



RESERVE MANAGEMENT POLICY AND OPERATIONAL PERFORMANCE OF PORTS IN RIVERS STATE, NIGERIA

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**RESERVE MANAGEMENT POLICY AND OPERATIONAL PERFORMANCE OF PORTS IN RIVERS STATE, NIGERIA**

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**ABSTRACT**

*The study examined the relationship between reserve management policy and operational performance of ports in Rivers State. The study was conceptualized into two variables: the predictor variable reserve management policy and criterion variable operational performance with berth occupancy, container handling efficiency and throughput. The study tested 3 null hypotheses in order to establish the hypothetical statement that there is no significant relationship between reserve management policy and measures of operational performance. The study population comprised 21 terminal operating firms within the two ports in Rivers State. Census Sampling Technique was adopted and the researcher administered five copies of questionnaire to five top managerial staff of the 21 terminal operating firms within the two ports in Rivers State totalling 105 respondents. After distribution and retrieval of questionnaire, 88 copies were fit and formed respondents for the study. Data were generated from the respondents by the use of a well-structured questionnaire. Pearson's Product Moment Correlation was used to test the hypotheses with the aid of statistical packages for social science version 25.0. The p-values of 0.000 less than 0.05 was used to determine the significance of the hypothesized relationship. The results showed different strength of statistically positive and significant relationships between the reserve management policy and the measures of operational performance Based on the findings; the study concluded that reserve management policy significantly relates with the operational performance of the 21 terminal operating firms within the two ports in Port Harcourt, Rivers State. The study therefore recommended among others that managers within ports in Rivers State should consider the strategic role of reserve management policy in their pursuit of operational performance*

**Keywords:** Reserve Management Policy, Operational Performance, Berth Occupancy, Throughput, Container Handling Efficiency

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## INTRODUCTION

The pace of advancement in the management of port authorities globally has affected the level of performance. Performance is essential for the maintenance and sustainability of the port business considering the level of global competition facing businesses operating within most port terminals. The efficient and effective performance of port managers depends on their job roles and responsibilities and is focused on the ability of their activities in order to capture the value and presence of stakeholders and shareholders in the industry (Stojakovic & Twrdy, 2023). Notteboom, Pallis and Rodrigue (2022) define operational performance as the degree of effectiveness and efficiency of the operations and services provided by a port. According to Sislioglu, Celik, and Ozkaynak, (2018), the actual and effective achievement of operational performance in ports is geared towards the attainment of goals of the organization rather than individual firms doing business or operating within the port premises with a minimum resources consumed to reach port goals. For instance, the Nigeria Port authority is a functional system that is controlled by government and operated by few individuals with an aim of making profits and empowering others in the society. However, the port authority in Nigeria over the years have enjoyed enormous benefits, expansion in infrastructure and manpower development which facilitated the development experienced by the authority but has not enjoyed policy that guides its activities.

Bešković, Twrdy and Bauk, (2019), averred that the neglect of managing port terminals has created certain challenges for the operation of port management such as container handling efficiency, berth occupancy, throughput rate as well as turnaround time, which inversely affects their performance. Understanding that the firms within port complexes are faced with challenges of poor funding, lack of competent and skilful manpower, lack of technological advancement in operating contemporary port activities, government policies in the management of the ports operations requires

effective policy's etc. To leverage on the identified challenge and strike a balance in the operational performance of firms within the port terminals, Scholars suggest that foreign exchange policy such as reserve management policy is need for an adequate and effective operations of businesses in port terminals in achieving performance and gaining relevance since it involves huge foreign currencies in the operations and maintenance of ports globally (Bierwirth, & Meisel, 2015; Dragovic, Tzannatos, & Park, 2017).

Other scholars gave different objectives of the policy's as ranging from maintaining a stable exchange rate, promoting export competitiveness, managing capital flow to accumulating foreign reserves (Devereux & Sutherland, 2010; Chin & Lee, 2016; OCED, 2019). This implies that scholars have tried to study different aspects, mostly the internal factors that individually affect the operational performance of ports and these factors are basically influenced by the decision of the management and board while the external factors are sector wide or country wide factors, which are beyond the control of the company or management such as effect of external reserve management on Nigerian economic growth from 1985 to 2013, the response exchange rate to economic policy uncertainty in Russian and study on cargo throughput for small and medium sized ports with reference to the multi-port system in polish (Akinwunmi, Akanni & Bokola, 2016; Sohag, Gainetdinova & Mariev, 2022; Dariusz & Christian, 2021).

Despite the identified listed empirical works above in attempt of finding the nexus between reserve management policy and operational performance of ports, there is still scarcely evidence and differences identified in methodology, location, findings, study variables and industries utilized in the above listed studies which creates a vacuum in literature especially in the performance of maritime sector in actualizing reserve management policy and operational performance of ports in Rivers State in particular which this present study intends to fill by investigating the empirical relationship between

reserve management policy and operational performance of ports in Rivers State, Nigeria.

## LITERATURE REVIEW

### Theoretical Foundation

The supporting theory for this study was tied to Resource-based view theory, which was initially developed by Edith Penrose in 1959. It averred that eccentric resources and firms abilities are the key sources of performance (Lynch, Keller & Ozment, 2000). This statement appears to be supported by management research as firms are regarded as rational system that are considered by its characteristic and setting competences that are core to strategic purposes. Competences typically involve the development of specialist expertise, and firms may become locked into a route that is difficult to change effectively in a short term (Tushman & Anderson, 2006). Other scholars such as Jay Barney and Birger Wernerfelt advanced this theory in the field of strategic management emphasizing firms' behaviour and competitive strategy (Barney, 1986; Teece, 1988; Teece & Pisano 1994; Mowery, Oxley & Silverman, 1998).

Resource-based view theory argued that eccentric resources and firms abilities are the key sources of performance. The principles of the resource-based view is that successful firms develop distinctive capabilities on which their future competitiveness will be based each been unique to a particular firm, which may also be implied and intangible in nature. According to Barney, (1991), the resource based view theory suggests that firm performance is essentially determined by internal rather than external variables. Firms' follow heterogeneous historical paths and as a result, create different qualifications that affect their capabilities in different ways (Wernerfelt, 1984). Firms are successful in an industry when they can access and reserve diverse types of resources with which they can gain competitive advantages.

In conclusion, this theory leverages the relationship between reserve management policy and port performance, particularly in developing countries.

The resources based viewed theory explains that a firms resources can be a source of sustained competitive advantage if they are valuable, rare, difficult to imitate and difficult to substitute. In the context of ports, this would suggest that ports with unique and valuable resources such as deep water access, state of the art technology or a highly skilled workforce, are likely to perform well and attract business. However, reserve management policy can affect the availability and cost of these resources. For instance, a country with strict reserve management policy control may limit the ability of its port to acquire new equipment or technology or may make it more expensive to do so. In contrast, a country with more flexible reserve management policy may allow ports to access a wider range of resources at a low cost.

