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Port operation's efficiency and revenue generation in global maritime trade: implications for national growth and development in Nigeria

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Abstract

Purpose – It has been argued that a mono product economy experiences epileptic growth because it is prone to global dynamics such as epidemic. Therefore, the need to diversify investments cannot be over-emphasized. Hence, the study examined port operation's efficiency and revenue generation in global maritime trade: implications for national growth and development in Nigeria. The objectives of the study are to identify the factors that improve efficiency in port operations, and to ascertain how efficiency of operations will affect revenue generation and national growth.

Design/methodology/approach – The study employed correlation and multiple regressions analyses to test the hypothesis which states that port operation's efficiency does not have positive and significant effect on revenue generation in Nigeria. A cross sectional research design and structured questionnaires were deployed in the study and simple random sampling technique was used to select the sample size of 200 respondents.

Findings – Results revealed that efficient port operations affect revenue generation and national development.

Research limitations/implications – Port operations in Nigeria are bedeviled with daunting challenges that hamper smooth and efficient working port's system.

Originality/value – The study suggested that modern port's technologies (ICTs) be deployed to enhance operations in the ports and manpower should be trained on regular intervals to understand modern logistics management techniques in the ports. Third, government should provide port infrastructures being the backbone of efficient port system. Lastly, the private sector should be partnered with in several areas including port's concession to facilitate effective and efficient service delivery in the Nigerian ports.

Keywords Port operation efficiency, Revenue generation, National growth, Development, Nigeria

Paper type Research paper

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1. Introduction

Modern organizations across the world are developing strategies to attain the level of corporate efficiency to enhance efficient service delivery and maintain wide range loyal and wide range of customers due to intimidating competitors. That is a deliberate paradigm shift or graduation from individual worker's efficiency. Corporate efficiency is therefore, a combination of worker's efficiency (Edih *et al.*, 2022c), machine or infrastructural efficiency and maybe policy, or managerial efficiency. Sanchez *et al.* (2003) opined that port's efficiency is a relevant determinant of a country's competitiveness in the global maritime trade usually influenced by public policy. Efficiency in this context means effective service delivery to customers with the available resources (technologies, manpower, information, etc.). Efficiency is therefore dependent on several factors such as specialized manpower, information and communication technologies and specific infrastructures, etc. In that vein, efficiency would be lacking in an organization where the required resources, technical and otherwise are not available. The resultant effect will be gross inefficiency, poor performance and loss of revenues (Edih *et al.*, 2022a).

Ports have been described as gateway to international trade which provide vast investment opportunities for maritime nations (Osadume and University, 2020; Omoke *et al.*, 2019). The world would have been at standstill position without international trade. Trade logistics is a crucial aspect of transportation and storage of resources, components, inventories, information flow across companies and marketing channels (Jayathilaka *et al.*, 2022). Efficiency of port operations is central to GDP growth by generating revenues and providing investment portfolios for both government and the private sector. Gross domestic product, GDP is a significant measurement of economic well-being of countries in the world and efficient logistics performance affect the GDP of maritime nations (Raji *et al.*, 2021).

Investment in maritime transportation specifically in ports is an atom of economic diversification since a monolithic economy is vulnerable to global dynamics, volatility and shocks (Osadume and Edih, 2020). It has been shown that effective diversification is a foundation for growth and prosperity of nations, developed and emerging economies. Imbs and Wacziarg (2003) suggest that for a country with abundant natural resources (such as Nigeria) to experience long term sustainable development, it must first and foremost embark on a broad based economic development or diversification blue-print. Economic diversification energizes competitiveness, productivity and favorable terms of trade. In essence, diversification is the shift to varied forms of production, structures, introduction of new or expansion of pre-existing products towards producing quality products and services (IMF, 2014). Diversification could be achieved by encouraging large scale industrialization of the non-oil sector, deepening required technologies in every trade including port operations and diverse investments and agricultural development (Esu and Udonwa, 2015).

