Determinants of Cargo Dwell Time and Performance Onne Seaport, Rivers State, Nigeria

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Abstract

This study examined the determinants of cargo dwell time and the performance of Onne seaport, Rivers State, Nigeria. Two hundred and sixteen copies of questionnaire were administered to the operators and the clearing and forwarding agents in the study area to elicit information on the determinants of cargo dwell time and performance. Descriptive and inferential statistics were used for the data analysis. Findings revealed that males were 73% and females were 27% while majority (45.1%) had working experience of maximum of 10 years. Findings showed that the berth occupancy rate was highest in 2015 (40.86%) while the least was observed in 2017 (18.40%). The ship turnaround time was highest (2.70 days) in 2014 despite the fact that the number of ships completed was lower than that of 2015 (704). A significant relationship was revealed to exist between cargo handling equipment and cargo throughput ($r=0.87$; $9<0.05$). Similarly, the documentation procedures positively and significantly correlated with cargo dwell time ($r=0.72$; $p<0.05$) while a significant relationship existed between truck turnaround time and ship turnaround time ($r=0.057$; $p<0.05$). Analysis revealed that the turnaround time in Onne Seaport was higher than the appropriate 2.40 days except in 2016. The study concluded that availability of adequate, efficient and functional handling equipments tailored to handle different classes of cargo proves the cargo throughput of ports. It is recommended among others that the port terminal management should provide the necessary cargo handling equipment to help in maximizing the speed in cargo clearing processes, so that there will be no congested cargo traffic at Onne seaports.

Keywords: Cargo dwell, Determinants, Performance, Seaport, Nigeria

Introduction

International Maritime Trade, shipped over 90% overall volume (tonnages) of cargoes through exports/imports trades globally (UNCTAD, 2012). These cargoes are usually shipped in bulk, containerized and break bulk form that makes maritime transportation through the link of seaports serving as the source of global trading, as the 70% of the traded cargoes are handle by the seaports globally from which maritime nations earned huge revenue. Cargo dwell time in global shipping directly affect the supply chain network technique of Just-In-Time inventory approach can shorten the cost by ordering for inventory to be used for products production, based on the immediate customer orders. Longer dwell time could be a threat and impediments for cargo owners at the ports terminals. Raballand et al (2018) describe cargo dwelling time as a factory performance measures, because of product decrease at factories inventory levels cause by higher cargo dwelling time at ports.

Operational gap exist in cargo dwell time processes in the African region, especially in the West Africa countries. Improvement is urgently needed, to remain a competitive region in the shipping

activities in the international trade. These gaps brings about delays in the inventory management and impose a constraint to the cargo owners through increase in the freight and cargo tariff, that will lead to high cost of finished goods in the African region and also decrease the standard of living compare to other developed nations through high products sales. Hummels et al., (2012) explained that trade suffers from long cargo dwell time and reduce the activities of the traders because trade depends on the processes of importers for any factories to assemble or package any goods for exportation. Therefore any delay in the cargo clearing processes can unpredictably affects the increase level of the inventories and hindered global supply chain management integration network system. The report of Barloworld Logistics (2010) gave reasons that South Africa automotive industries should adopt Just-In-Time inventory technique model to reduced inventory wastages in their production and also advices on the serious need to improve cargo dwell time predictability as the sole possibility of reducing company inventory waste.

Cargo dwell time is a serious concern to the shipping operators, because of its criticality to the inventory management. Jean-François et al., (2010) lamented that more than half of the time cargo spend on transit (from the cargo point of origin to the point of destination) in Africa region is spent at the port terminal operators premises thereby increasing inventory cost through the extra cost in cargo tariff. Cargo dwell time differs from continents, countries, regions, states, etc. the development of each of the location of the port will determine the level of improvement in cargo dwell time. Refas et al., (2011) explain the consideration of different level in cargo dwell time within the African ports, ranging from fourteen days in the West Africa to four days in South Africa. There is an improvement in cargo dwell time level of the East Asian and the European countries. Ewuzie (2018) explained that increase in cargo dwell time leads to intra-regional trade in West Africa Region, causing the region to remain poor with 10-20% revenue from the low trade growth around the region, as the shippers will prefer to patronize the ports in the region that are business friendly and also improve in their clearing documentation process.

Raballand et al., (2018) through the report of World Bank, reported that South Africa have the shortest dwell time in Africa region with the cargo dwell time of four days in estimate while Nigeria is the highest with an estimate of fifteen days for cargo dwell time, making cost of product to be at a high price in the region, except for the landlocked countries with no access to the shipping activities. The report also listed some other Africa countries ports with low cargo dwell time; Benin Republic with 11 days, Kenya 9 days, Uganda 8 days and 8 days for Zambia. Hummel (2012) stated that higher cargo dwelling time made shipping processes difficult for the shippers and minimize the performance of traders that are trading in the West Africa ports through shipping. Cumbersome documentation processes increase cargo dwell time, reduce the supply in inventory level to factories and also produce costly collaboration between port users, and such relationship between users and management could become impossible in some cases.