### Concepts of Reserve Management Policy

Reserve management policy is defined as the strategies and guidelines taken by central banks or financial institution to manage it foreign exchange reserves (Lee & Luk, 2018). The primary objectives of reserve management policy is to ensure that a country reserves are sufficient to support its currency in the foreign exchange market and to provide a buffer against the external financial shocks. Additionally, reserve management policies are aimed at ensuring the availability of adequate reserves to meet a country's external obligation and to provide a buffer against economic shocks. Traditionally, most central banks over the world has held their reserves to ensure convertibility of their domestic currency is kept at a fixed rate of exchange. This system has continually evolved into one of adjustable pegged exchange rates and then into more flexible exchange rate arrangements. Reserves management policies differs at different central banks, depending upon their level of sophistication and the country-specific circumstances. The FX reserves of developed economies have not been as high as those of emerging market economies (EMEs), given their established access to international markets and an advanced institutional structure.

One important aspect of reserve management policy is the composition of reserves. The international monetary fund (IMF) guidelines for foreign exchange reserve management recommends that reserves be invested in high quality, liquid assets dominated in major currencies such as the US dollar, euro and Japanese yen (IMF, 2018). Another component of reserve management policy is the management of exchange rate risk. Central banks may engage in various strategies such as currency hedging and diversification, to mitigate the risk of exchange rate fluctuations on their reserves. The Reserve Bank of Australia's (RBA) (2016) posit the guidelines for foreign exchange reserve management outline various methods for managing exchange rate risk, including the use of derivatives and active management of currency positions.

In addition to the above strategies, the size and composition of their reserves in light of external obligations and economic circumstance are considered with tis policy. For example, the central bank of Brazil's guidelines for foreign exchange reserve management emphasized the importance of considering the county's balance of payments, external debt and fiscal position when determining reserve levels (Central Bank of Brazil, 2019). Hence, reserve management policy plays a critical role in ensuring the stability and resilience of a country's financial system. Organisations and nations that adopts sound reserve management practices give room for help to mitigate the risks associated with external shocks and ensure the availability of sufficient reserves to meet their external obligations. International monetary fund (2020) classify reserve management policies into passive management, active management and tactical asset allocation. Passive management involves investing reserves in low-risk, highly liquid assets such as government bonds or short term deposits. The objective is to preserve capital and ensure that the reserves are readily available to meet any external payment obligations.

Active reserve management policy involves actively managing the composition and allocation of reserves

in order to generate higher returns. This may involve investing in a wider range of assets, including equities, commodities, and alternative investments. According to Laeven and Valencia (2020) active reserve management policy maximizes returns for organisations while balancing risk. Finally, strategic asset allocation involves setting long term strategic targets for the composition of reserves and adjusting the allocation over time to reflect changes in the economic environment. Lee and Luk (2018) looked at the objectives of reserves management as ensuring that the reserve portfolio is diversified and resilient to shocks. Tactical asset allocation involves making short term adjustment to the composition of reserves based on market conditions and other factors, which objective is to take advantage of short term opportunities while maintaining a long –term strategic focus.

### **Operational Performance**

Port managers, whether port authorities or terminal operators, need to organize their activities in processes that are effective and efficient and enables them to find best ways of capturing values for their customers and concern stakeholders. Operational performance is a combination of two words known as operation and performance and have been defined by different scholars, World Bank (2021) defined operational performance as the efficiency and effectiveness with which a port authority and its marine terminals provide services to shipping lines and cargo owners. This definition highlights the importance of efficiency and effectiveness in port operations, emphasizes the role of port authority and marine terminals in providing service to their customers. The international association of ports and harbours (IAPH) (2021) define operational performance as the ability of a port to meet the needs of its users and to provide effective, efficient and sustainable services in a manner that meets or exceeds port ushers expectations. Thus definition emphasizes the importance of providing high quality services to port users, and highlights the need for ports to continuously improve their performance in order to



remain competitive in a rapidly changing global marketplace.

Operational performance of ports is the goal achievement of a port rather than individual firms operating in the port with minimum resource consumed to reach port goals. In combination, these operational performance components provide port operators and government policy-makers with essential feedback for assessing whether they meet their strategic objectives. The goal of any port is to provide high quality services to its uses and there purposes are frequently aimed at higher efficiency that minimizes time spent by vessels at port that in return maximizes cost. Mwasenga (2014) measured operational performance with operational and financial tools that had helped in undertaking the right decisions at the right time and improved service quality as well as deciding on investments needed. The operational performance indicators that are directly related to port activities and facilities are categorized into Service, Output (Production), Utilization and Productivity while The financial performance indicators include the Operating Revenues, Operating expenditures, Surplus from operations, Non-operating revenues and Net profit ratio, Cost per ton, labour cost per ton. For the purpose of this study, berth occupancy, container handling efficiency and throughput are used to measure operational performance.

### **Berth Occupancy**

International Maritime Organisations (2014) define berth as a designated location in a port used for mooring of vessels for the purpose of loading or unloading cargo, or for the embarkation or disembarkation of passengers. Another interesting definition of berth was given by the United Nations Conference Trade and Development (2018) as a space alongside a quay, jetty or wharf equipped for mooring of a vessel for the purpose of loading and unloading cargo or passengers or for berthing for other purposes. A berth however, is a crucial part of a port infrastructure that allows for the facilitation of international trade, travel and berth occupancy. Berth occupancy refers to the proposition of time

that a berth is occupied by a vessel in a given period. It is a commonly used measure of operational performance of a port or terminal and can be used to assess the demand for berths and the overall performance of a port.

According to the International Association of Ports and Harbors (IAPH) (2021), berth occupancy is calculated by dividing the total time that a berth is occupied by vessels by the total available time during a specified period, usually expressed as a percentage. For instance, if a berth occupies about 75% times of a vessel in a month, its berth occupancy rate for that month would be 75%. Mwasenga (2014) averred that high berth occupancy is a sign of congestion (>70%) and hence decline of services, while low berth occupancy signifies underutilization of resources (<50%). Earlier on, De Girolamo (2015) assessed the berths occupancy factor, as an average annual value that expresses the relationship between the occupation times of the berths with respect to the total available time. Chen, Fang and Wang (2015) in his study of multi-objective optimization model for berth, considered a port that is made by only one berth with a berth occupancy factor that equals 0.5 on average during one year, it reveals that the ship loading/unloading operations will be shown at a berth of only 50% of the available time (6 months). The maximum theoretical value of the berth occupancy factor will depict 1.

