



## WAREHOUSE OPTIMIZATION AND ORGANIZATIONAL EFFICIENCY OF INDIGENOUS SHIPPING COMPANIES IN SOUTH-WEST NIGERIA

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### Cite this article:

Ifekanandu Chukwudi Christian (2025), Warehouse Optimization and Organizational Efficiency of Indigenous Shipping Companies in South-West Nigeria. British Journal of Management and Marketing Studies 8(3), 25-38. DOI: 10.52589/BJMMS-EYUZDIVO

### Manuscript History

Received: 25 Aug 2025

Accepted: 6 Oct 2025

Published: 9 Oct 2025

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**ABSTRACT:** *This study examined the relationship between warehouse optimization and organizational efficiency of indigenous shipping companies in South-West Nigeria. The study adopted the correlational research design to explore the relationship between warehouse optimization (warehouse layout optimization and warehouse space optimization) and organizational efficiency (operational efficiency and cost efficiency) of indigenous shipping companies in South-West Nigeria. The population of this study consisted of 52 indigenous shipping companies registered with the Nigerian Shipping Council in the South-West Zone of Nigeria. The census sampling technique was adopted in this study. The sampling units consisted of managers of indigenous shipping companies in South-West Nigeria. Data were collected from the respondents using a structured questionnaire. The data collected were analyzed statistically while the Spearman Rank Order Correlation Coefficient ( $\rho$ ) and the SPSS version 24 were used to test the hypotheses. The findings revealed that warehouse layout optimization has significant relationship with operational efficiency of indigenous shipping companies in South-West Nigeria. The study also found a significant relationship between warehouse layout optimization and cost efficiency of indigenous shipping companies in South-West Nigeria. A significant relationship was also reported between warehouse space optimization and operational efficiency of indigenous shipping companies in South-West Nigeria. The study equally revealed that warehouse space optimization has significant relationship with cost efficiency of indigenous shipping companies in South-West Nigeria. Therefore, it was concluded that warehouse optimization is significantly related to organizational efficiency of indigenous shipping companies in South-West Nigeria. Based on the conclusion, it was recommended that shipping companies in Nigeria should optimize their warehouse operations as it would enhance their organizational efficiency.*

**KEYWORDS:** Warehouse optimization, warehouse layout optimization, warehouse space optimization, organizational efficiency operational efficiency, cost efficiency.



## INTRODUCTION

It is often said that production is not complete until goods produced get to the final consumers. Shipping activity completes the production process as it involves the movement of goods by sea to the end user. As a crucial activity in the supply chain, shipping activity requires a lot of resources to ensure the smooth movement of goods to their destination. Obviously, resources are scarce and as such shipping companies need to use their limited resources efficiently to deliver consignments to their destination. Efficiency is the key to unlock the door to business success. It is the road map to business growth and survival. Without efficiency, it will be difficult for shipping companies to carry out their logistics operations successfully (Ifekanandu & Asagba, 2025). For this reason, companies in the shipping industry need to improve their organizational efficiency in order to achieve business success. To achieve organizational efficiency, shipping companies need to embark on a number of activities in their warehouse including warehouse optimization.

Warehouse optimization is the processing of optimizing warehouse layout and design, workflow, product placement, space, storage process and material handling costs (Gill, in Pontius, 2019). It involves achieving the best possible warehouse layout design, streamlining the warehousing operations and to utilize space more efficiently as possible (Dharmapriya & Kulatunga, 2011). The aim of optimizing the warehouse processes is to maximize the efficiency of the operations and balance human and technical resources (Jaimes et al, 2012). To optimize warehousing operations, warehouse manager must carefully analyze the data on reserve storage, forward pick, cross docking, shipping, receiving, assembly and special handling lines, and thorough inspection (Pontius, 2019). The warehouse managers also need to consider the warehouse layout, product storage, inbound and outbound operations as well as value added processes while optimizing the warehouse. A warehouse manager can use the full capacity of the warehouse space to optimize the layout.

