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A PERCEPTION STUDY OF SEABORNE CARGO INFRASTRUCTURAL CAPACITY IN LAGOS PORT COMPLEX

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Abstract

The study aims to analyse the seaborne cargo infrastructural capacity in Lagos Port Complex. The research adopts expository research design, with Lagos Port Complex as the sample frame. 230 questionnaires was administered using purposive sampling technique. Mann Withney U-test was used for the analysis. The research reveals that Port infrastructural capacity based on infrastructural adequacy or inadequacy is of moderate effect in the stance of 'adequacy of port storage facilities', 'port-oriented traffic', 'obsolete handling equipment' and 'level of workforce' of r-value |-0.210|, |-0.207|, |-0.245|, |-0.212| respectively. Therefore, it can be said that the port infrastructural capacity of the Lagos Port Complex (LPC) is relatively poor considering eleven (11) independent variables, where only four (4) have moderate effect on

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infrastructural adequacy of the port and the remaining seven (7) were of no statistical significant effect on infrastructural capacity of the port.

Keywords: *infrastructural-capacity; seaborne-cargo; port; cargo.*

JEL Classification: R40, R42

Introduction

The importance of the maritime industry cannot be over-emphasized due to its impact on the economies of nations. The roles of seaports have now become obviously important as economies grow and nations continue to engage in international trade. This is made pertinent not just because of the number of vessels calling at seaports but because of size and volumes of cargoes these vessels now transport at a single time of visit to seaports (Stephens & Ukpere, 2011). Hence, ports infrastructural capacity now serves as bedrock in receiving and dispatching of cargoes (Prakash, 2005). The maritime industry embraces virtually all sorts of businesses and their associated activities aside its primary core businesses such as shipping activities, ship construction and repairs, as it has become industrial hubs for just-in-time manufacturing. Among all activities at the port, the infrastructural base for the port performance is second to none and cannot be handled with negligence. Cargo volumes are increasing from time to time due to changes in the volume of goods attracted to this country and the orientation of Nigeria's economy, which is an economy driven externally (importing more than exporting). The driving force is not of a concern in this research, but to what extent port infrastructural capacity can be harnessed to maximize revenue at possible smallest tariffs charges per unit of cargo handled at the port.

Therefore, in this paper, the infrastructural capacity is a function of the intermodal system available, storage facilities, ship design, port/berth design, cargo handling equipment/system, prevailing technological advancement, administrational structure (legal/policy/political framework) that ensure the functionality of the system.

The introduction shall have a page at the most, however not less than half a page. The text must provide answers for four questions. (1) What matter does the paper cover? (2) Why is the studied matter important? (3) How does the author intend to answer to this matter? (4) What is the relation between the paper and the already existent specialized literature? This introductory section shall be written clearly and any confusion in communicating the four answers might result in paper rejection.

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Theoretical foundation: Port demand and growth in seaborne cargo management

According to Jean-Paul (2008) seaborne cargo accounted for more than 90% of global trade in year 2006 in terms of volume and about 70% in terms of value (Jean-Paul, 2007). It is estimated that container ships carried about 52% of all seaborne cargo (value terms) in 2019 (United Nations Conference on Trade and Development (UNCTAD), 2019). The last two decades has witnessed containerization dominance of international trade, as over 70% of them were moved in containers and by container vessels (UNCTARD, 2019). According to the data from Containerization International (Containerisation International, 2019) and United Nations (UN 2008, 2016), there has been a great increase [from 84.6 million TEUs (20-foot equivalent unit) in 1990 to 485 million TEUs in 2007] in container traffic (Lee & Meng, 2015). In it all, a meager share of 18% goes to the developing economies. Among the developing economies, Asia has the largest share (UNCTAD, 2008).

Maritime transportation and total transport system costs have been on the decline. This is attributed to increase in carrying capacities of vessels and efficient connections at seaports to the land transportation systems. To maintain the momentum, seaports have to improve on their handling capacities and efficiency, which had come at a huge cost (UNCTAD, 2019). Though the operating cost is shrinking, the infrastructural investment base and associated cost are increasing. Nations that failed to adopt the current technological innovation trends may not only lose patronage of their seaports,but may have to pay more to move their cargoes through those that have developed and adopted these innovations.

In Nigeria, the Governor of Lagos State is making effort to improve the intermodal connection of the Lagos transport system. This is being done by integrating the rail, water and road transportation to compliments each other in order to reduce total costs and time lost in the Lagos metropolitan area and for transiting cargoes to other parts of Nigeria. Diversion of over 2 million commuters off road to water transportation is one of the key elements of the drive by the state where local ship building is highly encouraged (Ugbodaga, 2017). This is in line with the advent of the Cabotage act to ensure local content, though the maintenance is still outsourced and openned up for the private enterprises to participate; it is indeed a welcome idea in the maritime industry in Nigeria. Starting somewhere is essential at the moment, though it is essential to start off on a good note. But irrespective of the caution made, the country lacks data and technical know-how for planning in order to

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start well. Therefore, it is required of the country to start somewhere first and later transcend through proper management strategy to a greater height beyond the sphere of political influence, into a sphere where the socio-economic importance is given priority for a sustainable transport management system.