In contrast to this, Xiao, Zhang and Wang (2019) stated that, it is impossible to obtain a berth occupancy factor equal to 1 because there are times, during which the ship cannot load or unload, for instance, the time necessary for the ship to enter and exit from the port which are caused by stochastic nature that influences the loading and unloading times of ships. Hence, He and Zhu (2020) posit that a high berths occupancy factor causes an increase in the waiting time of the ships. The ship's waiting time is a problem for the shipping companies because during the waiting time the ships do not operate but the shipping company has to bear the relative costs. In general scholars stated that, If we assume a random time arrival of the ships, the berth

occupancy factor is a statistical parameter that connects with random arrival of the ships and a low acceptable waiting time of ships that may lead to a low value of berths occupancy factor (Yan, & Jia, 2018; Tan & Meng, 2013). Berth occupancy has capability that are categorized into innate ability and appropriate ability (UNCTAD, 2014). In order to resolve the unrealistic nature of the existing berth occupancy, Scholars have applied a simulation technique on activities related to ship arrivals, berthing, services, and departures in ports (SangKook & JongBae 2017; Park & Park, 2014; Dragovic, Park, Radmilovic & Maras, 2005).

### **Container Handling Efficiency**

Organisations are constantly struggling with the task of performing or achieving their goals with minimum wait of time, effort and resources. Efficiency is referred to as the extent to which resources such as time, money, and labour are utilized to produce desired results (Kumar & Kumar, 2018). Organisation that are concerned with moving goods to the markets on time use container handling operators as vital nodes in their logistics chain and as such must be in a position to guarantee reliable service levels to shipping lines (Dragović, Tzannatos, & Park, 2017). These consist of on-time berthing of vessels, guarantee turnaround time for vessels and guaranteed connection of containers. Container handling efficiency is often measured in terms of output per unit of input and can be improved by optimizing processes, eliminating waste and streamlining operations (Gopalan & Ravi, 2019).

In port management businesses, efficiency is a key metric that is used to evaluate performance of individual, group, and organisations operating within a port and it is often used for making decisions on resources allocation and process improvement. Dong-Wook, Paul and Kee-Hung (2010) define container handling efficiency as the ability of a terminal or port to efficiently handle containers, which are large metal boxes used for transporting goods. Efficient container handling is critical for the smooth functioning of international trade, as containers are the primary means of transporting

goods between nations. Sislioglu, Celik, and Ozkaynak (2018) explained that efficiency of container handling directly impacts the cost of transporting goods via containerized shipping. This implies that efficient container handling reduces the time it takes to load and unload containers from ships, trains, and trucks, reducing the labour costs associated with handling the containers, which in turn will lead to lower transportation cost for shippers and can help businesses remain competitive in the global market.

Container handling efficiency can be measured in several ways, including the number of containers that can be handled per hour or per day, the time it takes to load or unload a container and the accuracy of container tracking and inventory management systems (Zhen, Xu, Wang, & Ding, 2016). Hence, in improving container handling efficiency, ports are meant to invest in advanced technologies such as automated container handling equipment such as crane and straddle carriers as well as modern tracking and inventory management systems. Morteza, Hossein and Farnaz (2017) explained that, to improve container handling efficiency, training and development programs for workers are necessary for effective skill and knowledge acquisition, which will enable workers to perform their tasks effectively and efficiently. Container handling efficiency is a reflection of the freight rates charged by shipping companies, turnaround time of ships and cargo dwelling time (Nyema, 2014). This implies that the more time a ship stays at berth, the higher is the cost that a ship will have to pay.

### **Throughput**

Throughput is a concept that has been described by different fields of study, all pointing towards the rate at which a system delivers its services. Throughput with respect to operational performance of ports is defined as the amount of data that can be transmitted through a network of port in a given period of time (Abrams, 2020). Throughput is the rate of production or the rate at which a system accomplishes its tasks over a period of time (Hennessy & Patterson, 2017). Throughput as a

crucial measure for operational performance, describes the amount of cargo that can be handled by a port within a given time frame. In other words, throughput refers to the rate at which goods can be loaded or unloaded at a port. Záležák (2000) characterized throughput as the maximum amount of cargo that is transferred within and between berths of individual modes of transport in a required structure during an observed period. The main factors that affect the throughput of individual berths include the loading/unloading technology and technical equipment of the berth, the type of loaded cargo and the chosen variant of work, load capacity of vehicles and the overall organization and management loading/unloading process (Agerschou, 2004).

According to Dávid (2017), an increase in throughput can be achieved by modernizing loading/unloading activities and facilities of ports in order to improve their operational characteristics. Minimizing of human factor through the application of automatization processes relating to the operation of loading/unloading equipment also has a positive effect on increasing throughput. Tran et. al. (2019) claim that, an increase of the port's throughput can also be achieved by increasing the landfill load in combination with a reduction in cargo storage time. According to Záležák (2000), the total throughput of a port also depends on the throughput of individual berths. This throughput is affected by the daily throughput of loading/unloading equipment in warehouses, landfills and the throughput of individual landfills. In many ports, the total loading/unloading time of a cargo on import is different from the total loading/unloading time on its export. Several scholars stated that the differences in in loading and unloading can be divided between onshore loading/unloading equipment as imports and exports (Dávid, 2017; Zhang, Yan & Xu, 2006). Furthermore, Záležák (2000) explained that, onshore loading/unloading equipment, facilities located in the rear zone of the port also participate in the overall cargo handling.

Throughput is a measure of a company's level of operational performance that allows management several types of assumptions with respect to decision making concerning capacity. If the company assumes that production will operate continually without any interruptions, management will employ theoretical capacity, but this level of capacity is not reachable. No production process can produce the maximum output forever because machines need to be repaired and maintained, and employees take vacation days. It's more realistic for businesses to use practical capacity, which accounts for machine repairs, wait times, and holidays. Throughput in port operations are influenced by macro and micro influencing factors (Zhang, Yan & Xu, 2006). The Macro factors mainly refers to the objective regional factors, like the size of the hinterland area, the social product develop level, Export-oriented economic development level and the number of import and export commodities. Micro factors refers to the port's self-construction conditions, that emphasises the natural conditions and social economic factors, example the topography, waterways, hydrological and meteorological conditions, vehicle type, ship type, handling and loading ability and technology level, labor organization and management level, type of cargo through the port handling services. All of the above factors are likely to become the important factors which influence throughput capacity.

### **Empirical Review**

Alquist, Kahn and Stedman (2022) empirically examined the relationship between foreign reserve management and U.S money market. A model was develop with which U.S. money market spreads respond to foreign central banks' exchange-rate management decisions, which are driven by shocks to their net export position. Data were collected from 70 respondents from the US Monetary market and analysed with regression to ascertain the effect of foreign reserve management on US money market. Regression analysis shows that shifts in the central banks' demand for dollar liquidity related to oil price volatility are associated with elevated



spreads in domestic money markets. A one-standard-deviation increase in the demand for dollar liquidity by a central bank in an oil-exporting country leads to a two to six basis point increase in spreads and an average of \$3B in Treasury sales.