Warehouse optimization is a strategic tool for achieving organizational efficiency. According to Gill (2016), a company that optimizes its warehouse stands a chance of achieving greater efficiency and satisfying its customers better than its competitors. Apart from enhancing efficiency, space optimization helps to save overhead cost by not expanding the warehouse unnecessarily. Appropriate use of warehouse space allows store keepers to get jobs done faster and complete more jobs per day (Robinson, 2018). A shipping company can achieve greater efficiency if it develops warehouse optimization plan and execute it effectively. However, the foundation upon which shipping companies built their warehouse will determine how well the warehouse operations will run in the future. By optimizing the warehouse from the beginning, companies can set a high-efficiency standard and also create room for adaptation and modification of its warehousing operations if necessary (Krabbe & Klingberg, 2016). Pontius (2019) argued that optimizing warehouse ensures smooth and efficient operations and timely delivery of goods to customers. It is against this backdrop that this study explores the relationship between warehouse optimization and organizational efficiency of shipping companies in South-West Nigeria.

## Statement of the Problem

One of the major challenges confronting indigenous shipping companies in Nigeria is how to improve their organizational efficiency. There have been series of complaints from customers over the inefficiency of some indigenous shipping companies in Nigeria. Many indigenous shipping companies have lost significant number of their customers to international shipping companies due to their inefficiency. As customers continue to utilize the services of international shipping companies, the profit margin of indigenous shipping companies continue to decline. To reverse this situation, indigenous shipping companies need to optimize their warehouse in order to improve their organizational efficiency. Several studies (e.g. Dharmapriya & Kulatunga, 2011; Kariuki, 2014; Robinson, 2018; Pontius, 2019) have been conducted on warehouse optimization in companies but none of these studies relate warehouse optimization to organizational efficiency of shipping companies in Nigeria. This presents a gap in literature which this study is mapped out to fill.

## CONCEPTUAL FRAMEWORK

The conceptual framework of warehouse optimization and organizational efficiency is shown in figure 1 below:



Fig 1: Conceptual framework of warehouse optimization and organizational efficiency of indigenous shipping companies in South-West Nigeria

**Sources:** Gill (2006); Robinson (2018); and Pontius (2019).

## Aim and Objectives of the Study

The aim of this study is to examine the relationship between warehouse optimization and organizational efficiency of shipping companies in South-West Nigeria. Specifically, the study intends to:

1. determine the relationship between warehouse layout optimization and operational efficiency of shipping companies in South-West Nigeria.
2. ascertain the relationship between warehouse layout optimization and cost efficiency of shipping companies in South-West Nigeria.



3. examine the relationship between warehouse space optimization and operational efficiency of shipping companies in South-West Nigeria.
4. determine the relationship between warehouse space optimization and cost efficiency of shipping companies in South-West Nigeria.

### **Research Questions**

The following research questions are put forward to address the objectives of the study:

1. What is the relationship between warehouse layout optimization and operational efficiency of shipping companies in South-West Nigeria?
2. To what extent does warehouse layout optimization relate to cost efficiency of shipping companies in South-West Nigeria?
3. What is the relationship between warehouse space optimization and operational efficiency of shipping companies in South-West Nigeria?
4. To what extent does warehouse space optimization relate to cost efficiency of shipping companies in South-West Nigeria?

### **Research Hypotheses**

The following hypotheses are developed to guide this study:

Ho<sub>1</sub>: There is no significant relationship between warehouse layout optimization and operational efficiency of shipping companies in South-West Nigeria.

Ho<sub>2</sub>: There is no significant relationship between warehouse layout optimization and cost efficiency of shipping companies in South-West Nigeria.

Ho<sub>3</sub>: There is no significant relationship between warehouse space optimization and operational efficiency of shipping companies in South-West Nigeria.

Ho<sub>4</sub>: There is no significant relationship between warehouse space optimization and cost efficiency of shipping companies in South-West Nigeria.