Custom has influence on maritime operation involving international movement of consignment. The total cost, ease of import and export, turnaround time, compliance of consignment to the local and international law. Therefore, it is required of the custom activities to cost effective as possible not compromising the law associated to every region. This led to Nigeria Custom Embracing Authorized Economic Operators (AEO) programme proposed by the World Custom Organization (WCO). AEO is a programme works by assigning a certification to carriers/shippers/shipping agents that will be allowed to move cargo across international boundaries (into and out of Nigeria) without any check at the borders and seaports but at the destinations of these cargoes by the nation's customs eliminating time lost to cargo inspection at borders and seaports, thereby increasing cargo transit times.

Research methodology

The sample frame utilised for this study is the Apapa Port Complex (NPA) Lagos workforce. The total workforce population is 573 as at 2017. Utilising Cochran (1977) formula:

$$n_0 = \frac{Z^2 pq}{e^2}$$

where

$e = the\ desired\ level\ of\ precision$

$p = the\ (estimated)\ proportion\ of\ the\ population\ that\ will\ be\ sampled$

$q = 1 - p$

$z = z - value\ (found\ on\ Z\ table)$

$e = 0.05$

$p = 0.5$

$$q = 1 - 0.5 = 0.5$$

$Z = Z - Score\ for\ the\ 95\%\ level\ of\ confidence\ (1.96)$

$$n_0 = \frac{1.96^2 \times 0.5 \times 0.5}{0.05^2}$$

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$$n_0 = \frac{0.9604}{0.0025}$$
$$n_0 = 384$$

Modifying the Cochran formula for sample size calculation in smaller populations we then have:

$$n = \frac{n_0}{1 + \frac{(n_0 - 1)}{N}}$$

where

$n_0 = Cocharan's\ sample\ recommendation$

$N = population\ size$

$n = is\ the\ new\ adjusted\ sample\ size$

$n_0 = 384$

$N = 573$

$$n = \frac{384}{1 + \frac{(384 - 1)}{573}}$$
$$n = \frac{384}{1.668412}$$
$$n = 230.15898$$
$$n \approx 230$$

230 questionnaires were administered to the NPA Lagos Port Complex workforce. The sampling technique for the data collection was purposive sampling technique and Mann Whitney U-test technique was adopted for the analysis.

Mann Whitney-U test

$$U_1 = R_1 - (\frac{n_1(n_1 + 1)}{2})$$

or

$$U_2 = R_2 - (\frac{n_2(n_2 + 1)}{2})$$

$R\ is\ the\ sum\ of\ ranks\ in\ the\ sample\ and\ n\ is\ the\ number\ of\ items\ in\ the\ sample$

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Data analysis and findings

Mann-Whitney U test is used in analyzing the statistical significant difference between the variables considered and they are presented as follows: From Table 1, 162 respondents who said the port infrastructural capacity is inadequate (100.51, 103.91, 99.90, 103.45, 97.43, 105.13, and 104.23) have higher mean ranking compared to the 35 respondents (minus one (1) respondent who did not make his opinion known) who said the port infrastructure is adequate (92.03, 76.27, 94.83, 78.39, 86.97, 70.64, and 74.77); Compared to the mean ranking for "Port Capacity Utilization", "Adequacy of Storage Facility", "Port Competiveness", "Policy Oriented Traffic", "Adequacy of Handling Equipment", "Obsolete Handling Equipment", and "Level of Workforce Competence" respectively. At the point where the ranked mean of the 162 respondents who said the port infrastructural capacity is inadequate were lower in value 96.56, 98.48, 97.42, and 97.48 than the mean ranking of the 35 respondents who agreed that the port infrastructure is adequate 110.31, 98.59, 106.33, and 106.06 respectively. In the case of "Berth Capacity Exertion", "Modern Handling Equipment", "Port Automation", and if the port is a "Going Concern" respectively.