Ports, being a component of the identified investment portfolios create opportunities for employment and income generation in an economy (Edih *et al.*, 2022c; Osadume and University, 2020; Omoke *et al.*, 2019). Investment portfolios are offshoot of economic diversification plan and port operations are major areas to focus in modern economics as veritable possibilities in the non-oil or real sector of an economy. International freight has been observed to have impacted on trade as well as exchange rate and custom tariffs. A reduction in transport costs stimulates exports and imports. Estimates from econometric studies showed that doubling the transport costs of a country had caused a dramatic drop in trade by 80%. Transport costs resulted to a decrease in foreign investment, saving ratio, decline in employment, etc. (Sanchez *et al.*, 2003).

The shipping industry carries out a combination of activities but not limited to the following; transport of goods by Sea (containerized and non-containerized), transport of persons (on ferries and cruise ships), services and offshore support vessels (ships laying, or repairing, undersea cables and pipelines, prospecting for oil, conducting oceanographic research, diving assistance, undertaking undersea work, servicing offshore wind farms, oil

and gas platforms), towage and dredging at sea, etc. (Andrew, 2016). Shipping is a vital facilitator of world trade and records have demonstrated that real-terms increase in world GDP in the last 2 decades was 70%. Increase in world seaborne trade over the same period was 112% and the value of EU's trade with the rest of the world in 2015 was €3.5 tn and IMO estimated 90% value of world trade is seaborne (Andrew, 2016).

In Syriopoulos *et al.* (2016), it was demonstrated that shipping markets experienced growth boom due to robust freight rates, however, with sharp swings. This signal pushed demand for shipping stock upward and shipping companies switched towards the international capital markets to secure finance for their investment's plans. In similar vein, Mohanty *et al.* (2021) opined that freight charges are indices use to measure the component of word-wide real activities driving demand for industrial commodities in the global market. A positive correlation between freight rate and economic progress has been identified. Likewise, international shipping industry is seen to be the lifeblood of global economy because majority of raw materials, semi-finished products and finished goods are transported around the globe by ships (Alexandridis *et al.*, 2018).

Jung (2011) observes that ocean is the international route which provides massive transport services at low cost. Accordingly, 75% of total trade was transported by Sea in 2008 and seaborne trade is supported by port operation's system. Global drivers such as industrial expansion has significantly impacted on port operations and supply chain in international trade (Ziaul and Hans-Joachim, 2018). Growth in merchandise trade volume across the globe has shown positive effect on port operations and Gross Domestic Product, GDP of maritime countries (UNCTAD, 2015). Port operations are dependent on its infrastructures and manpower because both have influence on logistics performance (Ziau and Hans-Joachim, 2018). Logistics costs and supply chain reliability and predictability of cargo carriers are imperatives considered by exporters and importers (Arvis *et al.*, 2010; Ziaul and Hans-Joachim, 2018).

Nigeria's real GDP has declined by N63.49 bn quarter-on-quarter in 2022 according to National Bureau of Statistics. As a result, twenty-eight sectors are experiencing decline in the second quarter of 2022. According, Associate Professor of Economics, at Pan Atlantic University, Olalekan Aworinde, real GDP is the true reflection of the economic status of any country while nominal GDP represents the market value of goods and services produced at a particular period. Real GDP, therefore, is the nominal GDP indexed with inflation. The shrinking economic status could be attributable to prevailing macro-economic shocks (aftermath of Covid-19 epidemic) and many businesses are struggling to cope with the numerous challenges and shocks (www.reubenabati.com.ng, Tuesday August 30, 2022).

Port operations generate foreign exchange to the GDP of Nigeria in forms of ship repairs (Niger Dock), levies, taxes, port fees and charges (Ikpechukwu *et al.*, 2020). But, the Nigerian economy is confronted with multiple burdens such as huge debts (foreign and domestic debts), structural imbalance, global economic uncertainties, political upheavals, burden of corruption, farmers-herdsmen violence, insurgency (Boko Haram invasion), etc. leading to a decline in production of goods and services. Hence, the need for effective economic diversification and efficient management of such identified investment portfolios cannot be overemphasized now. Sanchez *et al.* (2003) had emphasized that port efficiency factors are easily observable in any port's terminal. Factors such as container hourly rate, annual average of container loaded per vessel and waiting time were considered in that study.

