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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

While the world witnesses more development, nearness to raw materials and markets turned out to be the factors that, stood above all others, illustrate the world's economy. Ports have become a dynamic connection in the general trading shackle and, thus, port proficiency contributes to a large scale to a country's regional and international competitiveness. Seaports are imperative to national economies, just like more economies depend to a great extent on international trade. The objectives of this paper are: (i) identify the factors that enhance the competitiveness of the Conakry container terminal (ii) measure the level of influence that a factor can impact on the overall competitiveness of the Conakry container terminal (iii) Restructure the terminal competitiveness playground to attain a step ahead of their direct competitors in the region (iv) Establish strong and viable relationships between the terminal operator and the shipping lines (v) Develop a practical and systematic competitiveness framework for operational and managerial enhancement at Conakry container terminal. Hence, this paper aims to review literature for the past studies in the shipping industry and will further employ a cluster sampling method within the Conakry region and Multiple Regression Analysis as a data analysis method to allow an evaluation of whether there is an interaction between different stages of the independent variables. The results at the final stage of this study will be undoubtedly important for the port authority and the terminal operator in the sense that they will allow them to incessantly evaluate their performance compared to the rest of the world so that a fitting business approach can be adopted.

Keywords: Container Terminal Competitiveness, Port Efficiency, Maritime Logistics, Shipping Lines, Multiple Regression Analysis.

1. Introduction

Maritime transport and seaports have allowed a huge diversity of resources to be extensively accessible and therefore facilitated the widespread circulation of our planet's commonwealth. The fact that ports have a vital standing edge of sea and inland transportation, the implication of the container port and its production proficiencies cannot be ignored. To attain and uphold a competitive advantage in the international markets, port authorities and terminal operators need to understand the primary factors of port competitiveness, and regularly evaluate their performance compared to the rest of the world so that proper business tactics can be established. It has been renowned that an effective and well-functioning seaport raises the output of key factors of production and efficiency of the producing components thus, allowing greater levels of production, employment and, income (Bottasso, Conti, Ferrari, Merk, & Tei, 2013). Hence, comparing and assessing one's port with other ports in terms of general efficacy has turned out to be an important element of many nations' microeconomic restructuring programs (Shan, Yu, & Lee, 2014).

The present upsurge in world attention in the African continent is an important subject of discussion. Many countries in Africa stand a good chance to profit from the trade and investment opportunities overflowing the African continent. However, poor transportation infrastructure especially, in the maritime sector denies this fact, Conakry container terminal despite being strategically positioned at the border of the Atlantic Ocean is not free from this phenomenon. **Firstly,** the Conakry container terminal (CCT) has low productivity compared to Dakar Dubai Port (DDP) which is considered its direct rival port in the region, both enjoying the same geographic location on the western coast of Africa. Table 1 illustrates the productivity comparison between the two terminals.

Table 1: Productivity comparison between CCT and DDP

Conakry Container Terminal		**Dakar Dubai Port**	
Number of TEUs handled in 2017	203373	**Number of TEUs handled in 2015**	882352
Container move per hour	30 mph	**Container move per hour**	40 mph
Water Depth	13m	**Water Depth**	13 m
Cargo handling equipment	1 terminal, 2 berths, 2 gantry cranes, 2 mobile cranes, 15 reach stackers, 6 forklifts and, 2 tugs.	**Cargo handling equipment**	1 terminal, 3 berths, 10 gantry cranes, 3 mobile cranes, 2 automatic spreaders, 15 reach stackers. 4 empty handlers, 32 tractors and, trailer parks.
Cargo handling charges	38190,42 EUR/Ship-volume of 94937m^3	**Cargo handling charges**	29340,74 EUR/Ship-volume of 94937m^3

Secondly, Conakry container terminal charges (CCT) have risen following its privatization in 2011, shipping lines have expressed their dissatisfaction about the cost rising of handling operations and how that could play a role in extra pricing goods for shippers "During the interview with Mr. Ibrahima Keita, MSC operations manager (Appendix A)", Keita strongly argued that terminal efficiency is an important determinant of handling cost, therefore, higher terminal charges at Port Autonome de Conakry (PAC) is one of the biggest barriers affecting its container terminal competitiveness.