Godfrey (2017) reported that about 60% of the cargoes shipped to West Africa Region are destined for Nigerian importers, while only 10% of such shipments are handled by the Nigerian seaport, which make Benin Republic with 11.18 million people (Contonou Port) to tragically remain the haven for the Nigerian shippers, there after transshipped to Nigeria through the boarders with the use of trucks. Nigerian population of about 190.9 million people should bring a huge market advantage in a large quantity, which have been deprived through the action of the shippers to the neighboring countries. Togo has a population of 8 million people, consuming about 15% of total cargo that comes into the Africa region, and also Douala port has also been a patronize port that serve the North Eastern part of Nigeria, taking away revenue from the Nigerian Ports. Nigeria ports have a high records of cargo abandonments by the cargo owners,

the abandoned cargoes by the importers are mostly repurchased through the auction of such cargoes by the ports management and Nigerian Custom Service with a reduce import duties, reduction in cargo tariff and also bypass the procedures and processes of storage charges. Raballand et al (2018), demonstrated, that most times, the importers deliberately abandon their cargoes at the terminal operators premises, wait until the cargoes are due for auctioning, especially the prohibited cargoes or could possible make a false declaration by under valuing the cargo so as to cut corners through the help of the port employee to repurchase the cargo back with minimal charges and at the cheapest possible rate. Reports showed that Nigeria cargo dwell time is still higher compare to other ports in the African region and their free storage days remain the least in the region, thereby increasing the discretional behavior of the port customers, by converting the port storage area to their warehouse in the management of supply chain, instead of the storage area being a node in the logistic intermodal chain (Refas et al., 2011). The high traffic congestion at Lagos State needs to be decongested through reduction of cargo dwell time at Onne Port, especially for containerized cargo. This will significantly help shippers to divert their attention away from ports around Lagos municipalities to patronize Onne Ports through reduction of port tariffs at the terminals, and smooth documentation procedures. Nigeria Ports one decade ago demonstrated very low levels of operational efficiency which resulted in long cargo dwell time and long turnaround times for ships (Leigland and Palsson, 2007). Also as is the case of public cooperation were believed to have complex institutional logistics structure with trucks bottlenecks. In a bid to address some of the clear and immediate problems such as congestion and delays for cargo increase, the NPA introduced port concession to some of the ports in the country to bring in needed expertise in the area of operations.

Onne ports serves as a local hub ports for shippers around south-south region of Nigeria and play a crucial role in improving the GDP of Nigeria, linking shipping activities internationally with the highest number of service boat that call at the port in Nigeria, compare to any other ports in Nigeria. It is one of the competitive ports in Africa especially in the West Africa region. Cargo dwell time is an instrument use to attract more port user to transport their cargo through their ports for profit making as the reduction in cargo dwell time is a marketing strategy for port efficiency. A delay of cargo clearance is a hindrance for growth and increase poverty in the environment and a tool in the measurement of port efficiency which can double terminals throughput without much marketing and more investments (Mercks, 2005). The performance of the port agencies including the Nigeria Custom services (NSC) affects the cargo clearing processes, because of inability to operate a 24 hours, 7 days a week at the Nigerian ports, instead of the 9am-5pm working hours that will increase the performance of the Nigerian seaports (Iweala, 2011). The performance of the port is measured by the cargo throughput exported and imported through the port (Tongzon, 2011). Port performance is characterized by the improvement and efficiency of the port stakeholders or the management in achieving the International Maritime Organization (IMO) stipulated order in the clearance of port cargo to decongest the port terminals between 48 hours stipulated time (Igbokwe, 2013).

Several studies have been done on Onne Ports being a popular sea port in the Niger Delta. For instance, Igbokwe (2014) reported that malfunctioning, old, insufficient and obsolete equipment including scanning facilities, finding it difficult to meet the 24 hours IMO stipulated hours for cargo clearance at Onne seaport and also reduces their performance level through the yearly reduction in cargo throughput. The previous studies did not consider the determinants of cargodwell time and performance of Onne Seaport, Rivers State which is the gap that this study

is filling. Thus, the study is to examine the determinants of cargo dwell time and the performance impact of Onne Seaport, Rivers State, Nigeria.

