is one that "explains an issue or phenomenon through the aggregation of data in a numerical form and analysis with the application of mathematical methods, notably statistics". Furthermore, this research uses both secondary and primary sources to collect data. A set of factors have been identified from the existing literature that was used to formulate the survey questionnaire.

For such a complex study, one might find it quite challenging to use a qualitative approach, not only because this study identifies the factors that influence a container terminal's competitiveness, but also because it determines the degree of influence a factor exercise in the overall terminal selection and competitiveness. Thus, this research uses a quantitative methodology that sounds more rational than quantifying.

The population targeted in this study is the shipping lines operating in Conakry, including Maersk Line, Mediterranean Shipping Company (MSC), Bollore, Transco S.A., and CMA CGM. Similarly, knowing the

degree of influence that a factor exercises in the container terminal selection will not be possible in any way without the expertise of frequent port users who are directly or indirectly involved in using the port facilities. Murphy (2016) claimed that resources would probably be squandered without a defined target population. As a result, survey respondents may get confused and dissatisfied if the population definition is unclear.

In the unit analysis of a study, the concern is not about where the data is coming from, as is the case with the population; the concern, however, is about what is being analysed in the study. Sedgwick (2018) defined the unit of analysis as the "who" or "what" for which information is analysed and conclusions are drawn. Therefore, it would be rational to bring this study to the attention of the shipping industry's key individuals and general shipping practitioners — including operations managers, logistics managers, business development managers, shipping clerks, warehouse managers, port captains, logistics supervisors, waterside operators, vessel pilots, tug pilots, accountants, transporters, customer service agents, and forwarding agents — for their in-depth knowledge about the selection of a particular seaport and the factors for doing so.

According to Taherdoost (2018), the sample size is "a crucial feature of every experimental study whose objective is to make inferences about a population from a sample". An arbitrary sample must be of sufficient size to generalize from it without bias or sampling errors. As a result, the sample size for this study is determined through the Taro Yamane formula, considering the confidence level of 95% and the margin error of .05%. Taro Yamane is a Japanese statistician who developed a statistical formula to calculate or determine the sample size of a given population. For the reliability and credibility of the results, a precise sampling computation must be performed for a sample to be representative of a specific population. Taro Yamane's formula is as follows:

$$n = \frac{N}{1+(Ne2)}$$

where: n = Sample size

N = Population determined

e = Margin error

Therefore:

$$\frac{1500}{1+[(1500)(0.05)2]}$$

n = 316

Thus, it can be concluded that the sample size of a population of 1,500 respondents are 316. In other words, 316 respondents are believed to represent this research's population well. It is also expected that trustworthy and reliable findings will arise from it.

This study uses a cluster sampling method within the Conakry region, which is believed to be the most industrialised zone in Guinea. Conakry also administrates the headquarters of all the shipping lines operating on Guinean soil, including Maersk Line, Mediterranean Shipping Company (MSC), Bollore, Transco S.A., and CMA CGM. Taherdoost (2018) argued that it is unlikely that the researcher would be able to gather information from every case to address the study issues fully. Thus, choosing a sample is necessary. The population is the complete set of circumstances from which the author's sample was selected. Since researchers lack the time and resources to analyse the entire population, they use sampling techniques to reduce the number of cases. By definition, cluster sampling is a method in which respondents are grouped representing the population and then included in the sample. Cluster sampling is known as finding a group of participants who best represent the population and including them in the sample group (Taherdoost, 2018).

Furthermore, this study uses regression analysis to ascertain how the factors interact with one another and to establish which ones impact the most. Uyanık and Güler (2013) said that a regression analysis using

one independent variable is known as a single regression analysis and a regression analysis utilizing two or more independent variables is known as a multiple regression analysis. Thus, this study uses multiple regression analysis to establish the relationship between the independent variables and the dependent variable and the relative strength that an independent variable impacts on the dependent variable. It is also important to discuss the significance of hypothesis testing in multiple regression analysis and how inferences could be drawn about population parameters using data from a given sample.