Thirdly, Congestion at PAC is linked to the port's location. Surrounded by government buildings, offices and, other businesses and the fact that traffic is shared between daily commuters and the port users, PAC is unable to deliver excellent services to its customers and therefore, has failed to

be in any way competitive. Hence, the port zone is always congested and the movement of cargo in and out of the port is severely restricted at the port's entrance "During the interview with Mr. Mamadi Kaba, Maersk port captain (Appendix B)". Kaba claimed that additional and unexpected delays are noticed in the supply chain and customers' satisfaction is jeopardized.

Fourthly, the port inland distribution system, Nazemzadeh and, Vanelslander (2015) argued that the hinterland connection is becoming an important dimension of maritime transportation. Thus, it has reshaped the maritime competition playground which was previously limited to the boundaries of the port perimeter. While Saeed and Aaby (2013) claimed that a poor inland distribution system played a crucial role in declining the performance of a container terminal.

The objectives of this research are: (i) Identify the factors that enhance the competitiveness of the Conakry container terminal. (ii) Measure the level of influence that a factor can impact on the overall competitiveness of the Conakry container terminal. (iii) Restructure the terminal competitiveness playground to attain a step ahead of their direct competitors in the region. (iv) Establish strong and viable relationships between the terminal operator and the shipping lines. (v)

Develop a practical and systematic competitiveness framework for operational and managerial enhancement at the Conakry container terminal.

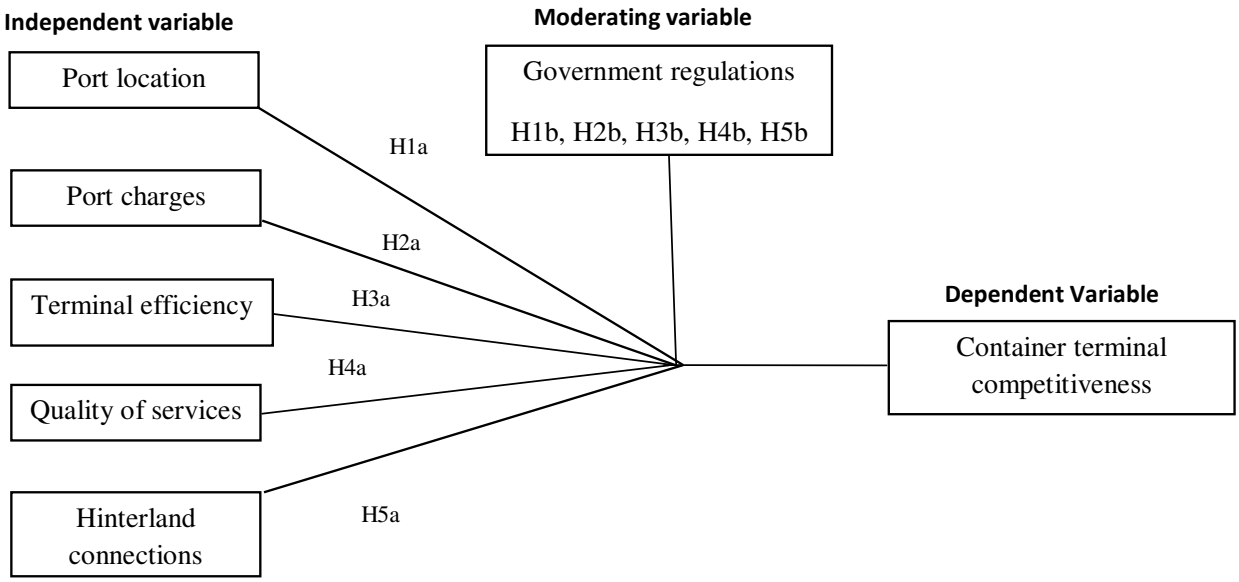
This study is also expected to benefit firstly, the microeconomics growth of the country or the host city. Shan, Yu, and Lee (2014) statistically argued that a 1% increase in port cargo throughput is associated with a 0.076% increase in per capita GDP growth. Thus, seaport cargo throughput has a positive effect on the host city's economic development. Secondly, job employment, Bottasso et al., (2013) claimed that that in a region of one million employees, a growth of 1 million tons of port net output would reveal an immediate increase of about 400 to 600 new employments. Thirdly, since this study investigates a topic that has drawn little attention to academicians and researchers in Guinea Conakry, it is therefore expected to shed light and pave the way for the next researchers and academicians in the field of port operations and management. Fourthly, from the perspective of the port authority and the terminal operator, this study underlines the factors that influence a container terminal's competitiveness in the international market and also develops a practical framework that will be used as a benchmarking tool for the terminal operator and the port authority to regularly evaluate the terminal's performance compared to the rest of the world so that suitable business plans can be advocated.