Materials and Methods

The study area is Onne SeaPort. The Onne Port is situated at Eleme LGA near the Bonny River; measuring 19km from Port Harcourt City L.G.A. Onne Port comprises three Local Government Areas of Rivers State, namely: Eleme LGA, Ogu-Bolo LGA and Bonny LGA. The port has been designated as an Oil and Gas Free Zone by the government of Nigeria; with over 100 companies' licensed to work at Onne Port. According to census data released in 2006, the state has a population of 5,185,400, the Nigeria sixth populous state. Its capital, Port Harcourt is amongst the largest city and is economically significant as the centre of Nigeria's Oil industry with many indigenous ethnic groups: Ikwere, Ibani, Opobo, Okrika, Kalabari, Etche, Ogba, Ogoni, Engenni others. Onne seaport operates a Public Private Partnership (PPP), with a multi-purpose and a one 'stop-shop' that relates various port activities that serves the West Africa and the central Africa sub region. Onne port is a Hub and Logistics Centre for oil & gas sector; Centre for onshore and offshore activities with the total land area 2,538.175 hectares. Onne port operates at security level one with two operational areas called Federal Lighter Terminal (FLT) with 4 berths, 2,022 metres quay length, 7.5 metre draft; Federal Ocean Terminal (FOT), operating with 11 berths 2,890 mtres quay length and 11.5 metres draft.

Research Design

Cross-sectional survey research was used and applied in this study. This was used so that generalization can be made from the sample chosen. Kothari (2004), said the survey method is a fair method and exhaustive method to analyzed a case study research to help the researcher in studying the study deeply and thoroughly on the different factors, phenomenon that affect different aspect of the phenomenon, which can be feasible respectively to the method of data collection, also save time and cost.

Source of Data Collection

The sources of data collection included the primary and secondary sources of data. The primary sources of data were questionnaire, interview and personal observation. The sources of secondary data are the documents obtained from published sources like magazines, newspapers, textbooks, journals and the internet

Method of Data Collection

Determination of Sample Size

The population of the study is the operational staff of the Onne Port and the clearing and forwarding companies operating on behalf of the cargo owners at Onne Port, with the target population of 308 (Tables 2 and 3). The list of all clearing and forwarding agencies are listed in Table 1. The total number of clearing agents was 148 and 160 operational staff working in Onne Seaport. However, 70% of the total clearing agents and operational staff were used to determine the sample size and thus, the study made use of 104 freight forwarders and 112 port operators, therefore the total sampling size of 216. The sample size of each freight forwarder and port operator was proportionally determined and displayed in Tables 2 and 3. Out of the sum of two hundred and sixteen (216) copies of questionnaire that were circulated among the respondents; one hundred and eighty eight copies were returned and out of this, one hundred and sixty-six (166) copies were deemed to have being correctly filled representing 76.9% of the instruments that was circulated.

Table 1: List of active clearing and forwarding companies operating at Onne seaport.

1	Ecosphere Nig. Ltd	16	Romytex Nigeria Limited
2	Act Nigeria ltd	17	Frank Clear Resources limited
3	Fidepat International Co. ltd	18	Ideke shipping, sea freight services ltd
4	Seaside shipping ltd	19	National clearing and forwarding agency
5	Todel Investment ltd	20	Sea consolidated limited
6	North Atlantic Transit ltd	21	Trans Atlantic shipping agency
7	Nathan Investment Limited	22	Candid moving, logistics Nigeria ltd
8	Micro Freight Consult	23	Blue tide
9	Luglo Nigeria Enterprises	24	Skelas ltd
10	Grasun Exclusive Resources	25	Accessport Nigeria ltd
11	Chipet and God's Power Clearing Agency	26	Aladex Nig. ltd
12	Bachemas Nig. Agencies Ltd	27	Clemarsup Nig. Ltd
13	Joe Eboje International Agencies Limited	28	Daddo Maritime Services Ltd.
14	Zewbiz cleaning Services	29	Dantras (Nig) Ltd
15	Union freight forwarders ers ltd	30	E. I ocean freight forwarders ltd
31	Yinkaomilani& associates	46	G. a paret& co
32	Intersearchnig. ltd	47	Global eagle w.a. ltd
33	Todel investments limited	48	Joe eboje international agencies limited
34	Grasun exclusive resources	49	Nathan investment limited
35	North atlantic transit limited	50	Microfreight consult
36	Fidepat international co limited	51	John holt shipping
37	Coez international logistics	52	Mj shekinah marine services
38	Marine gulf shipping agency limited	53	N. mor agencies ltd
39	Ibc worldwide express ltd.	54	Odalo enterprises ltd
40	Trans kontinetal services limited	55	Padamas int'l nig. ltd
41	Flying eagle shipping limited	56	Quality freight agency ltd
42	Obyson global logistics ltd.	57	Chinax Service Nig. ltd
43	Efk world logistics limited	58	Sunik Maritime Nigeria ltd
44	Fortune global shipping & logistics ltd	59	Taurus nig. ltd
45	Joe eboje international agencies ltd	60	The hawker group (h.g)