Results

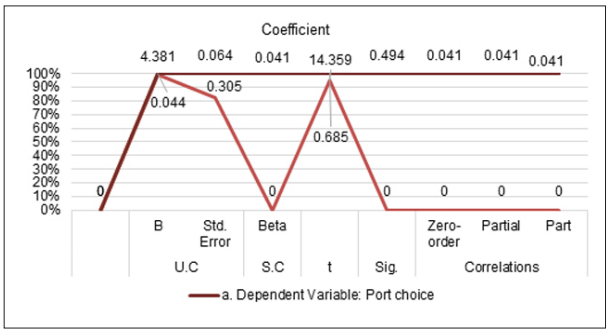
This study aims to improve the competitiveness of the Conakry container terminal regionally and internationally. Furthermore, the following independent variables, including terminal handling charges, port location, hinterland connections, cargo moved per hour, response to customers' needs and customs performance was regressed on the dependent variable (port choice) to gauge the degree of influence of each independent variable on the dependent variable and the interaction between the independent variables. Hence, the following hypotheses were made in Table 2.

Table 2: Hypothesis of the study

No.	No. Hypothesis	
1	H1a	Port charges influence container terminal competitiveness
2	H1b	Government regulations moderate port charges and container terminal competitiveness
3	H2a	Port location influences container terminal competitiveness
4	H2b	Government regulations moderate port location and container terminal competitiveness
5	H3a	Hinterland connections influence container terminal competitiveness
6	H3b	Government regulations moderate hinterland connection and container terminal competitiveness
7	H4a	Terminal efficiency influences container terminal competitiveness
8	H4b	Government regulations moderate terminal efficiency and container terminal competitiveness
9	H5a	Quality of services influences container terminal competitiveness
10	H5b	Government regulations moderate the quality of services and container terminal competitiveness

Hypothesis Testing

The dependent variable (port choice) was regressed on the independent variable terminal handling charges. H1a claims that high terminal handling charges negatively influence port choice. The results indicate that high terminal handling charges do not have a significant influence on port choice (B = .044, t = .685, p = .494). Thus, H1a is not supported. Figure 2 displays the results of the regression coefficient of H1a.



* UC = Unstandardized Coefficients and SC = Standardized Coefficients

Figure 2: The regression coefficient of H1a

About the model summary of H1a, the R^2 change = .002 indicates that the percentage of .002% of the variance of port choice is accounted for by high terminal handling charges (H1a) and p > .005. Table 3 illustrates the results of the model summary of H1a.

Table 3: The R^2 change of H1a

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.041[a]	.002	.002	.55465	.002	.469	1	280	.494
a. Predictors: (Constant), High terminal handling charges									

Likewise, H2a assumes that a strategic port location positively influences port choice. The results revealed that a strategic port location does not significantly influence port choice (B = .093, t = 1.426, p = .155). Hence, H2a is not supported. Figure 3 exhibits the results of the regression coefficient of H2a.

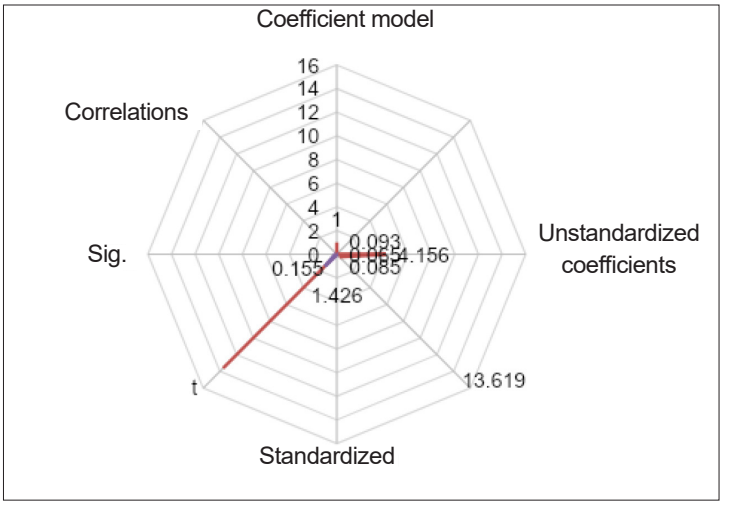


Figure 3: The regression coefficient of H2a

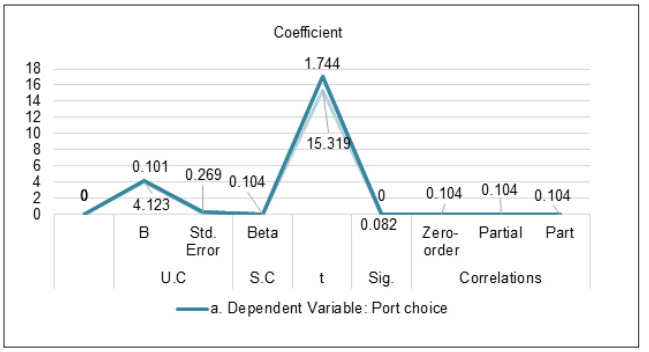
With regards to the model summary of H2a, the R^2 change = .007 designating that the percentage of .007% of the variance of port choice is accounted for by strategic port location (H2a), and p > .005. Table 4 explains the results of the model summary of H2a.