From Tables 1 and 2, the respondents who said the port infrastructure were inadequate have a significant higher mean rank (103.91) than the respondents who said the port infrastructure were adequate (92.03). The level of "adequacy of storage facilities" within the port, $U = 2039.5$, $p = 0.003$, $r = -0.210$, is of a moderate effect (Cohen, 1988). There is a significant difference in the mean rank of port inadequacy (103.45) and adequacy (78.39) on "Policy Oriented Traffic", $U = 2113.5$, $p = 0.004$, $r = -0.207$, is of moderate effect. There is a significant difference in the mean rank of port inadequacy (105.13) and adequacy (70.64) on "Obsolete Handling Equipment", $U = 1842.5$, $p = 0.000$, $r = -0.254$, it is of moderate effect still. And likewise, significant differences were recorded in the mean ranks port inadequacy (104.23) and port adequacy (74.77). On "Level of Workforce Competence", $U = 1987.0$, $p = 0.003$, $r = -0.212$ this is also considered a moderate effect. However, the independent variables such as "Port Capacity Utilization", "Port Competitiveness", "Berth Capacity Exertion", "Modern Handling Equipment", "Port Automation", "Adequacy of Handling Equipment", and "Going Concern" did not differ on port infrastructural adequacy or inadequacy. Therefore, it can be said that, the "adequacy of storage facilities", "Policy Oriented Traffic", "Obsolete Handling Equipment", and "Level of Workforce Competence" have medium statistical significant effect on port infrastructural capacity.

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Table 1: Ranking of Adequacy of Port Infrastructure

	Adequacy of port Infrastructures	N	Mean Rank	Sum of Ranks
Port Capacity Utilization	No	162	100.51	16282.00
	Yes	35	92.03	3221.00
	Total	**197**		
Adequacy of Storage	No	162	103.91	16833.50
Facility	Yes	35	76.27	2669.50
	Total	**197**		
Port Competiveness	No	162	99.90	16184.00
	Yes	35	94.83	3319.00
	Total	**197**		
Policy Oriented Traffic	No	162	103.45	16759.50
	Yes	35	78.39	2743.50
	Total	**197**		
Berth Capacity Exertion	No	162	96.56	15642.00
	Yes	35	110.31	3861.00
	Total	**197**		
Modern Handling	No	162	98.48	15954.00
Equipment	Yes	34	98.59	3352.00
	Total	**196**		
Port Automation	No	162	97.42	15781.50
	Yes	35	106.33	3721.50
	Total	**197**		
Adequacy of Handling	No	155	97.43	15101.00
Equipment	Yes	35	86.97	3044.00
	Total	**190**		
Obsolete Handling	No	162	105.13	17030.50
Equipment	Yes	35	70.64	2472.50
	Total	**197**		
Going Concern	No	162	97.48	15791.00
	Yes	35	106.06	3712.00
	Total	**197**		
Level of Workforce	No	162	104.23	16886.00
Competence	Yes	35	74.77	2617.00
	Total	**197**		

No = Inadequate port infrastructural capacity, Yes = Adequate port infrastructural capacity

Source: Author's Field Survey

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Table 2: Mann-Whitney U Test Statistics[a]

	Port Capacity Utilization	Adequacy of Storage Facility	Port Competiveness	Policy Oriented Traffic	Berth Capacity Exertion	Modern Handling Equipment	Port Automation	Adequacy Handling Equipment	Obsolete Handling Equipment	Going Concern	Level of Workforce Competence
Mann-Whitney U	2591.0	2039.5	2689.0	2113.5	2439.0	2751.0	2578.5	2414.0	1842.5	2588.0	1987.0
Wilcoxon W	3221.0	2669.5	3319.0	2743.5	15642.0	15954.0	15781.5	3044.0	2472.5	15791.0	2617.0
Z	-.842	-2.944	-.527	-2.904	-1.476	-.011	-.937	-1.098	-3.564	-.869	-2.980
Estimated r	-0.060	-0.210	-0.038	-0.207	-0.105	-0.001	-0.067	-0.080	-0.254	-0.062	-0.212
Asymp. Sig. (2-tailed)	0.400	0.003	0.598	0.004	0.140	0.991	0.349	0.272	0.000	0.385	0.003

a. Grouping Variable (Dependent Variable): Adequacy or Inadequacy of port Infrastructural Capacity

Source: Author's Field Survey

Discussion and Conclusion

Port infrastructural capacity based on infrastructural adequacy or inadequacy is of modearate effect in the stance of "adequacy of port storage facilities", "port-oriented traffic", "obsolete handling equipment" and "level of workforce" of r-value |-0.210|, |-0.207|, |-0.245|, |-0.212| respectively. Port infrastructural capacity can be easily influenced working on the infrastructural components mention earlier on that have moderate effect on the infrastructural capacity of the country's port operation. The inappropriateness of the management approach had failed to achieve statistical significant deduction in the "port capacity utilization", "port competitiveness", maximization of berth capacity ("berth capacity exertion"), "modern equipment", "port automation", "adequacy of handling equipment and whether the strategy adopted can ensure the port to remain a "going concern in the long run.

Therefore, it can be said that the port infrastructural capacity of the Lagos Port Complex (LPC) is relatively poor considering eleven (11) independent variables, where only four (4) have moderate effect on infrastructural adequacy of the port and the remaining seven (7) were of no statistical significant effect on infrastructural capacity of the port.

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