Source: NPA Bulletin, 2019

Table 2: Sample size of the clearing agents

Category	Number of Employees	Percentage of total (%)
Supermaritime Nig. Ltd	11	11
Integrated Shipping Services	10	10
Red Transport Logistics	12	12
Derong Alpha Logistics Services	8	8
Express concern Int'l ltd	14	13
Air sea freighter	7	7
Well word wide energy ltd	12	12
Danang logistics	7	7
Prestige associates ltd	11	10
Timariz Logistics ltd	12	11
Total	104	100

Table 3: Sample size of the operators

Name of Operating Agency	No. of Operators	Percentage (%)
NPA	27	24
WACT	15	13
BRAWAL	29	26
INTELS	41	37
TOTAL	112	100

The instrument used for the study is the "Determinant cargo dwell time and the performance of Onne seaport questionnaire" (DCDTPOSQ) which was developed by the researcher. The DCDTPOSQ has twenty-four (24) items and the questionnaire was divided into two sections. Section A seeks for information on the respondent personal information and Section B seeks information on the variables under study. Information on the DCDTPOSQ was positive statements made on a four point Likert rating scale as Strongly Agreed (SA) 4, Agreed (A) 3, Disagreed (D) 2, and Strongly Disagreed (SD) 1, in a tabular form**.**

Validation and Reliability of the instrument

The researcher uses following validities for the research and these included content validity, face validity: construct validity; predictive validity and expert judgment. Reliability of the instrument is concerned with the measurement consistency. The rate at which the research instrument measures repeatedly the same thing, in the same way, any time it is use, at the same condition and subject (Chismall, 1981). Test-retest reliability method was use in the intervening interval of one week from when the first and the second administration of the research instrument were administered. Re-examination of the data were re-entered into the SPSS software, before it was

finally analyzed by the researcher which help the researcher to be guided on the correct and accuracy of the data re-entered into the software.

Administration of the instruments

The research instruments were administered to the Terminal Operators staff, NPA, clearing agents via hand delivery and mail with the assistance of one (1) research assistants in each category in distributing the questionnaires to the respondents. The research instrument was also returned through the hand delivery and mails and the mean score of the research instrument was computed by multiplying ordinal value of each responses of a particular item.

Method of Data Analysis

The study employed the use both descriptive and inferential statistics to treat the data collected from the questionnaires distributed and from data extracted from the Nigerian Ports Authority.

The descriptive and inferential statistics used are; frequency tables, bar chart, simple percentage method in analyzing the data, the Spearman's Rank Correlation Statistics were used to test the hypothesis on data gotten from respondents.

Results and Discussions

Socio-economic Characteristics of Respondents

Table 4 presents the socio-economic characteristics of respondents in the study area which revealed that 73% (121) of the sampled population were males while only 27% (45) were females. In term of working experience, 45.1% (75) of the samples had spent between 2-10 years working either as an operator or agent, 37.5% (62) for category 11-19 years of experience, 9% (15) for category 20-28 years and finally 29& above category has 8.4% (14). Analysing the respondents qualification, 33.7% (56) were educated to SSCE level, 25.9% (43) have OND/NCE qualification while 31.2% (52) were qualified at HND/BSC level. M.Sc. holders constitute 9.1% (15).

Table 4: Socio-Economic Characteristics of

Sex	Frequency	Percentage (%)
Male	121	73.0
Female	45	27.0
Total	**166**	**100.0**
Working Experience Distribution	**Frequency**	**Percentage (%)**
2-10	75	45.1
11-19	62	37.5
20-28	15	9.0
29 & above	14	8.4
Total	**166**	**100.0**
Educational Qualification	**Frequency**	**Percentage (%)**
SSCE	56	33.7
OND/NCE	43	25.9
HND/BSC	52	31.3
MSC	15	9.1
Total	**166**	**100.0**

Effects of cargo handling equipment on cargo throughput

In the response culled from the respondents who are operators at Onne seaport on the question of determining how cargo handling equipment affects cargo throughput in Table 5; items 1,2,3,4 produced the response means of 3.56, 3.58, 3.45, and 3.52 respectively while the items standard deviations are 1.04, 0.24, 0.71 and 1.90 respectively. These returned mean values are above the criterion mean value of 2.5 therefore all the items are accepted.