Hadi, Househang, Marjanand Shahriyar (2022) empirically examined the impact of Foreign Exchange Reserve Management Dynamics and the Structure of Central Bank Interventions on Foreign Exchange Market Stabilization in Iran. The study sample was estimated based on annual data of 1365-1398 to be 361 respondents. Data were analysed with linear auto regression and non-linear auto-regression statistical tool for analysis with the help of an M-plus. Foreign exchange market pressure index and budget deficit have a negative effect on the real exchange rate in Iran. Again, the results of estimating the nonlinear part of the model showed the positive impact of the growth rate of foreign exchange earnings from oil sales, net exports, consumer price index and fiscal policy index on the real exchange rate in Iran.

Akinboyo, Omotosho, Oladunni, and Owolabi (2016) examined empirically the nexus between Nigeria's foreign reserves and economic growth. Data were sourced quarterly on real gross domestic product (RGDP) and external reserves (RES) covering the period 2000Q1 to 2013Q2. Data were analysed using regression, unit root test, Granger causality. The result of the pairwise Granger causality test revealed a unidirectional causality running from reserves to output at 10 per cent significance level from external reserves to economic growth. The results of the modified Wald test depicts that the null hypothesis of Granger no-causality from LRES to LRGDP is rejected at the 5 per cent significance level, affirming the results obtained from the pairwise Granger causality test. Furthermore, Gregory and Hansen co-integration test showed the existence of a long run relationship between the variables, but with a structural break in 2009 Q4. The findings summarizes that external reserves drive economic growth in Nigeria, both in the short and long term horizons. Again, results showed that a one per cent increase in

external reserves leads to 0.15 per cent increase in economic growth.

Akinwunmi, Akanni and Bokola (2016) examined empirically the effect of external reserves management on Nigerian economic growth from 1985 to 2013. Data were collected secondarily from central bank of Nigeria statistical bulletin, Nigeria Bureau of statistics and other related journals. Data were analysed with Durbin Watson auto-correlation test; for reliability data sourced and diagnostic test such as unit root test, co-integration test, for stationary and non-stationary of data and long relationship between the variables and multiple regression was used to test the relationship between the explainable and external reserve management in Nigeria. The result of the findings showed a significant relationship between external reserves and explanatory variables. Durbin-Watson is 0.97 greater than the R2 0.90 which shows that the data are spurious. Unit root test showed differential level at first, EXR, MPR, IFR, FDI are stationary; and co-integration test shows that p-value is lesser than trace and Max-Eigen statistics which is a proof of co-integration between the variables. The regression result showed that the explanatory variable explains and account for 90% variation in external reserves which is an evidence of goodness of fit for their models. Furthermore, GDP, MPR and FDI were found to be highly statistically significant while IFR and EXR are statistically insignificant.

Dash and Narayanan (2010) empirically carried out a study on the relationship between trade dynamics and foreign exchange reserve management in India. Data were sourced secondarily by estimating export and import functions for the period from January 1994 to October 2008 from India central bank. Using the method of co-integration test and vector error correction on monthly data for analysis. The study findings revealed a long-run significant relationship among exports, world exports, and real effective exchange rate in the export function, and among imports, domestic demand and real effective exchange rate in the import function. However, the findings implies that a sensitive change in demand

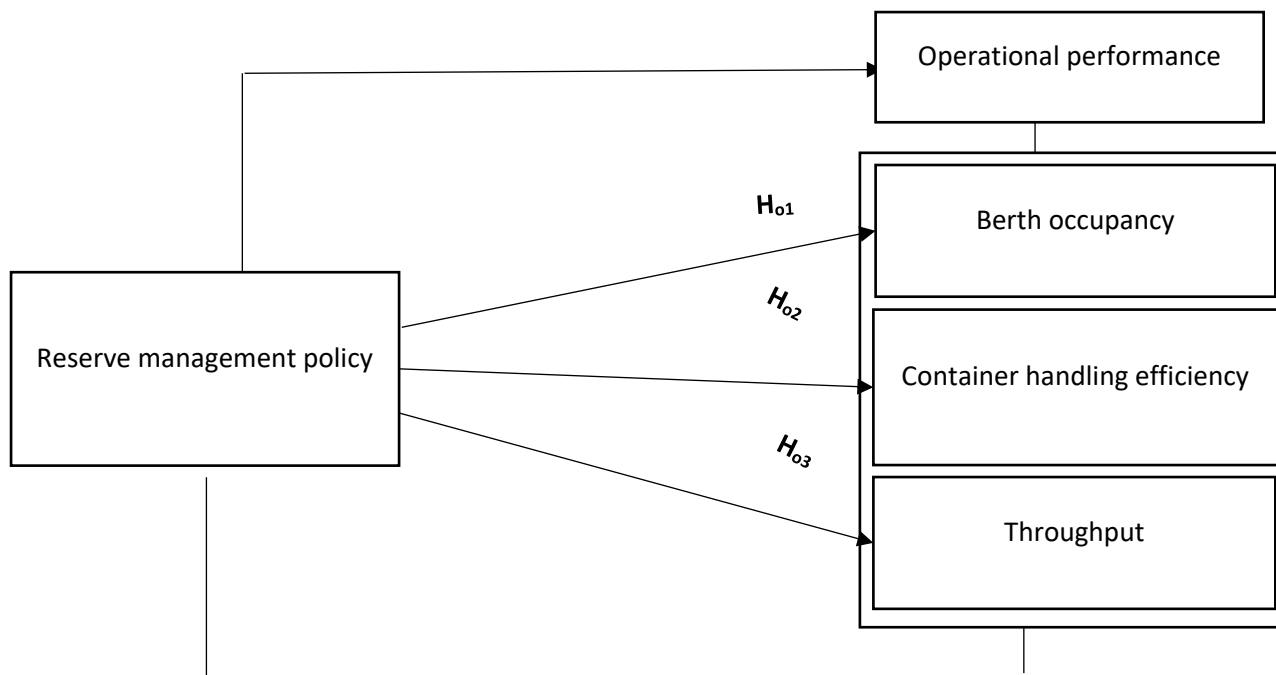
for trade flow will result to a change in real exchange rate. Furthermore, the findings also revealed that a minimum precautionary holding of reserves is desirable in order to delay any unwarranted adjustments in output and exchange rate.

Nwokoye, Adibe, Uzoechina and Aduku (2022) carried an empirical study on the effect of foreign reserve interest rates in Nigeria. Data were collected secondarily from foreign reserves effects of different interest rates using time series data for the period 1990 to 2020. Data gathered from secondary source were analysed using autoregressive distributed lag technique. The result showed negative effects of monetary policy rate on foreign reserve in the short run though not significant but positive effects of monetary policy rate on foreign reserve in the long run, also not significant. Bond rate effect on foreign reserve was positive but not significant in the short run and negative but significant in the long run. Treasury bill rate and US federal fund rate had positive but no significant effect on foreign reserves in both long run and short run. We found interest rate differential to have positive and significant effects on foreign reserves both in the long and short run.