## **REVIEW OF RELATED LITERATURE**

### **Concept of Warehouse Optimization**

Warehouse optimization is defined as the automation and a determination of how to save time, space, and resources while reducing errors and improving flexibility, communication, management and customer satisfaction (Pontius, 2019). Matyi (2015) defined warehouse optimization as the process of determining the optimal way to store, execute and ship orders to give customer the desired satisfaction. Robinson (2018) posited that warehouse optimization seeks to determine the most cost-effective way to pick and ship orders and at the same time meeting customer requirements. Warehouse optimization is a strategy used to get the most out of the overall warehousing processes (Jaimes et al, 2012). Warehouse optimization is highly necessary to achieve greater efficiency (Bartholdi & Hackman, 2018). The optimization process needs to be carefully planned and executed. Without a well-designed plan, the warehouse manager will find it difficult or impossible to achieve the desired result. A little thing can drastically affect the warehouse optimization process; therefore taking note of them can improve the optimization process. Identifying the storage areas and staging lanes is a must because warehouses that are successful in optimization process opt for easily read labels on cartons, pallets, storage shelving, aisles and floors and pallet racks (Celik & Sural, 2012).

### **Dimensions of Warehouse Optimization**

Warehouse optimization takes various dimensions such as layout, storage, space and operating cost optimization. However, the dimensions of warehouse optimization considered in this study are layout and space optimizations.

### **Warehouse Layout Optimization**

Warehouse layout optimization is a process of determining the best layout for an order picking area and the optimal number of aisles and blocks (Ackah & Agboyi, 2015). It is the process of examining the layout design of the warehouse, the choice and dimensioning of conveyors and warehouse equipment, the design of the physical interfaces to neighboring systems and other attributes related to technical structure with a view to minimize time and distance of picking, storage and movement (Karasek, in Kariuki, 2014). Karasek (2015) stated that layout design is a key component of warehouse optimization and has a significant impact on order-picking and traveling distance in the warehouse. According to him, warehouse layout optimization is a factor of warehouse conceptual design and aisle design. The conceptual design determines the sizing and dimensioning of the warehouse and its departments, the specification of functional departments, the flow relationships between departments as well as space allocation among various warehouse departments. Aisle design on the other hand determines material and employees flow pattern and flow relationship within departments and the choice of warehouse equipment (Kariuki, 2014). The fluid model of product flow advanced by Bartholdi and Hackman in Kariuki (2014) explained that the design and operation of an optimal warehouse should follow three main guidelines: First, the product flow should be with minimal handling as too much handling would result in additional space requirements and extra labour meaning increased inventory handling cost. Secondly, guideline is to implement a warehouse layout that does not impede smooth flow and thirdly, identify and resolve bottlenecks to flow.





## **Warehouse Space Optimization**

Warehouse space optimization is the process of ensuring efficient utilization of space in the warehouse to avoid the cost of hiring an additional warehouse (Matyi, 2015). Many companies are often faced with the challenge of optimizing the warehouse space efficiently due to limited availability (Robinson, 2018). Running a large scale of warehouse constitutes a heavy cost on business and this is why it is important for warehouse managers to efficiently optimize the space in their warehouse. The aim of optimizing warehouse space is to increase the quantity of goods that can be stored in the warehouse, avoid the cost of hiring third party warehouse and ensure that the quantity of goods stored can be located and moved safely (Dharmapriya & Kulatunga, 2011). A warehouse manager can optimize space in the warehouse by using a number of methods. The most common methods of optimizing space in a warehouse include mezzanine installation, reduce aisle width in the racking area, use wooden pallet collars, use of under-utilized space, analyze depth of storage, right size the slot, organize offsite or supplier storage, use cross-docking, deal with obsolete inventory, use revamping racks, use automated storage and retrieval systems, use drop shipping, reduce SKU quantity, create extra storage space and consolidate location (Ackah & Agboyi, 2015).

## **Concept of Organizational Efficiency**

Organizational efficiency is the degree to which a company achieves its goals using limited resources (Kalinzi, 2016). It involves the use of limited resources such as time, money, labour, materials, and technological resources to accomplish organizational goals. Esther and Katuse (2013) defined organizational efficiency as the ability of an organization to deliver products or services using fewer resources without compromising on quality. It involves maintaining high quality while delivering products in a cost-effective manner (Fugate et al, 2010). An efficient organization minimizes wastes, time, materials, labour and cost in the course of delivering quality products or services to customers (Muiruri & Iravo, 2015). This type of organization tends to maintain a higher level of stability and profitability while at the same time ensuring optimal resources usage. Thus, an efficient organization competes more favourably in the market due to its ability to use limited resources to deliver quality products and services that satisfy its customers (Laird, 2012).