Likewise, agents at Onne seaport who were parts of the respondents responses based on the question of determining how cargo handling equipment affects cargo throughput in Table 6; mean values of 3.57, 3.62, 3.45 and 3.59 were obtained for items 1, 2, 3, and 4 respectively. Those items also produced standard deviation values of 0.99, 1.14, 0.61 and 0.97 respectively. These calculated means are greater than our criterion mean thereby making our reservation on those items acceptance. This shows that Onne seaport cargo handling gears are efficient and functional to meet cargo throughput; there are cargo handling equipment available for general, dry bulk, liquid bulk and containerized cargoes at the seaport; the cargo handling equipment operators often in regular basis gets train to acquaint with the modern cargo handling equipment available in the maritime industry; and Onne port has sufficient manpower to work as a cargo handling equipment operator.

According to data obtained from Nigeria Port Authority (NPA), Onne cargo throughput for the years of 2013, 2014, 2015, 2016 and 2017 as displayed in the above table are 24,784,405 (metric tons), 27,968,869 (metric tons), 26,526,815 (metric tons), 23,458,883 (metric tons) and 26,049,226 (metric tons) respectively. This shows an unstable throughput being experienced in Onne Seaport over time though the total throughput was over 20 million metric tons.

Table 5: Analysis of how cargo handling equipment affects cargo throughput at Onne Seaport (Operators Response)

S/N	Item	Operators						Clearing Agents					
		N	Min	Max	Mean	S.D.	Resolve	N	Min	Max	Mean	SD	Resolve
1	Onne seaport cargo handling gears are efficient and functional to meet cargo throughput.	84	1	4	3.56	1.04	Accept	82	1	4	3.57	0.99	Accept
2	There are cargo handling equipment available for general, dry bulk, liquid bulk and containerized cargoes at the seaport.	84	1	4	3.58	0.24	Accept	82	1	4	3.62	1.14	Accept
3	The cargo handling equipment	84	1	4	3.45	0.71	Accept	82	1	4	3.45	0.61	Accept

	operators often in regular basis gets train to acquaint with the modern cargo handling equipment available in the maritime industry.											
4	Onne port has sufficient manpower to work as a cargo handling equipment operator.	84	1	4			Accept	82	1	4			Accept
					3.52	1.90					3.59	0.97	

Table 6: Cargo throughput for Onne Seaport from 2013-2017

Year	Inward Throughput (metric tons)	Outward Throughput (metric tons)	Total Throughput (metric tons)
2017	2,034,033	24,015,193	26,049,226
2016	1,758,539	21,700,344	23,458,883
2015	2,497,937	24,028,878	26,526,815
2014	3,144,073	24,824,796	27,968,869
2013	2,809,686	21,974,719	24,784,405

Source: NPA Bulletin, 2018

Effects of Documentation Procedure on Cargo Dwell Time

Table 7 reveals the calculated means and standard deviations of operators and clearing agents at Onne seaport on the question of documentation at the seaport. For the operators, Items 1, 2, 3, and 4 produced means of 3.54, 3.62, 3.56 and 3.64 with standard deviation values of 0.90, 1.16, 0.60 and 1.32 respectively. The mean of each of the items was above the criterion mean, suggesting that all were agreed on. However, the means and standard deviations of clearing agents at Onne seaport on the question of documentation at the seaport are also shown in Table 7. Items 1, 2, 3, and 4 produced means of 3.61, 3.65, 3.49, and 3.51 with standard deviation values of 1.05, 1.26, 0.67 and 1.70 respectively. All the means of these items were above the criterion mean, so all were agreed on.

Table 7: Analysis of documentation procedures at Onne Seaport

S/N	Item	Operator Response						Clearing Agents Response					
		N	Min	Max	Mean	S.D.	Resolve	N	Min	Max	Mean	S.D.	Resolve
1	The cargo clearing procedures is not done manually at Onne seaport.	84	1	4	3.54	0.90	Accept	82	1	4	3.61	1.05	Accept
2	There is a reduction in the bureaucracy towards Onne seaport clearing cargo processes.	84	1	4	3.62	1.16	Accept	82	1	4	3.65	1.26	Accept
3	The Customs and other enforcement agencies are operating in a 24 hours operation daily.	84	1	4	3.56	0.60	Accept	82	1	4	3.49	0.67	Accept
4	There is a functional scanners to aid the efficient and fast scanning process of cargo at Onne port	84	1	4	3.64	1.32	Accept	82	1	4	3.51	1.70	Accept

Table 8 reveals the calculated means and standard deviations of Operators at Onne seaport on the question of cargo dwell time at the seaport. Items 1, 2, 3, and 4 produced means of 3.62, 3.42, 3.43 and 3.74 with standard deviation values of 1.27, 1.60 0.66 and 1.81 respectively. All these means were above the criterion mean, so all were agreed on. Similarly, in the response culled from the respondents who are clearing agents at Onne seaport on the question of cargo dwell time at the seaport; items 1,2,3,4 produced the response means of 3.46, 3.65, 3.62 and 3.55 respectively while the items standard deviations are 1.69, 2.35, 1.18 and 0.95 respectively. These mean values are above the criterion mean value of 2.5 therefore all the items are accepted. The information in Table 9 shows that the cargo dwell time in WACT and Bonny were the highest having recorded 16.31 days and followed by Intels of 15 days.