Table 4: The R^2 change of H2a

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.085[a]	.007	.004	.55311	.007	2.032	1	280	.155

a. Predictors: (Constant), Strategic port location

Similarly, H3a presumes that poor hinterland connections negatively influence port choice. The results in Figure 4 revealed that poor hinterland connections do not significantly influence port choice (B = .101, t = 1.744, p = .082). Therefore, H3a is not supported.



* UC = Unstandardized Coefficients and SC = Standardized Coefficients.

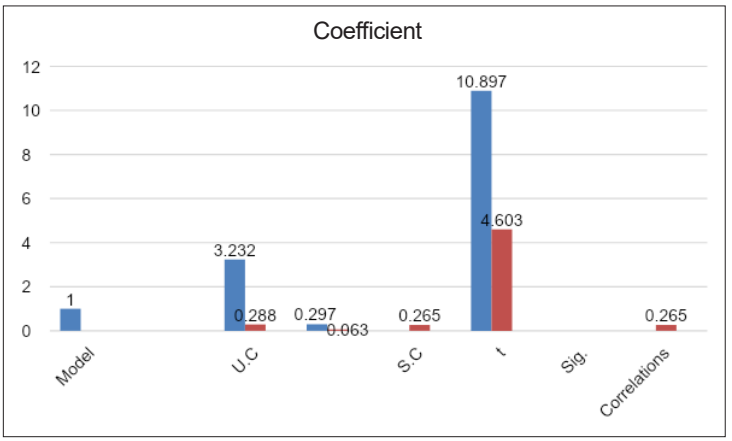
Figure 4: The regression coefficient of H3a

Concerning the model summary of H3a, the R^2 change = .011 indicates that the percentage of .011% of the variance of port choice is accounted for by poor hinterland connections (H3a), and p > .005. Table 5 describes the results of the model summary of H3a.

Table 5: The R^2 change of H3a

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.104[a]	.011	.007	.55213	.011	3.043	1	280	.082
a. Predictors: (Constant), Poor hinterland connections									

However, H4a claims that high cargo moves per hour positively influence port choice. The results revealed that high cargo moves per hour positively and significantly influence port choice (B = .288, t = 4.603, p < .001). Henceforth, H4a is supported. Figure 5 demonstrates the results of the regression coefficient of H4a.



*UC = Unstandardized Coefficients and SC = Standardized Coefficients.

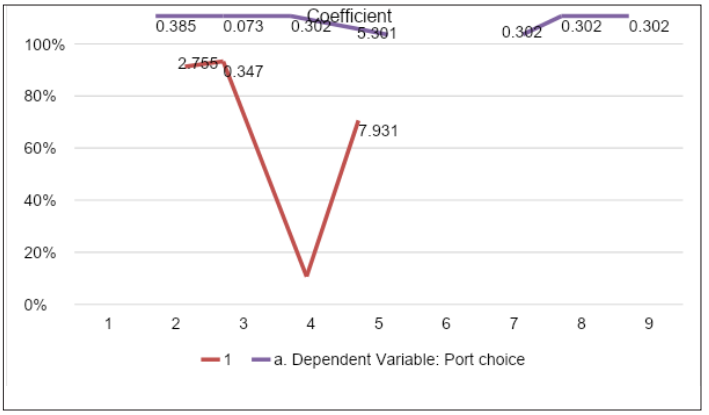
Figure 5: The regression coefficient of H4a

Regarding the model summary of H4a, the R^2 change = .070 indicates that the percentage of .070% of the variance of port choice is accounted for high cargo moves per hour (H4a), and p < .001. Table 6 illustrates the results of the model summary of H4a.

Table 6: The R^2 change of H4a

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.265[a]	.070	.067	.53524	.070	21.184	1	280	.000
a. Predictors: (Constant), High cargo move per hour									

Likewise, H5a assumes that quick response to customers' needs positively influences port choice. The results indicate that quick response to customers' needs positively and significantly influences port choice (B = .385, t = 5.301, p < .001). Thus, H5a is supported. Figure 6 presents the results of the regression coefficient of H5a.