## **Operational Efficiency**

Operational efficiency is the ability of a company to streamline its business processes to reduce operating costs and deliver the expected quality of products or services (Muiruri & Iravo, 2015). Many companies operate multiple processes which consume a lot of time, money and generate waste (Heizer et al., 2016). These processes can be streamlined or optimized to reduce costs, time and waste. When a company is able to optimize its business processes, its operational efficiency is guaranteed (Ifekanandu & Asagba, 2025). Achieving operational efficiency is important for business organizations as it helps to increase profitability and organizational competitiveness (Laird, 2012). Li (2014) opined that a company that operates efficiently will become more profitable than their competitors with inefficient operations.



## **Cost Efficiency**

Cost efficiency refers to the minimization of the operational costs of running a company while maintaining the acceptable standard (Kalinzi, 2016). It involves spending less amount of money to get the desired result out of the work processes. Cost efficiency is crucial to the growth and survival of an organization. According to Kyusa (2015), cost efficiency leads to higher profitability and business growth. It enables a company to compete favourably in its industry by delivering high quality products and services at a reduced costs. Zacharias and Boopathy (2022) stated that cost efficiency enable companies to deliver quality products and services at a cheaper price which will increase customer satisfaction and ensure their loyalty and retention.

## **Theoretical Review**

This study was anchored on the modern control theory which was developed by Norbert Wiener in 1948. The theory states that organizations need to act, put things together and optimize its resources and facilities in order to achieve organizational efficiency. The theory explains the kind of control that exists within an organization that improves organizational efficiency. This control involves checking and testing key facilities and personnel to ensure that their behaviours are satisfactory. Modern control theory requires organizations to optimize their work processes and efficiently utilize their facilities including warehouse facility to achieve organizational efficiency (Inman et al., 2011). Relating the modern control theory to this study, it can be observed that the theory support the practice of warehouse optimization and its relationship with organizational efficiency. The theory argues that companies can effectively control their warehousing activities by optimizing their warehouse operations to get the best out of the facility and achieve operational efficiency.

## **Empirical Review**

Some related studies have been conducted on warehouse optimization and organizational efficiency. For instance, Ackah and Agboyi (2019) examined the impact of warehousing on customer satisfaction. The study employed the survey research design and used a structured questionnaire to obtain data from 20 workers in the warehouse department in EPP BOOKS limited. The data collected from the respondents were analyzed using descriptive statistics such as percentage and frequency tables, pie chart and histogram. After analyzing the data collected, the researchers discovered that EPP BOOKS Limited has an adequate space for storing books and that the common means of storage in the warehouse is racks which are proven to be effective in increasing customer satisfaction. The study also reported that customer satisfaction is positively correlated to repurchase intention, actual repurchase, market share and word of mouth. The study equally found a positive and significant relationship between the warehousing operations of EPP BOOKS Limited and customer satisfaction.

Gill (2016) explored the methods of warehouse optimization in business organizations. The researcher employed the descriptive survey research and used a structured questionnaire to collect data from warehouse managers and store keepers in New York. The data collected were analyzed using the percentage and frequency analysis while the hypotheses were tested using the Pearson Product Moment Correlation Coefficient (PPMCC). The findings revealed that most companies use random storage, mechanical devices and casual labour to optimize their



operations. The study also reported that warehouse layout, space, storage and operational cost optimization have a significant impact on firm performance.

Ali and Asif (2012) investigated inventory management and its effects on customer satisfaction in the retail industry. The researchers adopted the descriptive survey research design where questionnaire was used for data collection. The data collected were analyzed statistically using mean, standard deviation and the Spearman Rank Order Correlation Coefficient. The finding showed that proper inventory management has a positive and significant relationship with customer satisfaction.

Dharmapriya and Kulatunga (2011) examined the new strategy for warehouse optimization in manufacturing companies. Their study adopted the descriptive survey research design and used a structured questionnaire to obtain data from warehouse managers and stock keepers. After analyzing the data using descriptive statistics such as percentage and frequency analysis, mean, standard deviation and Pearson Product Moment Correlation, the researchers found out that warehouse optimization significantly correlated to business performance. The study also reported that space and layout optimization have a positive and significant relationship with business performance.