Adama, Ohwofasa and Onabote (2022) carried out an empirical assessment of the impact of external reserves on economic growth in Nigeria. In the last few decades, the continuous depreciation in the value of the naira occasioned by the dwindling external reserves affected the exchange rate resulting in several macroeconomic fundamentals in Nigeria. The objective of the study is to examine the impact of external reserves on economic growth in Nigeria. The study utilizes the descriptive approach for the trend analysis, while the autoregressive

distributed lag (ARDL) model was relied upon in scrutinizing the contemporaneous dynamics for the unrestricted ECM. The data that were culled from several issues of the Central Bank of Nigeria's annual report and statement of account covered the period 1986–2020. Descriptively, the study finds that economic growth rate and external reserves witnessed fluctuations with the latter being relatively more pronounced. Accordingly, the study found that all the explanatory variables in the study were key determinants of economic growth in Nigeria in the long run. Specifically, economic growth is significantly and positively responsive to changes in external reserves by 0.22%, inflation rate by 0.08%, and a one period lag of GDP of 0.21% contrary to its negative response to changes in exchange rate of 0.10% in the short run. The study recommended that the government may consider providing conducive environment for increased productivity, thereby increasing foreign reserves. Likewise, the situation that may encourage exchange rate misalignment should be avoided. Finally, inflation rate must be controlled within a single digit. We therefore make the following hypothetical assumptions.

- Ho<sub>1</sub>:** There is no significant relationship between reserves management policy and berth occupancy of ports.
- Ho<sub>2</sub>:** There is no significant relationship between reserves management policy and container handling efficiency of ports.
- Ho<sub>3</sub>:** There is no significant relationship between reserves management policy and throughput of ports



**Figure 1:** Operational framework of hypothesized relationship between reserve management policy and operational performance.

**Sources:** Researchers Conceptualization from Reviewed of Literature (2023).

### METHODOLOGY

The study adopted a survey research design of explanatory attribute with a correlational style of examination in a non-contrived setting to study a population of 21 terminal port operating firms with the two port complex in Port Harcourt, Rivers State as enlisted by the Nigerian port authority, 2023. The sample size of the study was drawn from 5 managerial staff of the 21 terminal port operating firms within the two ports in Rivers State making a total of one hundred and five (105) respondents. The study validity and reliability were validated by three experts in the field of transport and maritime management and the reliability of the data in the

study were tested with alpha Cronbach method, of which reserve management policy = 0.847; berth occupancy = 0.823; container handling efficiency = 0.845; throughput = 0.818. Data were collected using a structured questionnaire in a five-point Likert scale format ranging from strongly agreed to strongly disagree. Data collected were analysed using Pearson product moment correlation with the help of a statistical package for social sciences version 25.0. The Pearson product moment correlation was used to test the stated hypothesis. Pearson product moment correlation coefficient, (r) measures the strength and direction of relationship between two variables.

## DATA ANALYSIS AND RESULTS

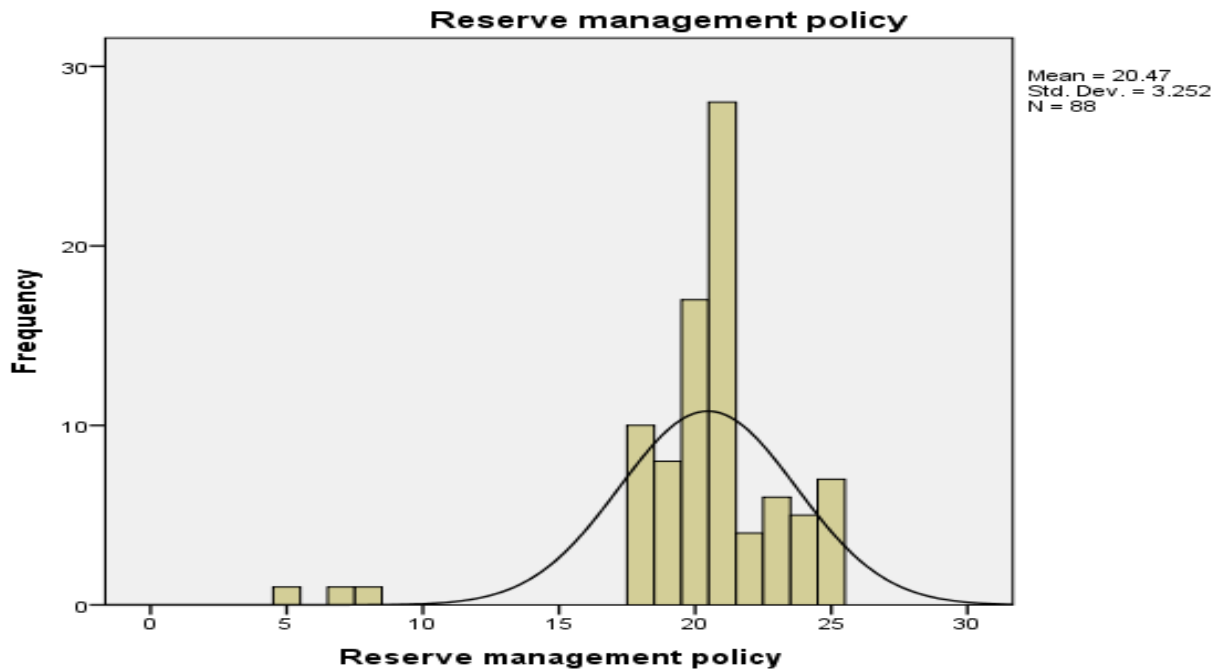
**Table 1: Reserve management policy**

	N	Sum	Mean	Std. Deviation	Skewness	Std. Error	Kurtosis	Std. Error
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
Reserve adequacy is considered a reserve management policy in our company	88	354	4.02	1.203	-1.017	.257	-.173	.508
Our reserve management policies with other countries or international bodies is considered very important to our growth	88	359	4.08	.647	-2.418	.257	11.587	.508
Our reserve management policies prioritizes and maintain the value of our company reserves rather than pursuing higher yields	88	363	4.13	.770	-2.227	.257	8.065	.508
Our company maximizes return on reserves as a primary objectives of reserve management policy	88	363	4.13	.692	-2.089	.257	8.970	.508
Effective reserve management policy is essential for maintaining financial stability	88	362	4.11	.685	-2.121	.257	9.242	.508
Valid N (listwise)	88							

**Source: SPSS output from Field Survey, 2023.**

Table 1, showed a high mean scores of the questionnaire items ranging over 3.00, this implies that greater number of the respondents agreed and strongly agreed to the research question with reverence to reserve management policy. However, it can be seen that question 3 and 4 which sought to determine the extent to which policies prioritizes and maintain the values rather than pursuing higher yields and maximizes return on primary objectives of reserve management policy, has the highest sum score of 366; highest mean score of 4.13. This illustrates that question 3 and 4 has the strongest impact on the variables. However, question 1 has the highest standard deviation of 1.203, which means question 1 has the most data variation.