However, in the study, emphasis is laid on the following areas;

(1) Worker's efficiency in delivery of daily tasks, via training and welfare to spur motivation.

(2) Infrastructural efficiency with respect to the required port infrastructures that form port operations networks, e.g. terminal and dock yard construction, warehouse, maritime railways and road networks, cargo handling equipment, ships, etc.

(3) Technological efficiency which emphasizes the use of ICT in management of data, processing information on port operations, cargoes, loading and offloading, in warehouse, computation of revenues generated on daily basis, revenue net, lay time and possible demurrage calculation, daily incidents, challenges, etc. Through ICTs, revenue chart like the Gant chart can be developed to display sales, production records at a stretch on daily, weekly and monthly periods.

The null hypothesis considered in the study read thus;

H1. Port operation's efficiency does not have positive and significant effect on revenue generation and economic growth.

It is on this basis that the study used primary data generated through structured questionnaires distributed to staff of the selected ports in Nigeria and data were analyzed using multiple regressions method. It is the authors candid optimism that the suggestions proffered at the end of the study would guide government and private organizations in making relevant decisions on maritime investments.

2. Literature review

2.1 Conceptual

2.1.1 Efficiency. The concept of efficiency, or operational efficiency is hard to be defined but better explained based on its composite nature. It represents factors, ingredients, human, technical and otherwise that enhance competitive advantage or core competence of an organization. Competitive advantage or core competence is a determinant factor for effective and efficient service delivery (Ogbor, 2019). There is that thin difference between efficiency and effectiveness of resource use in an industry. However, both are geared towards achieving qualitative performance and standardized targets for the organization. Understanding the competitive position of a company is crucial in improving its efficiency (Oritsede *et al*., 2020). It is trite to state that competitive strategies, logistics performance, logistics marketing, or marketing mix strategies, operating strategies and structure of the organization are modeled in line with the set mission and vision, values, objectives and goals of the hypothetical maritime organization.

On a broader approach or look, corporate efficiency can best be attained by carrying out dedicated studies to evaluate the strength, weakness, opportunities and threats, popularly known acronym as SWOT Analysis with detailed information about the surrounding business environment, megatrends and foreseeable possibilities and developments. Such rigorous study will determine policy formulation strategies, just in case or just in time or the supply chain models to meet up with favorable demands for products or services and/or otherwise.

Therefore, efficiency is the utilization of a combination of inputs such as, human resource, modern technologies, partnerships, etc. that are required in the right proportion for the execution of policies, projects and programs timeously according to core mandate of the organization. Corporate efficiency could well be defined as dependent on policy of top and middle management levels because efficiency is a product of decision/(s) plan and control, supervision, deployment of manpower, technical support systems and other necessary apparatus. Port operations efficiency in this context may not be different from qualitative logistics performance and measurements. The author may be bold to advocate an improved public private partnership (PPP) in the Nigerian port system for effective and efficient service delivery. Raji *et al*. (2021) considered efficiency from the perspective of cost efficiency. Generally, efficiency is enhanced by increasing cost efficiency via reduction of wastages in resource utilization.

2.1.2 Port operations. These are several and encompassing operations and activities taking place in the maritime industry. It could well be canvassed that port operations is synonymous with the maritime industry. There can be no industry called maritime industry or sector without the existence of ports or port operations. Maritime industry being a sub-division of the mother sector called the transportation sector of the global economy includes but not restricted to the following, freight forwarders and custom brokers, stevedoring companies, labor unions, Chandlers, warehouse, ship building and repairs, importers and exporters, brokerage services, construction, manufacturing, acquiring, operating, supplying, ship yards, dry docks, marine railways and marine pilot association (Lawsl-Fagbo, 2018; Raji *et al.*, 2021).

The maritime industry account for nearly 90% of global trade and seaborne trade constitute about 60% of the total gross domestic product GDP of 16 West African Countries including Nigeria (Raji *et al.*, 2021). It has been seen that ports serve as major catalyst to socio-economic growth and development as well as improved competitiveness in a dynamic global economy (Fintell, 2014; Raji *et al.*, 2021; Osadume and University, 2020).