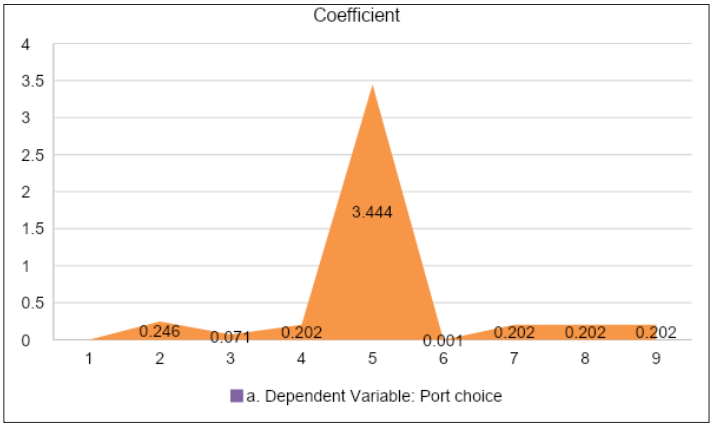
*UC = Unstandardized Coefficients and SC = Standardized Coefficients.
Figure 6: The regression coefficient of H5a

For the model summary of H5a, the R^2 change = .091 designates that the percentage of .091% of the variance of port choice is accounted for quick response to customers' needs (H5a), and p < .001. Table 7 exhibits the results of the model summary of H5a.

Table 7: The R^2 Change of H5a

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.302[a]	.091	.088	.52919	.091	28.104	1	280	.000
a. Predictors: (Constant), Quick responsiveness to customers' needs									

Similarly, H1b to H5b presumes that good and smooth customs performance positively influences port choice. The results indicate that good and smooth customs performance positively and significantly influences port choice (B = .246, t = 3.444, p < .005). Thus, H1b, H2b, H3b, H4b, and H5b is supported. Figure 7 displays the results of the regression coefficient of H1b to H5b.



*UC = Unstandardized Coefficients and SC = Standardized Coefficients.
Figure 7: The regression coefficient of H1b to H5b

Concerning the model summary of H1b to H5b, the R^2 change = .041 indicates that the percentage of .041% of the variance of port choice is accounted for excellent and smooth customs performance, and p < .005. Table 8 illustrates the results of the model summary of H1b to H5b.

Table 8: The R^2 change of H1b to H5b

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.202[a]	.041	.037	.54372	.041	11.860	1	280	.001
a. Predictors: (Constant), Good and smooth customs performance									

Multiple Regression Analysis

In this section, the overall model is regressed on the dependent variable (port choice) to measure the overall influence of the predictor variables on the outcome variable, and the variance R^2 change accounts for the independent variables. Furthermore, the results of the ANOVA regression analysis performed revealed that there is a major and significant influence of the independent variables on the dependent variable (port choice), df (5, 276) = 8.210, p < .001, which demonstrates that the five (5) predictor variables in this study significantly influence the outcome variable (port choice). Figure 8 displays the ANOVA results.

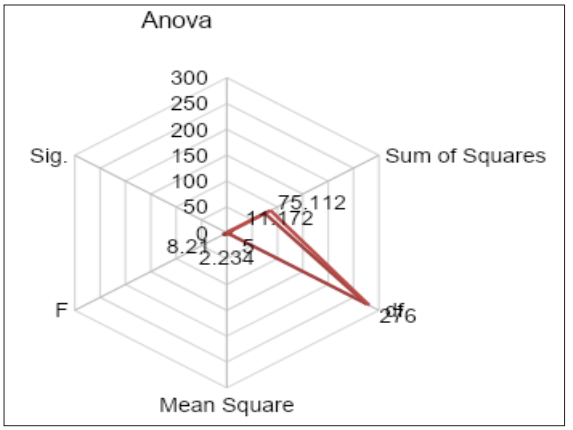


Figure 8: ANOVA summary

With regards to the regression coefficient of the model, the results disclosed that H1a, H2a, and H3a have a beta value equal to -.076,.082, and -.017; a t value equal to 1.159, 1.150, and -.273; and a significant f value equal to .247,.251, and .785, respectively. However, the results also revealed that H4a and H5a have a beta value equal to .203 and .330, a t value equal to 2.947 and 4.282, and a significant f value equal to .003 and .000, respectively. Table 9 reveals the results of the regression coefficient of the model.