This study adopts Steven & Corsi, (2012) port choice model. However, factor analysis is conducted in this research to reduce the identified factors in the literature into fewer factors so that a coherent conceptual framework will be drawn. Decoster & Hall, (1998) defined factors analysis as "a collection of methods used to examine how underlying constructs influence the responses on several measured variables". Whereas Young & Perce, (2013) defined factor analysis as "to summarize data so that relationships and patterns can be easily interpreted and understood". Decosta and Hall further argued that there are two (2) sorts of factor analysis: Confirmatory and Explanatory

- Confirmatory factor analyses test whether a specified set of hypotheses is influencing answers in a forecasted way. While
- Explanatory factor analysis attempts to discover the nature of the hypotheses influencing a group of responses.

Hence, this study uses Explanatory factor analysis to identify the correlation between factors concerned and the kind of relationship that can be attributed to that correlation. Furthermore, a correlation test of eleven factors was run in Statistical Package for the Social Sciences (SPSS) which include: Port charges, terminal handling charges, port location, hinterland connections, quality of services, value-added services, port infrastructure, terminal efficiency, terminal productivity, cargo volume and, congestion. The result showed a strong correlation between the factors. Thus, of the eleven factors, five are extracted based on the results produced by Component Transformation Matrix and Rotated Component Matrix. The factors extracted are Terminal handling charges, port location, terminal efficiency, quality of services and, hinterland connections. Consequently, the following conceptual model is developed.

Figure 1: Proposed conceptual model



3. Hypotheses of the Research

H1a: Port location influences container terminal competitiveness.

H1b: Government regulations moderate port location and container terminal competitiveness.

H2a: Port charges influence container terminal competitiveness.

H2b: Government regulations moderate port charges and container terminal competitiveness.

H3a: Terminal efficiency influences container terminal competitiveness.

H3b: Government regulations moderate terminal efficiency and container terminal competitiveness.

H4a: Quality of services influences container terminal competitiveness.

H4b: Government regulations moderate quality of services and container terminal competitiveness.

H5a: Hinterland connections influence container terminal competitiveness.

H5b: Government regulations moderate hinterland connections and container terminal competitiveness.

4. Container Terminal Competitiveness in the Past Literature

Container terminal competitiveness has drawn substantial attention amongst researchers in the past decades as it is believed to be the support of many countries' economic development (Shan et al., 2014). Ahmed Salem Al-Eraqi, Adli Mustafa, Ahamad Tajudin Khader, (2008) claimed that globalization and intercontinental trade are governed by maritime transportation which drives 80% of the world trades.

In 2012, Steven & Corsi, (2012) analytically investigated the port choice decision making by port managers between large and small shippers, the model choice focussed on shipments of imports into the United States, specifically into the Pittsburgh metropolitan area. On the other hand, Song & Yeo, (2004) identified the competitiveness attributes for Chinese container ports from the user's perspective. The researchers used the Analytic Hierarchy Process (AHP) method to identify the elements and factors influencing competitiveness in respect to Chinese container ports. Similarly, Yeo, Roe, & Dinwoodie, (2008) empirically evaluated factors influencing the competitiveness between Chinese and Korean seaports. Factor analysis was used as a methodology in the research. On the

contrary, Wiegmans, Hoest, & Notteboom, (2008) studied the importance of port selection and container terminal choice for deep-sea container transporters. The research questions on what basis do shipping lines base their choice to select a container terminal in Le Havre and Hamburg over other ports? To attempt to answer the question, the researchers addressed three dimensions in detail: First, the buying decision characteristics, second, the port choice strategy, and finally the terminal selection.