2.1.3 Revenue generation. Economic growth and development are largely determined by the amount of monetary wealth in an economy. It does not connote that human resource and technological advancement are not important but buttressing the central role played by the money capital in establishing investments and employing expatriates and the required technology or infrastructure (Jhinghan, 2008).This is one of the reasons why developed or emerging economies are borrowing from World Bank, IMF and other donors. It is trite to assert that, when countries borrow for productive investments that generate revenues to pay back the loan is welcomed but borrowing to settle recurrent expenditures and consumption is a wrong channel or physical policy that is disastrous to economic wellbeing such country (Osadume *et al.*, 2022). A consuming nation will remain a pauper economy because there are no measures to enhance the real sector for productivity and export.

Revenue generation is key to establishing productive investments and further diversification of the economy. The ports system is an investment portfolios in the maritime world. The amount of revenue to be generated from the operations in the ports is directly proportional to the availability of specialized, trained manpower, infrastructure and effective management system (Ziaul and Hand-Joachim, 2018). A porous management system tainted with bureaucratic bottlenecks, corruption and corrupt public officers will do the country no good. In Nigeria, corruption has been the monster hampering nation building in all its ramifications (Edih, 2020). More so, unaddressed problems bedeviling the smooth and optimal ports operations will negatively affect revenue generation in the Nigerian. Several challenges such as lack of ports infrastructure, political interference, failure to adhere to regulations, corruption, poor participation of the private sector are inhibitors to effective and efficient operations in the Nigerian ports (Edih *et al.*, 2022b).

2.2 Empirical studies

Edih *et al.* (2022c) showed that referral recruitment improves worker's efficiency which in turn leads to higher level of productivity and overall performance of the organization. In that study multiple regressions technique was employed to analyze the primary data generated through structured questionnaires. The need to focus on improving worker's efficiency by Nigeria Ports Authority was recommended.

Raji *et al.*, (2021) examined maritime logistics factors on Nigeria Gross Domestic Product, GDP in terms of vessel movement and cargo throughput. Expo-facto research design was used in the study and results revealed that Nigeria GDP had positive but weak relationship between bulk cargo ($r = 0.16$) and cargo throughput ($r = 0.29$) costs, and inversely related to container vessel ($r = 0.33$) and roro vessel ($r = 0.13$) costs. Their combined contribution to

GDP growth amounted to 29.1%. In order to increase cost efficiency, government is advised to augment cargo handling infrastructure at the seaports.

In Mohanty *et al.* (2021), the impact of macro-economic risk factors on shipping stock returns was examined using a quantile regression QR model. It was found that the sensitivity of stock returns to risk factors differ across quantile and shipping segments. There is a confirmation of asymmetric and heterogeneous dependence between stock returns and certain macro-economic risk variables. However, the study suggested that the standard OLS regression was inadequate to reveal the risk-return relationship.

Ikpechukwu *et al.* (2020) conducted a study on appraisal of shipping trade influence on economic growth in Nigeria and adopted co-integration regressions method to analyze the variables; shipping trade, external reserves and external debts. It was observed that there was statistically significant relationship between GDP and external reserves with p-value 0.019; shipping trade with p-value 0.000. Shipping trade and external reserves contribution to GDP were at 1 and 5% levels of significance respectively while external debts showed a negative impact on the GDP at 5% level of significance with a long run variance of co-integration regressions. It was suggested that government should upgrade port facilities and encourage exportable goods.

Osadume and University (2020) carried out a study on port revenue performance and economic growth which hinged on Neoclassical Growth Theory. It employed Ordinary Least Square Regression and Engle-Granger Co-integration to analyze the secondary time series data used for study. Results indicated that total revenue to gross registered tonnage had impact on economic growth.

Akram (n.d.) contend that economic diversification is a channel that accelerates economic growth and productivity which in turn improves the GDP in the manufacturing and service sectors. It suggested a deliberate improvement in infrastructures and virile institutions that will stimulate efficient management of Investments portfolios arising from diversification. According to Esu and Udonwa (2015), there is need to encourage industrialization by investing in non-oil real) sector.