Table 9: The regression coefficient of the model

Coefficients								
Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	2.117	.483		4.383	.000	1.166	3.067
	High terminal handling charges	-.076	.066	-.071	1.159	.247	-.206	.053
	A strategic port location	.082	.071	.075	1.150	.251	-.058	.222
	Poor hinterland connections	-.017	.064	-.018	-.273	.785	-.142	.108
	High cargo move per hour	.203	.069	.187	2.947	.003	.067	.338
	Quick response to customers' needs	.330	.077	.259	4.282	.000	.179	.482

a. Dependent variable: Port choice

Furthermore, in the model summary of the regression analysis, the R^2 change = .129 indicates that 12.9% of the variance of port choice is accounted for by the five predictor variables, and $p < .001$. Hence, the hypotheses of the five independent variables in this study are all supported. Figure 9 presents the results of the R^2 change in the model.

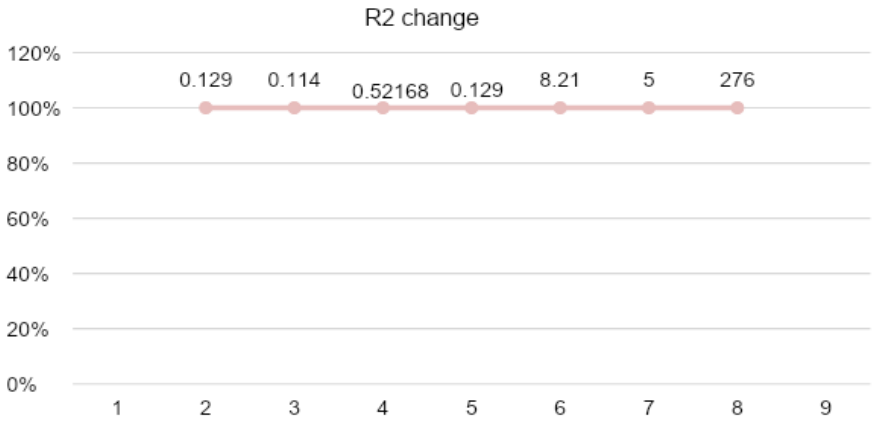


Figure 9: The R^2 change of the model

Similarly, with the addition of the moderating variable (H1b, H2b, H3b, H4b, and H5b) in the regression analysis, a significant and positive interaction was observed in the overall model, df (6, 276) = 6.975, $p < .001$, which demonstrates a significant and positive interaction in the model. Table 10 summarises the results of the interaction observed in the regression analysis.

Table 10: ANOVA interaction summary

ANOVA						
	Model	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	11.172	5	2.234	8.210	.000[b]
	Residual	75.112	275	.272		
	Total	86.284	281			
2	Regression	11.397	6	1.899	6.975	.000[c]
	Residual	74.887	276	.272		
	Total	86.284	281			

a. Dependent variable: Port choice

b. Predictors: (Constant), Quick response to customer's need, A strategic port location, High terminal handling charges, High cargo move per hour, and Poor hinterland connection

c. Predictors: (Constant), Quick response to customer's need, A strategic port location, High terminal handling charges, High cargo moves per hour, Poor hinterland connection, Good and smooth customs performance

However, in the interaction summary, the R^2 =.132 designates that the independent variables and the moderating variable account for the percentage of 13.2% of the variance of port choice. On the other hand, speaking about the moderating variable alone, the R^2 change =.003 indicates that a percentage of .03% of the variance of port choice is accounted for by the moderating variable, and p >.005. Thus, we conclude that with the addition of the moderating variable (H1b…H5b), a positive interaction was observed between the moderating variable and port choice, though not statistically significant. Table 11 displays the results of the interaction summary with the addition of the moderating variable.

Table 11: The R^2 change of the interaction summary

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.360[a]	.129	.114	.52168	.129	8.210	5	276	.000
2	.363[b]	.132	.113	.52184	.003	.826	1	275	.364

a. Predictors: (Constant), Quick response to customer's need, A strategic port location, High terminal handling charges, High cargo move per hour, and Poor hinterland connection

b. Predictors: (Constant), Quick response to customer's need, A strategic port location, High terminal handling charges, High cargo moves per hour, Poor hinterland connection, Good and smooth customs performance

Conclusion and Future Research

In conclusion, the findings of this study indicate that all five (5) independent variables in the model positively and significantly influenced the dependent variable, as well as that the moderating variable has a positive and significant interaction with the independent variables but otherwise concerning the dependent variable. Moreover, in line with the findings, we propose a practical competitiveness framework for the terminal operator as well as the port authority as a means to improve terminal competitiveness regionally. Figure 10 illustrates the terminal competitiveness pyramid and the factor distribution to represent a benchmark to improve the terminal's operations to gain a step ahead vis-à-vis the potential competitors in the region. The terminal competitiveness pyramid consists of two (2) layers. The first layer groups the factors that the terminal operator and the port authority control and, therefore, can capitalize upon through investments and human resources in order to boost terminal competitiveness. On the other hand, the second layer consists of a factor that the terminal operator and the port authority do not control. Thus, they can only rely on the ones they control to finally influence the one beyond their control.