Adolf Ng, (2006) evaluated the attractiveness of Northern Europe's major seaports serving as transshipment centers. A Liker-style survey was distributed to the best thirty (30) most efficient shipping companies. The respondents targeted in the survey were mainly from the management positions, including the operations department, Purchasing department, Chief executives and, Terminal operators. The survey was made up of two parts, in the first part, the survey participants rated twenty (20) factors implicated in impacting the focal point of port attractiveness. These factors were identified through detailed discussions with different major players within the port as well as the existing literature. Questionnaires were ranged from a scale of 5 to 0, 5 being very significant and 0 being not significant at all. In the second part, The survey participants rated the quality of different elements that would impact the attractiveness of six (6) main container ports within the province. Which are Rotterdam, Antwerp, Felixstowe, Le Havre, Bremerhaven, and Hamburg. Average Appreciation Score and Average Significance Score were both employed to process and analyze the data collected from the survey respondents.

However, Tongzon & Sawant, (2007) gauged the numerous attributes of selecting a seaport from the perspectives of shipping lines in Singapore and Malaysia. The researchers studied the constancy between the revealed preference and stated preference of the shipping lines for the sake of finding factors that influence liners' port choices. A revealed preference technique denotes a method of evaluation of the significance of the several factors that play a role in determining port selection based on the observation of the shipping lines' behavior and their port choice decision making. While a stated preference technique denotes a method of evaluating the significance of various factors involved in influencing port choice through survey questionnaires in which shipping lines will be asked to state their preference. The Boxplot analysis was used as a methodology to identify the most influential attributes listed by shipping liners, whereas Binary Logistics Regression (BLR) was applied to determine the revealed factors which have influenced shipping lines' port choice.

Likewise, Yuen, Zhang, & Cheung, (2012) explored the most influential factors in container port's competitiveness from the users' perspective. To carry out the research, the researchers used the Analytical Hierarchy Process to determine the important factors in determining container port competitiveness in Hong Kong, China and, other Asian cities. The survey respondents were identified and further categorized into three groups, namely, the shipping lines, freight forwarders and, shippers.

On the other hand, Rosa Pires Da Cruz, Ferreira, & Garrido Azevedo, (2013) studied the main attributes of seaports' competitiveness by engaging the Iberian seaport shareholders. The researchers from the existing literature on seaport attractiveness and competitiveness produced a wide-ranging list of attributes that is common to the majority of container port studies. The identified factors were further clustered into four (4) proportions namely: geographical location, seaport management, cost perspective, and, technical and physical characteristics.

Similarly, Ng, Sun, & Bhattacharjya, (2013) studied in what manner the supply chain arrangement of shippers and shipping lines affects their port of origin and destination selection in Australia. Interviews with Australian shipping liners and freight forwarders were conducted to investigate the factors influencing the port of origin and destination choice of shippers as well as shipping lines. On the contrary, Gohomene et al., (2015) examined the attractiveness of ports in West Africa through the development of a container shipping lines' port choice methodology. The researchers identified sixteen factors from the literature and interviews they preliminarily conducted with experts in the shipping industry. With the use of pair-wise comparison matrixes in AHP for data analyses, fourteen shipping lines and shipping business consulting companies serving the container ports in West Africa were identified and contacted for the data collection.

However, Nugroho, Whiteing, & de Jong, (2016) identified the factors influencing seaport and inland transport mode selection from the forwarders and exporters' perspectives in Java, Indonesia. With the aid of a stated preference survey, the researchers were able to examine the choice of the exporters and forwarders relating to port and inland mode choice. Similarly, Vega, Cantillo, & Arellana, (2019) evaluated the port choice decision making from the shippers' perspective in Columbia. Discrete choice models were employed as a methodology to allow shippers to select a port among a given set of factors.

5. Methodology of the Research

This study uses a quantitative research methodology. Apuke, (2017) defined quantitative research as "a method which deals with quantifying and analyzing variables to get results". It covers the use and analysis of mathematical data with precise statistical practices to respond to questions such as "who, how much, what, where, when, how many, and how". Furthermore, Apuke defined quantitative research methods as "the explaining of an issue or phenomenon through gathering data in a numerical form and analyzing with the aid of mathematical methods in particular statistics".