Furthermore, the skewness statistics are all negative indicating a negatively skewed distribution with scores concentrating on the high end of the scale. Also, standard errors of skewness are 0.257 which shows that, the distribution is not skewed to a significant degree. The kurtosis showed a positive results depicting a relatively peaked distribution. Values of the standard errors of kurtosis are less than 2 indicating that the value is high though not significant to a degree. This type of distribution is actually a desirable outcome because it signified that only few responses are on the lower side of the scale. The result of the analysis is illustrated via histogram on figure 2.



**Figure 2: Histogram with superimposed normality curve showing the distribution of data for reserve management policy**

Source: Field Survey, 2023.

**Table 2: Descriptive Statistics of Berth occupancy**

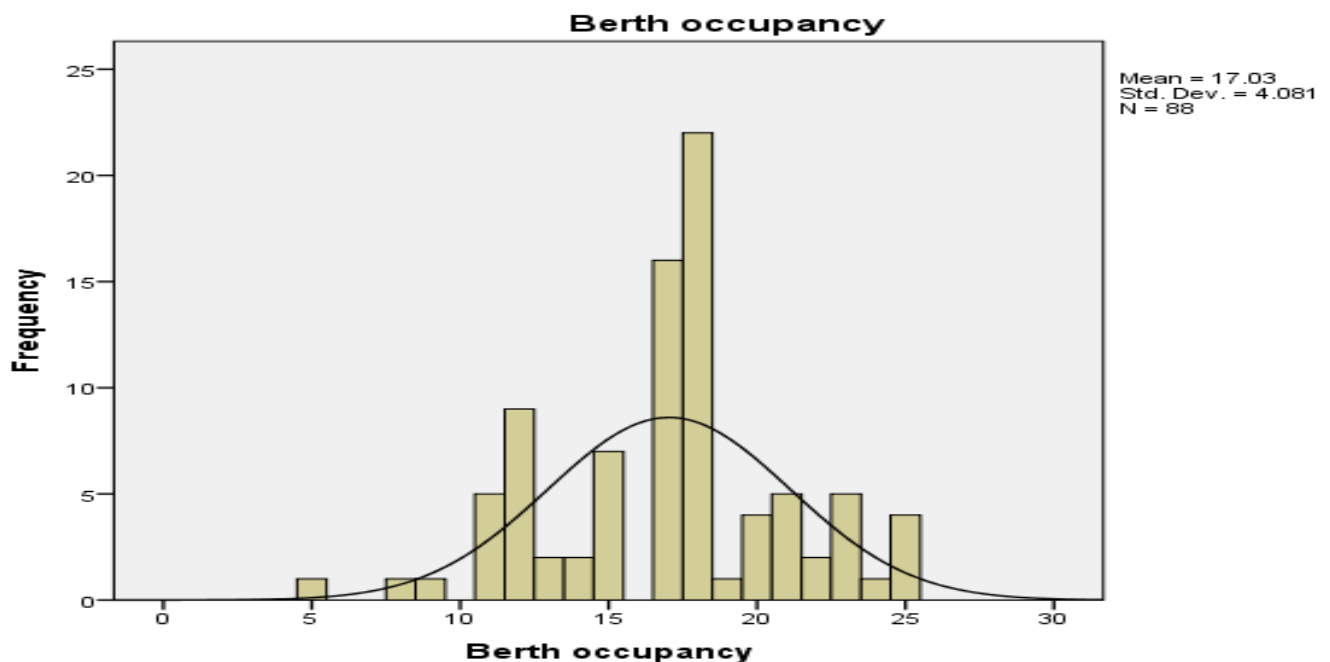
	N	Sum	Mean	Std. Deviation	Skewness	Kurtosis	Std. Error
Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
Utilization of designated space in a terminal provides valuable insight into the effectiveness of our company planning and scheduling	88	187	3.12	1.337	1.064	.257	-.019
Monitoring and analyzing the berth can help identify potential bottlenecks, optimize allocation and scheduling	88	311	3.53	1.061	-.742	.257	-.178
High utilization of designated space shows optimal operation of port infrastructure	88	337	3.83	.950	-1.133	.257	1.424
Efficient berth scheduling and allocation reduces vessel waiting time and congestion in ports	88	351	3.99	.634	-2.758	.257	12.141
Coordination and collaboration between port operators and shipping lines improves the location within a port where vessels can dock and perform other activities	88	313	3.56	1.163	-.634	.257	-.856
Valid N (listwise)	88						

Source: SPSS output from Field Survey, 2023.



Table 2, illustrates high mean scores of the questionnaire items ranging over 3.00, this means that greater number of the respondents agreed and strongly agreed to the research question with respect to berth occupancy. Nonetheless, it has been showed in question 4 which sought to determine the extent to which Efficient berth scheduling and allocation reduces vessel waiting time and congestion in ports in Rivers State ports, has the highest summed scored of 351; highest mean score of 3.99. This shows that question 4 has the strongest influence on the variables. However, question 1 has the highest standard deviation of 1.337, which means question 1 has the most data variation.

Furthermore, the skewness statistics are mostly negative indicating a negatively skewed distribution with scores concentrating on the high end of the scale. Also, standard errors of skewness are 0.257 which shows that, the distribution is not skewed to a significant degree. In the area of the kurtosis, the results showed three negative and two positive value from the kurtosis analysis, indicating a relatively normal distribution. Values of the standard errors of kurtosis are less than 2 indicating that the value is high though not significant to a degree. This type of distribution is actually a desirable outcome because it shows only few responses are on the lower side of the scale. The result of the analysis is illustrated via histogram on figure 3



**Figure 3: Histogram with superimposed normality curve showing the distribution of data for Berth occupancy**  
**Source: Field Survey, 2023.**