Table 8: Analysis of cargo dwell time at Onne Seaport

S/N	Item	Operators						Clearing Agents					
		N	Min	Max	Mean	SD	Resolve	N	Min	Max	Mean	SD	Resolve
1	General, dry bulk, liquid dry bulk or containerized cargoes determine the dwell time of cargo at port terminals.	84	1	4	3.62	1.27	Accept	82	1	4	3.46	1.69	Accept
2	Terminal operators regulate their operations and determined how long cargo can stay at the port terminal for profit making.	84	1	4	3.42	1.60	Accept	82	1	4	3.65	2.35	Accept
3	There is a good customer relationship officer to guide the new customers on the need to quicken their cargo clearing processes.	84	1	4	3.43	0.66	Accept	82	1	4	3.62	1.18	Accept
4	The increasing numbers of port inspection officers increase cargo dwell time.	84	1	4	3.74	1.81	Accept	82	1	4	3.55	0.95	Accept

Table 9: Analysis of dwell time at each of Onne ports terminals

Terminal	Cargo Dwell Time (Days)
Brawal	10.5
Intels	15
WACT	16.31
Bonny	16.31

Cargo Storage Areas and Ship Berth Occupancy Rate

Table 10 presents the cargo storage areas and ship berth occupancy rate. For the operators, the analysis reveals that the calculated means and standard deviations of Items 1, 2, 3, and 4 produced means of 3.51, 3.60, 3.48 and 3.69 with standard deviation values of 1.81, 1.07, 0.71 and 1.47 respectively. All these means were above the criterion mean, so all were agreed on.

Likewise, clearing agents at Onne seaport who were parts of the respondents responses based on the question of availability of cargo storage area; mean values of 3.61, 3.52, 3.65, and 3.56 were obtained for items 1, 2, 3, and 4 respectively. Those items also produced standard deviation values of 2.04, 1.78, 1.26, and 1.85 respectively. All these items means were above the criterion mean, so all were agreed on.

According to data obtained from NPA annual reports, Onne seaport's berth occupancy rates for the years of 2013, 2014, 2015, 2016 and 2017 as displayed in the above table are 30.7%, 37.20%, 40.86%, 32.64% and 18.40% respectively.

Table 10: Analysis of availability of cargo storage area at Onne Seaport

		Operators						Clearing Agents					
S/N	Item	N	Min	Max	**Mean**	**S.D.**	**Resolve**	N	Min	Max	**Mean**	**S.D.**	**Resolve**
1	There is a widen stacking area or warehouse for cargo at Onne port terminals	84	1	4	3.51	1.81	Accept	82	1	4	3.61	2.04	Accept
2	There is an adequate provision of tank farms to accommodate any quantity of liquid cargo at Onne port.	84	1	4	3.60	1.07	Accept	82	1	4	3.52	1.78	Accept

3	Onne port is not congested with abandon cargoes.	84	1	4			Accept	82	1	4			Accept	
					3.48	0.71					3.65	1.26		
4	Cargo size and volume does not affect the port warehouse.	84	1	4			Accept	82	1	4			Accept	
					3.69	1.47					3.56	1.85		

Table 11: Berth Occupancy rate for Onne Seaport from 2013-2017 (16 Berths available)

Year	Berth Occupancy rate (%)
2017	18.40
2016	32.64
2015	40.86
2014	37.20
2013	30.7

Source: NPA, 2019

Effect of truck turnaround time on ship turnaround time

In the response culled from the respondents who are operators at Onne seaport on the truck turnaround time at the seaport; items 1,2,3 and 4 produced the response means of 3.42, 3.67, 3.68 and 3.31 while the items standard deviations are 1.55, 1.45, 2.68 and 1.26 respectively. These returned mean values are above the criterion mean value of 2.5; therefore all the items are accepted. Furthermore, clearing agents at Onne seaport responded on the truck turnaround time and the mean values of 0.43, 0.57, 0.43 and 0.64 were obtained for items 1, 2, 3, and 4 respectively. Those items also produced standard deviation values of 0.60, 0.94, 0.60 and 0.34 respectively. All these means of the items were above the criterion mean of 2.5, and thus, all were agreed on. According to data obtained from NPA annual reports, Onne seaport's ship turnaround time for the years of 2013, 2014, 2015, 2016 and 2017 as displayed in Table 12 are 2.60 days, 2.70 days, 2.59 days, 2.39 days and 2.47 days respectively. With this analysis, the turnaround time in Onne Seaport was higher than the official 2.40 days except in 2016.