Syriopoulos *et al.* (2016) examined dynamic management of shipping stock portfolios and employed alternative dynamic volatility models to estimate the risks and returns characteristics of selected sample of shipping stocks. The objective was to assess stock volatility as a critical element to efficient asset allocation, dynamic portfolios management and firm valuation. It was found that shipping stock returns are highly volatile in Tanker and Dry bulk earnings. Though, shipping stocks attract high profile returns but are associated higher risk level.

In Sanchez *et al.* (2003), the determinants of waterborne transport cost with particular reference to efficiency at port level was examined. Principal Component Analysis was used to assess the different port efficiency measures. It was shown that specified variables in the model explain a great proportion of changes in waterborne transport costs. It also revealed the relevance of port efficiency to country's competitiveness in the global maritime business. The study recommended that public policy direction is key to port efficiency.

2.3 Theoretical framework

2.3.1 Operations management theory. It entails a set of practices use by organizations to increase efficiency in production and service delivery to customers. The act of controlling the process of production and operations in business enterprises in an efficiently planned manner refers to operations management. Organizations or firms are said to be operating efficiently, where they use the least amount of resources needed to meet customer's demands at the highest possible standard. Operations Management also involves managing the process of

transforming raw materials, labor, energy and technologies into goods and services. To attain success in operations management, people skills, creativity and rational analysis and technological knowledge must be appropriately harnessed by management and/or managers (Mcclay and Li, 2021).

Accordingly, Fedrick Taylor developed the principles of Scientific Operations Management in 1911 (www.investopedia.com). These principles are majorly four, namely;

(1) Developing a true science of management

(2) Scientific selection of an effective and efficient employees

(3) Education and development of workers

(4) Intimate cooperation between management and staff.

Likewise, Modern operations management thinkers around four theories such as,

(1) Business Process Redesign (BPR)

(2) Reconfigurable manufacturing systems

(3) Six sigma

(4) Lean manufacturing

The goal of BPR is to restructure and redesign the business process and procedures from the starting point while reconfigurable manufacturing systems represent production system incorporated to accelerate structural changes, hardwares and softwares components. This is to enhance flexibility in adapting to required production capacity, and efficiently respond to intrinsic system changes and market dynamics.

The six sigma focuses on quality products and services. The term 'six' exemplifies control limits arrange at six standards deviations from the normal distribution mean. An initiative of Jack Welch of General Electric in 1995.

Lastly, Lean manufacturing strategy is the systematic procedure for eliminating waste in a manufacturing process. This theory is focused on resource use but not at the expense of value creation to customer's needs (Mcclay and Li, 2021).

Every management theory in modern times ought to seek to accomplish goals congruence in organizational development. The principal elements or goals should accommodate resource use element, quality of products and services, an enhanced welfare scheme to motivate workers and value creation to satisfy customer's requirements. It is believed that the congruence of these composite factors will enrich operational efficiency, corporate efficiency and improve sales volume leading to increase in Revenue generation for the organization.

3. Materials and methods

3.1 Materials

The study distributed a set of questionnaires to staff of selected ports in Nigeria. The ports selected based on simple random sampling techniques, are Lagos Port Complex, Warri Port and Port Harcourt Old Port.

3.2 Methods

The primary data generated were analyzed using correlation and multiple regressions methods. A sample of 200 staff were administered questionnaires by applying Taro Yamane formula for sample size determination for finite population.

3.3 Model specification

The general multiple regressions model is as follows;

$$Y = a + B_1X_1 + B_2X_2 + \ldots + B_nX_n + et \quad (1)$$

Vincent *et al.*, 2010)

Y is dependent variable

a is constant term

B_1 B_n are coefficients

X_1 X_n is the independent variables

et is error terms due to stochastic disturbance

Based on the above, the applicable modified model for the study is

$$PtEff = a + B_1(Weff) + B_2(Infeff) + B_3(Teff) + et \quad (2)$$

PtEff is port operation's efficiency as the dependent variable

Weff is worker's efficiency due to training, practice and welfare

Infeff is infrastructural efficiency as a result of public and private sector interventions in port construction, terminal, warehouse, networks of roads to and fro ports, railways to the ports (standard Port's facilities).