This study uses a quantitative research methodology. Apuke, (2017) defined quantitative research as "a method which deals with quantifying and analyzing variables to get results". It covers the use and analysis of mathematical data with precise statistical practices to respond to questions such as "who, how much, what, where, when, how many, and how". Furthermore, Apuke defined quantitative research methods as "the explaining of an issue or phenomenon through gathering data in a numerical form and analyzing with the aid of mathematical methods in particular statistics".

To answer the research questions, survey questionnaires are developed to facilitate fact-finding. The questionnaires of this research are made up of closed format questions to keep the focus and allow a better understanding of the data collected at the analysis phase. The population targeted in this study will be shipping lines operating in Conakry. Murphy, (2016) argued that if not with a clearer population identification, one would waste time and resources. Therefore, a lack of clarity in the population definition may lead to misunderstanding and dissatisfaction among survey respondents. Murphy further claimed that any changes that occur to the population definition over time that will eventually impact the capacity to measure those tendencies.

The sample size required in this research is three hundred and sixteen (316) as that was determined by the Taro Yamane formula. Hamed, (2017) defined sample size as "a significant feature of any empirical study in which the goal is to make inferences about a population from a sample". For a sample to be generalized to a given population and avoid sampling prejudices, the sample needs to be of satisfactory level.

Consequently, this research uses Multiple Regression Analysis to determine the impact of the factors on each other and to confidently determine which factors matter the most. Porzio, (2013) argued that Regression Analysis is "a conceptually simple method for investigating the functional relationship among variables". Similarly, Uyanık & Güler, (2013) defined Regression Analysis as "to determine the correlation between two or more variables having cause-effect relations, and to make predictions for the topic by using the relation".

Furthermore, Rawles & Bignall, (1986) claimed that there are three benefits of using regression analysis:

1. It designates whether independents variables have a substantial relationship with a dependent variable or otherwise.
2. It designates the comparative strength of different independent variables' effects on a dependent variable.
3. It allows forecasting.

6. Discussion and Conclusion

Based on the literature above reviewed, container terminal competitiveness has undoubtedly shown its relevance both in academia and the economic development of countries. Shan et al., (2014) claimed that assessing and comparing one's port with other ports in terms of general efficacy has become an indispensable part of many nations' microeconomic reform programs. The literature also revealed that for a seaport to maintain its market position, it should further improve its competitiveness strategies to stay ahead of its rival ports. Speaking to the point, it should respond to the numerous new requirements of shipping lines and other port users, and consequently, attempt to adapt to an ever-changing situation.

Hence, this literature review paper concludes and emphasizes on the importance of making the Conakry container terminal efficient and competitive regionally and internationally knowing its strategic location at the border of the Atlantic ocean which has one of the busiest maritime traffics connecting the three continents, Africa, Europe, and America. Likewise, the Conakry container terminal is not only expected to be a gateway to its own hinterland but also a hub for cargo distribution to other neighboring countries like Mali and Burkina Fasso since they have no access to a seaport in their respective hinterland and therefore, considered landlock countries. Thus, the competition intensifying between the two terminals, Conakry container terminal (CCT) and Dakar Dubai port (DDP) as both are trying as best as they could to attract cargo from these two countries.

Consequently, the importance and significance of undertaking the above literature review to propose ways and strategies at the final stage of this research on how the Conakry container terminal could gain a step ahead of their direct competitor in the region in their quest of being a hub container terminal.

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Appendix A

Interviewer	Interviewee	Company & Occupation	Date and place of the interview	Mode of the interview	T. Number
Mamadou Lamine Diallo	Ibrahima Keita	MSC operations manager	27 November 2017 (Conakry)	Face to face interview	+224 628354237

Appendix B

Interviewer	Interviewee	Company & Position	Date and place of the interview	Mode of the interview	T. Number
Mamadou Lamine Diallo	Mamadi Kaba	Maersk port captain	17 November 2017 (Conakry)	Face to face interview	+224 622354779