Table 12: Analysis of truck turnaround time at Onne Seaport

S/N	Item	Operators						Clearing Agents					
		N	Min	Max	Mean	S.D.	Resolve	N	Min	Max	Mean	S.D.	Resolve
1	There are sufficient trucks available to handle any volume of discharge cargo at Onne port.	84	1	4	3.42	1.55	Accept	82	1	4	3.43	0.60	Accept
2	The truck drivers are monitored with the use of Intelligent Transport System (ITS) to increase their service time and transport corridors.	84	1	4	3.67	1.45	Accept	82	1	4	3.57	0.94	Accept
3	There is an increase in the Onne port road network for truck turnaround time.	84	1	4	3.68	2.68	Accept	82	1	4	3.43	0.60	Accept
4	There is a good road network to make the truck turnaround time faster.	84	1	4	3.31	1.26	Accept	82	1	4	3.64	0.34	Accept

Table 13: Ship Turnaround Time for Onne Seaport from 2013-2017 (Official turnaround time 2.40 days)

Year	Number of ships completed	Ship turnaround time (days)
2017	684	2.47
2016	663	2.39
2015	704	2.59
2014	862	2.70
2013	826	2.60

Improvement of Ship Traffic Rate by Free Storage Period

Table 14 reveals the calculated means and standard deviations of Operators at Onne seaport on the issue of free storage period usability. Items 1, 2, 3, and 4 produced means of 0.45, 0.49, 0.67 and 0.40 with standard deviation values of 0.65, 0.73, 0.50 and 0.47 respectively. All these items means were above the criterion mean, meaning that all were agreed on. Similarly, the calculated means and standard deviations of clearing agents at Onne seaport on the issue of free storage period usability at the seaport. Items 1, 2, 3, and 4 produced means of 3.39, 3.37, 3.65 and 3.57 with standard deviation values of 1.35, 2.37, 2.31 and 1.95 respectively. All these items means were above the criterion mean, so all were agreed on. According to data obtained from NPA annual reports shown in Table 15, Onne seaport's ship traffic for the years of 2013, 2014, 2015, 2016 and 2017 as displayed in the above table are 826, 862, 704, 663 and 684 respectively.

Table 14: Analysis of Free storage period usability at Onne Seaport

S/N	Item	Operators						Clearing Agents					
		N	Min	Max	Mean	SD	Resolve	N	Min	Max	Mean	SD	Resolve
1	There is a government interventions processes in eradicating the use of cargo storage yard to shippers warehouse deliberately.	84	1	4	3.45	1.65	Accept	82	1	4	3.39	1.35	Accept
2	The free storage period is not regulated by the terminal operators.	84	1	4	3.49	0.73	Accept	82	1	4	3.37	2.37	Accept
3	Cargo abandonment is not cause by the free storage period at Onne seaport.	84	1	4	3.67	0.50	Accept	82	1	4	3.65	2.31	Accept
4	The final price of products at the Rivers State location market is not from the effects of free storage period.	84	1	4	3.40	0.47	Accept	82	1	4	3.57	1.95	Accept

Table 15: Ship Traffic Rate at Onne Seaport from 2013-2017

Year	Number of ships completed
2017	684
2016	663
2015	704
2014	862
2013	826

NPA, 2019

Relationships between Cargo Throughput and Cargo Handling Equipment; Documentation Procedures and Cargo Dwell Time; and Truck Turnaround time and Ship Turnaround Time

Table 16 shows the correlations between cargo throughput and cargo handling equipment; documentation procedures and cargo dwell time; and truck turnaround time and ship turnaround time and the level of significance was determined at $p<0.05$.

A significant relationship was revealed to exist between cargo handling equipment and cargo throughput ($r=0.87$; $9<0.05$). Similarly, the documentation procedures positively and significantly correlated with cargo dwell time ($r=0.72$; $p<0.05$) while a significant relationship existed between truck turnaround time and ship turnaround time ($r=0.057$; $p<0.05$).

Table 16: Correlations

		Cargo handling Equipment
Cargo Throughput	Spearman's Rank Correlation	0.874
	Sig. (2-tailed)	0.01
	N	5
		Cargo dwell time
Documentation procedures	Spearman's Rank Correlation	0.716
	Sig. (2-tailed)	0.03
	N	4
		Ship turnaround time
Truck turnaround time	Spearman's Rank Correlation	0.569
	Sig. (2-tailed)	0.03
	N	5

Discussion of Findings

Findings showed that both operators and clearing agents affirmed that the availability of adequate, efficient and functional handling equipments tailored to handle different classes of cargo (general, dry bulk, liquid bulk & containerized) attributes to the port having an impressive cargo throughput for the years under review. They also confirmed that Onne port have adequate manpower when it comes to operators that handles these equipments and these workers are regularly trained on modern equipments which enables them to handle these equipments efficiently. Checking Onne cargo throughput for the years under review, it can noted that the port's throughput seems to be peak in 2014, declined afterwards but steadily surged in 2017. The sudden surge might be caused by an improved cargo handling equipment and the improved training received by the operators of the equipment recently.