**Table 3: Descriptive Statistics of Container handling efficiency**

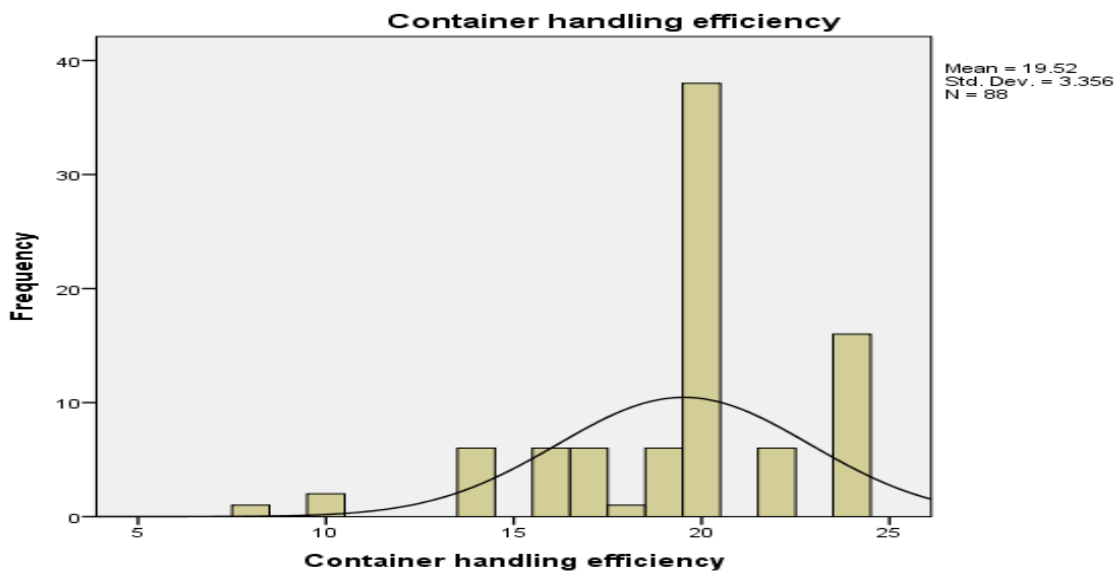
	N	Sum	Mean	Std. Deviation	Skewness Statistic	Std. Error	Kurtosis Statistic	Std. Error
Our quick turnaround time for vessels positively impact port productivity	88	368	4.18	.751	-1.979	.257	7.029	.508
Container handling efficiency are enhanced through yard layout and storage system	88	333	3.78	.999	-.893	.257	.313	.508
Our effective coordination and communication among terminal operators, shipping lines and other stakeholders are essential for container handling efficiency	88	316	3.59	.721	-1.454	.257	.538	.508
Our skilled-trained personnel contributes to efficient container handling through effective coordination and proper equipment handling techniques	88	368	4.18	.751	-1.979	.257	7.029	.508
Our ability to handle container gives a smooth flow of goods in supply chain reliability and customer satisfaction	88	333	3.78	.999	-.893	.257	.313	.508
Valid N (listwise)	88							

**Source: SPSS output from Field Survey, 2023.**

Table 3 described high mean scores of the questionnaire items ranging over 3.00, this means that greater number of the respondents agreed and strongly agreed to the research question with respect to berth occupancy. Nonetheless, it has been showed in question 1 and 4 which sought to determine the extent to which quick turnaround time for vessels positively impact port productivity and skilled-trained personnel contributes to efficient container handling through effective coordination and proper equipment handling techniques in Rivers State ports, has the highest summed scored of 368; highest mean score of 4.18. This shows that question 1 and 4 has the strongest influence on the variables. However, question 2 and 5 has the highest standard

deviation of 0.999, which means question 2 and 5 has the most data variation.

Furthermore, the skewness statistics are all negative indicating a negatively skewed distribution with scores concentrating on the high end of the scale. Also, standard errors of skewness are 0.257 which shows that, the distribution not skewed to a significant degree. The kurtosis results showed all positive value, indicating a relatively normal distribution. Values of the standard errors of kurtosis are less than 2 indicating that the value is high though not significant to a degree. This type of distribution is actually a desirable outcome because it shows only few responses are on the lower side of the scale. The result of the analysis is illustrated via histogram on figure 4.



**Figure 4: Histogram with superimposed normality curve showing the distribution of data for container handling efficiency**

Source: Field Survey, 2023.

**Table 4: Descriptive Statistics of Throughput**

	N	Sum	Mean	Std. Deviation	Skewness	Kurtosis		
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Std. Error
High throughput is essential for the efficient operation of port activities	88	247	3.80	1.380	.061	.257	-1.360	.508
Increase throughput positively impact on the overall terminal activity outcome	88	317	3.60	1.067	-.825	.257	-.019	.508
Our company improves throughput to meet customer demand and expectations	88	332	3.77	1.058	-.839	.257	.140	.508
Customers believe in us because they experience the value our products have promised	88	335	3.81	.856	-1.416	.257	2.274	.508
We deploy modern technology and competent staff to offer products that are of high value to our customers	88	330	3.75	1.127	-.869	.257	-.232	.508
Valid N (listwise)	88							

Source: SPSS output from Field Survey, 2023.

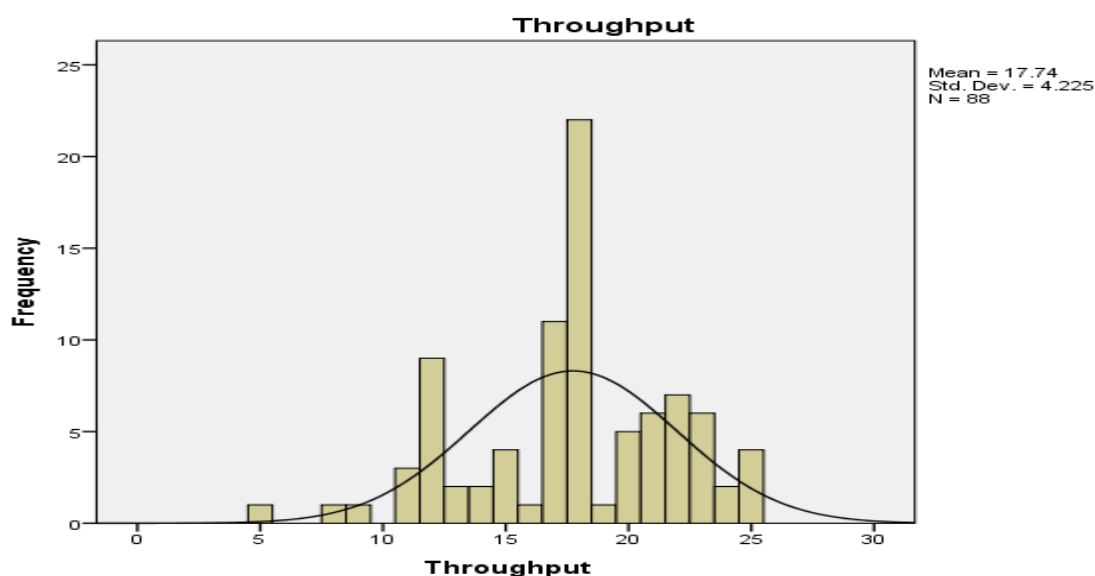
Table 4, elucidates high mean scores of the questionnaire items ranging over 3.00, this means that greater number of the respondents agreed and strongly agreed to the research question with respect to throughput. However, it has been showed

in question 4 which sought to determine the extent to which Customers believes in companies experience and values that companies products have promised in Rivers State ports, has the highest sum score of 335; highest mean score of 3.81. This shows

that question 4 has the strongest influence on the variables. However, question 1 has the highest standard deviation of 1.380, which means question 1 has the most data variation.

Furthermore, the skewness statistics are all negative indicating a negatively skewed distribution with scores concentrating on the high end of the scale. Also, standard errors of skewness are 0.257 which shows that, the distribution is not skewed to a significant degree. In the area of the kurtosis, the

results showed both negative and positive values indicating that data distribution deviated from a normal distribution in terms of tail behaviour and peak shape. Values of the standard errors of kurtosis are less than 2 indicating that the value is high though not significant to a degree. This type of distribution is actually a desirable outcome because it shows that only few responses are on the lower side of the scale. The result of the analysis is illustrated via histogram on figure 5.