Teff is Technological efficiency based on government and private sector participation in providing ICTs gadgets/facilities/ICTs specialists

3.4 A priori expectation

The combined efficiencies from worker's efficiency, infrastructural efficiency and Technological efficiency will positively enhance revenue generation in port operations which in turn will improve national growth and development.

4. Results and discussion

Stated as follows are the results and discussion arising from the correlation and multiple regressions analyses on primary data generated through structured questionnaires distributed to 200 staff of the selected ports in Nigeria.

4.1 Results

Results from Table 1 showed a positive correlation among the variables used for study. Worker's efficiency (Weff) revealed a positive relationship with infrastructural efficiency

	Weff	Infeff	ICTseff	Rgdp
Weff	1.000			
Infeff	0.4575**	1.000		
ICTeff	0.5372**	0.4261**	1.000	
RgGDP	0.5119**	0.6242**	0.4444	1.000

Note(s): **correlation is significant at o-level [2-tailed]
Source(s): Computed by authors

Table 1.
Correlation analysis of sub variables

(infeff), ICTs efficiency (ICTseff) and revenue generation and GDP growth (RgGDP) at ($r = 0.4575, 0.5872, 0.5119, p < 0.01$). In this same vein, other variables indicated a positive and significant correlation with revenue generation and GDP growth at ($r = 0.6242, 0.4{,}444, p < 0.01$).

4.2 Discussion

The objectives of the study are, to identify the ingredients or factors that would enhance port operations, to evaluate how efficient port operations affect revenue generation and how revenue generated will lead to national growth and development.

Results from Table 2 revealed that worker's efficiency proxy with (regular training and enhanced welfare scheme) had a positive and significant effect on port operation's efficiency statistically at ($B = 0.72$; $p = 0.000$). This is a clear indication that a unit improvement in training and welfare will cause 0.72 unit of corresponding improvement in port operation's efficiency and revenue generation. This finding support the submission that employee's efficiency, knowledge of work and productive skills are improved by training and improved working conditions (Edih *et al.*, 2022c). Klovland (2002 as cited in Mohanty, 2021) observed a positive correlation between ocean freight rates and economic activities and in UNCTAD (2015), sea carriage and port operation growth of maritime nations affect their GDPs.

It was also observed that infrastructural efficiency proxy with standard port facilities (ships, terminals, warehouse, road networks, railways) had a positive and significant effect on port operation's efficiency and revenue generation and GDP growth statistically at ($B = 0.61$, $p = 0.000$). This results explains that a unit change in the provision of port infrastructures will lead to 0.61 improvement in port operations efficient and expeditious delivery of service to customers. The study of (Akram, n.d) stated that port infrastructures are drivers of efficient port operations and GDP growth. Also, Mohanty *et al.* (2021) emphasized that international shipping industry is the life wire of the global economy fostered by specialized ships operating in freight market for tankers, container carriers and bulk carriers. According to Ikpechukwu *et al.* (2020), the relevance of standard port's facilities to efficient operations and quality service delivery cannot be over stressed. Therefore, there is need to fill such gap in Nigerian port's system.

In similar circumstance, Table 2 demonstrated that ICTs efficiency proxy with (ICTs gadgets and ICTs specialists) showed a positive and significant relationship with port operation's efficiency, revenue generation and GDP growth statistically at ($B = 0.595$, $p = 0.000$). The statistical result exemplify that a unit change in ICTs knowledge and proficiency will definitely result to 0.60 unit improvement in ICT proficiency, port operations, reduction of wastages (blocking loopholes, corruption) and increases revenue generation.

coefficient[a]

Model		Unstandardized coefficient β	Unstandardized coefficient Std error	Standardized coefficient Beta	t	Sig
1	[constant]	0.407	0.505		78.798	0.428
Weff		0.701	0.039	0.720	7.885	0.000
Infeff		0.605	0.039	0.610	15.426	0.000
ICTseff		0.584	0.101	0.595	14.012	0.000

Note(s): a. predictors; weff, ineff, icteff
Source(s): Table by authors

Table 2.
Multiple regression co-efficient[a]

Sanchez *et al.* (2003) opined that increase in cost efficiency is a booster for revenue generation and GDP growth.