When determining how documentations affects cargo dwell time at Onne Port, the operators and clearing agents confirmed that at Onne seaport, clearing procedures are done electronically, all the agencies of government present at the seaport work on a 24 hour shift every day. Also usual government bureaucracy that characterizes other Nigerian ports is not present at the Onne port, they also attest to the presence of functional scanners to aid the fast checking of cargo. Findings revealed the presence of scanners for effective documentations. This is similar to the findings of Godfrey (2018) that availability of fast containers scanning facilities help to improve cargo dwelling time at Nigeria ports. All these procedures help in reducing documentations cargo has to go through to be cleared at the port. The reduced and electronic documentation procedures invariably help reduce the cargo dwell time at all the port terminals. When asked what affect cargo dwell time at the port, both group affirmed that increased number of documentation does add to cargo dwell time. Although they also pointed out other factors that delays cargo at the port, our main concern is documentation. An analysis of each of the terminals cargo dwell time reveals that Brawal terminal has 10.5 days with Intels, WACT and Bonny terminal having 15, 16.31 and 12 days respectively. These figures are within the global acceptable standard of cargo dwell time in an efficient port.

To understand the influence of adequate cargo storage areas in improving ship berth occupancy rate at the Onne port; the clearing and forwarding agents and operators affirmed the presence of adequate wide stacking areas at the port terminals. They also stated that the warehouses which they say are not congested are big enough to store any volume and size of cargo brought into them. The availability of adequate tank farms for the storage of any quantity of liquid cargo was also confirmed by the respondents. The presence of facilities has definitely attracts more ships to Onne port which is seen in the high berth occupancy rate.

Truck turnaround time and how it affects ship turnaround time at Onne port is what research question four seeks to answer. From the analysis, it was revealed that there are enough trucks available for any volume of cargo discharge at the Onne port. These trucks have competent and qualified drivers; these drivers are monitored through a system called intelligent transport system which enables the port authority to monitor their service time. Onne seaport also posses good and motorable road network which aids the truck turnaround time. The respondents affirmed that the availability of good road network helps in improving truck turnaround time. An analysis of the data obtained from NPA reveals that Onne seaport ship turnaround time quite impressive, from 2014 to 2017, the port ship turnaround time dropped from 2.60 days to 2.47 days. This reveals a significant drop in ship turnaround time at Onne port. This impressive figure can be traced to a drop in truck turnaround time facilitated by improved road network, increased fleet size and highly qualified truck drivers.

The quest to understand if free storage period at Onne seaport is helping to improve ship traffic rate gave an indication that the clearing agents and operators believed that Onne port free storage period is not regulated by the terminal operators, government determines how long a cargo can stay at the warehouse before being charged for demurrage. This act prevents the shippers from leaving their cargo indefinitely at the warehouse as government usually updates the port's free storage period based on demand for space rather than operator's discretion. This measure tends to encourage shippers to berth their ship at Onne port. This position agrees with the findings of UNTAD (2008) and Beuran et al, (2012) which states that good policies on free storage period creates investment opportunities for terminals to reach high cargo capacity limit through high ship traffic rate. It also affirms Jean-François (2010)'s notion that charge rates from port terminals determine the destination of ships by cargo owners.

Conclusions and Recommendations

Based on the finding as revealed by the study, availability of adequate, efficient and functional handling equipments tailored to handle different classes of cargo (general, dry bulk, liquid bulk & containerized) proves the cargo throughput of ports. Furthermore, modern handling equipment operated by highly trained and experienced workers also contributes to an improved port throughput. It was also discovered that a small number of documentation procedures done electronically tends to reduce government bureaucracy at port which always leads to an impressive cargo dwell time at the port. Ports with adequate storage facilities will always have a high berth occupancy percentage as the presence of the storage facilities will attract more ships to the port. Availability of good road network and presence of competent and qualified drivers who are monitored through an intelligent transport system helps to reduce truck turnaround time at ports which usually lead to a low ship turnaround time. Moreso, the port terminal management should provide the necessary cargo handling equipment to help in maximizing the speed in cargo clearing processes, so that the will be no congested cargo traffic at Onne seaports; and the government should mandate the ports authority to develop programs that will cargo handling operators to have the in-depth knowledge of new cargo handling equipment and other technologies use in fast cargo clearance. Finally, port workers should be motivated to work 24 hours as stipulated by the (IMO), to enable Onne port remain competitive in reduction of cargo dwelling time.

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