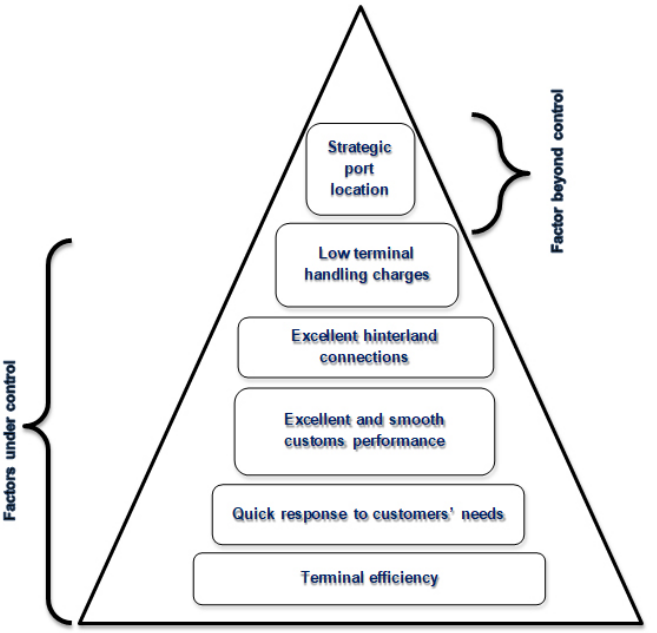


Figure 10. Container terminal competitiveness pyramid

Implications

Concerning the practical implications of this study, our results have disclosed that terminal efficiency (high cargo throughput/moves per hour) has a major impact on overall shipping transactions, as it is believed that the vast majority of port tariffs come from terminal handling charges. This implication was also supported by Fung, Cheng, and Qiu (2003), who argued that terminal handling charges are the most important component in the overall port charges for shipping lines. Therefore, the efficiency of the terminal would exponentially help to minimize the unnecessary costs caused by delays, crane breakdowns, old cranes and equipment, and insufficient manpower. Similarly, our findings have also disclosed that terminal handling charges (THCs) are significantly related to terminal efficiency; hence, the shipping lines are very concerned about the efficiency of this segment of the supply chain, as the opposite would lead to higher handling charges, which would in turn lead to a higher price for the end consumer.

From a literature perspective, this study's results support many practical findings from the existing literature. For instance, Yeo, Roe, and Dinwoodie (2008) evaluated factors influencing the competitiveness between Chinese and Korean seaports. Among other factors found were hinterland connectivity, port services, and logistics costs, which are similar factors also found in this study. Similarly, Tongzon and Sawant (2007) evaluated the various facets of port choice from the shipping lines' perspective in Malaysia and Singapore. The findings revealed the following factors: terminal efficiency, port charges, connectivity, location, infrastructure, and port services, which are the same factors found in this research. However, this study's findings challenge any claim stipulating that "port/ terminal charges" are the most important

and dominant factor for port users, including shipping lines. This study's results revealed that shipping lines, for quality purposes, customer satisfaction, and loyalty, might privilege other factors over port charges, including additional tariffs other than the loading and unloading fees, including docking charges, overtime charges, and electricity charges.

Future Research

For future studies, we would recommend that inclusive and broader research be conducted to investigate container terminal competitiveness from the users' perspectives, which would eventually include freight forwarders and shippers. A deeper investigation of container terminal competitiveness from the users' perspectives will undoubtedly provide a greater understanding of the commonly agreed-upon factors among all port users. Once these factors are empirically analysed, generalised findings can be substantiated from the conclusion for all port users, and more practical recommendations will be made for the terminal operator and the Port Authority.

We also recommend that extensive research be performed to gauge port hinterland connections and the efficiency of port connectivity. As argued by many researchers in the literature, including Yeo, Roe, and Dinwoodie (2008), believe that the more efficient a port could be in its hinterland connectivity, the more the container terminal could be competitive as well. Other researchers also argued that port hinterland connectivity is the second most significant factor and that the competitiveness of the seaport is slowly shifting from the port waterways to inland connectivity (Sdoukopoulos & Boile, 2020).

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