Table 3 results explain the *p*-value for the F-statistics (0.000) is less than 0.05 which demonstrates that at least one of the independent variables (training, welfare scheme, road networks, standard port facilities, ICTs gadgets, ICTs gurus) are significant predictors of the dependent variables (revenue generation and economy growth). While Table 4 is the summary model of both independent (predictors) and dependent variables. The results indicate the extent the predictors affected the dependent variables. The R square value of 84.1% is strong indication that 0.841 unit change in revenue generation and GDP growth was brought about the identified efficiencies such as worker's efficiency, infrastructural efficiency and ICTs efficiency. Therefore, the remaining 15.9% may be due to other factors or efficiencies not considered in the study (Management, control, supervisory efficiencies). The Durbin Watson value is a statistical measure used to ascertain autocorrelation between tested variables. A statistical figure within the range is free from the effect of autocorrelation. Hence, the variables tested are free from autocorrelation since the Durbin Watson value is 2.041.

4.3 Implications from the study

The study implies the following positive-negative possibilities;

(1) Efficient or optimal port operations are catalyst for economic growth and development (Edih *et al.*, 2022a; Raji *et al.*, 2021; Omoke *et al.*, 2019)

(2) Efficient port operations will boost revenue generation and GDP growth (Osadume *et al.*, 2022; Raji *et al.*, 2021)

(3) Inefficient operations in the ports are tantamount to poor performance, loss of revenue, loss of investment opportunities and widens the unemployment gap (Edih *et al.*, 2022a).

(4) Therefore, factors such as lack of regular training of staff, infrastructural dearth and poor technologies, corruption, bureaucratic bottlenecks, stringent concession arrangements, etc. must be addressed by the government in partnership with the private sector (Edih *et al.*, 2022b).

(5) Failure to resolve these teething challenges to efficient port operations will further frustrate the intended economic diversification vision of the Nigerian economy.

Model		Sum of squares	Df	Man square	f	Sig
1	Regression	1270.567	6	207.74 544	370.915	0.000[b]
	Residual	228.064	419			
	Total	1438.631	425			

Note(s): "b" refers to the independent variable "port operations efficiency"
Source(s): Table by authors

Table 3.
ANOVA

Model	R	R Square	Adj.R square	Std error estimate	Durbin waston
1	0.917[a]	0.841	839	0.738	2.04

Note(s): SPSS version 22, output on field data, 2022. "b" in Table 4 represents the dependent variable - port operation's efficiency, "a" refers to the predictors (weff, ineff, icteff) of port operations efficiency
Source(s): Table by authors

Table 4.
Model summary[b]

5. Conclusion

The study examined port operation's efficiency and revenue generation in global maritime trade: implications for national growth and development in Nigeria. A sample size of 200 staff of the three selected ports (Lagos Port Complex, Warri Port, Port Harcourt Old Port) were administered a set of questionnaires. The primary data generated were analyzed using correlation and multiple regressions methods. Based on the results, it was shown that the variables; worker's efficiency, infrastructural efficiency and technological efficiency were positively correlated. Also, revealed was that, the three independent variables (worker's, infrastructures, technological efficiencies) had a positive and significant effect on revenue generation and GDP growth. It is therefore recommended as follows;

(1) Government and private organizations should organize special maritime training on port operations for their employees from time to time. This will help them adapt to dynamics in global maritime trade. It is also advised that, maritime workers be given special welfare package to boost their morale and enthusiasm to stimulate productivity.

(2) There is urgent need and tasks for the government and the private firms to provide maritime infrastructural facilities to enhance effective and efficient operations in the Nigerian ports. It was discovered that quality and efficient service delivery is a yardstick for revenue generation from port operations.

(3) In order to link operations in Nigerian ports to other ports across the world, there is the urgent tasks to install Internet connectivity in the ports. Information and communication technologies are central to global trade in these days of globalization. More so, crews and maritime workers should be conversant with the application of ICTs gadgets as a veritable measure to curtail wastages and corrupt practices.

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