**Figure 5: Histogram with superimposed normality curve showing the distribution of data for throughput**  
Source: Field Survey, 2023.

### Test of Hypothesis Five

**Ho<sub>1</sub>:** There Is No Significant Relationship between Reserve Management Policy and Berth Occupancy

**Table 5: Correlation analysis of the relationship between reserves management policy and berth occupancy of ports**

		Reserve management	
		policy	Berth occupancy
Reserve management policy	Pearson Correlation	1	.603**
	Sig. (2-tailed)		.000
	N	88	88
Berth occupancy	Pearson Correlation	.603**	1
	Sig. (2-tailed)	.000	
	N	88	88

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS output, 2023.

**Ho<sub>2</sub>:** There is no significant relationship between reserve management policy and container handling efficiency

**Table 6: Correlation analysis of the relationship between reserves management policy and container handling efficiency of ports**

		Reserve management policy	Container handling efficiency
Reserve management policy	Pearson Correlation	1	.903**
	Sig. (2-tailed)		.000
	N	88	88
Container handling efficiency	Pearson Correlation	.903**	1
	Sig. (2-tailed)	.000	
	N	88	88

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS Output, 2023

**Ho<sub>7</sub>:** There is no significant relationship between reserve management policy and throughput.

**Table 7: Correlation analysis of the relationship between reserves management policy and throughput of ports.**

		Reserve management policy	Throughput
Reserve management policy	Pearson Correlation	1	.566**
	Sig. (2-tailed)		.000
	N	88	88
Throughput	Pearson Correlation	.566**	1
	Sig. (2-tailed)	.000	
	N	88	88

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS Output, 2023

### DISCUSSION OF FINDINGS

The result from the SPSS output on table 5, showed the correlational coefficient  $r = 0.603$  indicating a strong, positive and statistically significant relationship between reserve management policy and berth occupancy of ports in Rivers State with a probability value ( $p = 0.000 < 0.01$ ). Again table 6 revealed a correlational coefficient  $r = 0.903$  at a probability value ( $p = 0.000 < 0.01$ ); indicating a very strong, positive and statistically significant relationship between reserve management policy and container handling efficiency of ports in Rivers State. Furthermore, table 7 showed a correlational coefficient of  $r = 0.566$  at probability value ( $p = 0.000 < 0.01$ ), indicating a moderate, positive and statistically significant relationship between reserve management policy and throughput of ports in Rivers State. In view of the results, we rejected the null hypotheses one, two and three and accepted an alternate hypotheses which states that there is a

significant relationship between reserve management policy and the measures of operational performance in the light of berth occupancy, container handling efficiency and throughput of ports in Rivers State.

This study is validated by the findings of Alquist, Kahn and Stedman (2022) as they empirically examined the relationship between foreign reserve management and U.S money market. Their findings depicts that shifts in the central banks' demand for dollar liquidity related to oil price volatility are associated with elevated spreads in domestic money markets. A one-standard-deviation increase in the demand for dollar liquidity by a central bank in an oil-exporting country leads to a two to six basis point increase in spreads and an average of \$3B in Treasury sales. Hadi, Househang, Marjanand Shahriyar (2022) explored the impact of Foreign Exchange Reserve Management Dynamics and the Structure of Central Bank Interventions on Foreign



Exchange Market Stabilization in Iran. It was found that foreign exchange market pressure index and budget deficit have an effect on the real exchange rate in Iran. Again, the results of estimating the nonlinear part of the model showed the positive impact of the growth rate of foreign exchange earnings from oil sales, net exports, consumer price index and fiscal policy index on the real exchange rate in Iran.

Akinboyo, Omotosho, Oladunni, and Owolabi (2016) examined the empirical relationship between Nigeria's foreign reserves and economic growth. The result of the test revealed a unidirectional causality running from reserves to output at 10 per cent significance level from external reserves to economic growth. Furthermore, the result showed the existence of a long run relationship between the variables, but with a structural break in 2009Q4. Summarizing that external reserves drive economic growth in Nigeria, both in the short and long term horizons. And that a percentage increase in external reserves brings about 0.15 percentage increase in economic growth. Akinwunmi, Akanni and Bokola (2016) examined the effect of external reserves management on Nigerian economic growth from 1985 to 2013. The result showed a positive statistical and significant relationship between external reserves and explanatory variables with the explanatory variable explaining and accounting for 90% variation in external reserves which is an evidence of goodness of fit for their models. Furthermore, GDP, MPR and FDI were found to be highly statistically significant while IFR and EXR are statistically insignificant.

Dash and Narayanan (2010) explored the empirical relationship between trade dynamics and foreign exchange reserve management in India. Revealing that a long-run significant relationship exists among exports, world exports, and real effective exchange rate in the export function, and among imports, domestic demand and real effective exchange rate in the import function. However, their findings implies that a sensitive change in demand for trade flow will result to a change in real exchange rate and a

minimum precautionary holding of reserves is desirable in order to delay any unwarranted adjustments in output and exchange rate. Nwokoye, Adibe, Uzoechina and Aduku (2022) sought to find out the effect of foreign reserve interest rates in Nigeria. The result showed a mixed result-negative effects of monetary policy rate on foreign reserve in the short run though not significant but positive effects of monetary policy rate on foreign reserve in the long run, also not significant. Bond rate effect on foreign reserve was positive but not significant in the short run and negative but significant in the long run. Treasury bill rate and US federal fund rate had positive but no significant effect on foreign reserves in both long run and short run. They found interest rate differential to have positive and significant effects on foreign reserves both in the long and short run.

The study result is also supported by the findings of Adama, Ohwofasa and Onabote (2022) as they assess the impact of external reserves on economic growth in Nigeria and it was found that economic growth rate and external reserves witnessed fluctuations with the latter being relatively more pronounced. Accordingly, the study findings revealed that in the long run, all the explanatory variables were key determinants of economic growth in Nigeria. Specifically, economic growth is significantly and positively responsive to changes in external reserves by 0.22%, inflation rate by 0.08%, and a one period lag of GDP of 0.21% contrary to its negative response to changes in exchange rate of 0.10% in the short run.

## **CONCLUSION AND RECOMMENDATION**

Sequel to the results of this study and to the extent of its consistency with similar studies, the study concludes that reserve management policy significantly relates with operational performance of ports in Rivers State. Thus, reserve management policy adopted by companies is important for businesses to closely monitor and assess strategies to manage the associated risk in business to be able to reach its operational performance. In order to gain competitive advantage and also reach their set

obligations to serve their operational performance, port activities will have to be aimed at achieving operational performance.

The study therefore recommended that managers within ports in Rivers State should consider the strategic role of reserve management policy in their

pursuit of operational performance. The study underscores the pivotal role of regular dredging and maintenance of the navigational channels leading to the ports. It is recommended that a portion of the budget be allocated specifically for these activities to ensure that channels remain accessible to larger vessels.

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