In another study conducted on optimization of warehouse layout used for storage materials used in ship construction and repair, it was revealed that warehouse layout optimization significantly improve the efficiency of corporate organizations (James et al, 2011). The study conducted Matyi (2010) revealed that warehouse space has a significant relationship with corporate performance. The study also reported that storage optimization significantly enhance the profitability of business firms.

Kariuki (2014) examined third-party warehouse layout and operation optimization in Bollore Africa logistics Limited, Nairobi. The study adopted the descriptive survey research design where data were collected from 40 warehouse supervisors in Bollore Africa logistics Limited. The data were collected using structured questionnaire while the descriptive statistics, ratios and correlation analysis were used for data analysis. After analyzing the data collected for the study, the researcher discovered that majority of the warehouses used random storage, mechanical devices and casual labour to optimize their operations. The study also found a positive relationship between level of optimization and storage system adopted by third-party logistics firms. The study concluded that the random storage guarantee high level of storage space utilization as opposed to the use of class based and dedicated storage design while the dedicated and class based system guarantee high level of labour productivity compared to random storage.

### **Gap in Literature**

It was observed that a good number of studies have been conducted on warehouse operations in business organizations but none of these studies related warehouse optimization and its dimensions such as warehouse layout optimization and space optimization to organizational efficiency (operational efficiency and cost efficiency) of indigenous shipping companies in Nigeria. Most of the studies conducted on warehouse operations relate the concept to customer satisfaction and business performance and while studies that examined the relationship between warehouse optimization and organizational efficiency of indigenous shipping companies in Nigeria are lacking. This has created a gap in literature which the present study intends to fill.





## METHODOLOGY

This study adopted the correlational research design in which the researcher measures the relationship between two variables (warehouse optimization and organizational efficiency). The population of this study consisted of 52 indigenous shipping companies that are functional and duly registered with the Nigerian Shipping Council, South-West Zone of Nigeria. Given the researchable nature of the population, the census sampling technique was applied where all the indigenous shipping companies in the six states that make up the South-West Zone were studied. The sampling units consisted of logistics managers, warehouse managers and operational managers of the shipping companies in South-West Nigeria. A sample of 156 managers of the above categories was drawn from the 52 indigenous shipping companies in South-West Nigeria on the ration of 3 managers per company. A structured questionnaire was used to elicit data from the respondents. The questionnaire was validated via content analysis while its reliability of the instrument was determined using Cronbach Alpha method. A total copy of 156 questionnaires was administered to the respondents and 143 copies were retrieved. The data collected were analyzed in tables while the hypotheses were tested using the Spearman Rank Order Correlation Coefficient ( $\rho$ ). The SPSS 24.0 version was used to correlate the data on the study variables.

## RESULTS AND DISCUSSION

The results of the correlation analysis carried out on the study variables are presented in the tables below:

**Table 1: Result of correlation analysis between warehouse layout optimization and operational efficiency of indigenous shipping companies**

			Warehouse Layout Optimization	Operational Efficiency
Spearman Rank (rho)	Warehouse Layout Optimization	Correlation Coefficient	1.000	.712**
		Sig. (2 tailed)	.	.001
		N	143	143
	Operational Efficiency	Correlation Coefficient	.712**	1.000
		Sig. (2 tailed)	.001	.
		N	143	143

\*\*Correlation is significant at 0.01 levels (2 tailed)

\*Correlation is significant at 0.05 levels (2 tailed)

**Source:** SPSS-generated Output

Table 1 shows that warehouse layout optimization is strongly and positively correlated to operational efficiency of indigenous shipping companies ( $\rho = .712^{**}$ ) and the symbol \* signifies that this correlation is significant at 0.01 level. Based on this result, the null hypothesis ( $H_{01}$ ) is rejected and the alternate hypothesis is accepted. This implies that there is significant relationship between warehouse layout optimization and operational efficiency of indigenous shipping companies in South-West Nigeria.



**Table 2: Result of correlation analysis between warehouse layout optimization and cost efficiency of indigenous shipping companies**

			Warehouse Layout Optimization	Cost Efficiency
Spearman Rank (rho)	Warehouse Layout Optimization	Correlation Coefficient Sig. (2 tailed) N	1.000 . 143	.623** .002 143
	Cost Efficiency	Correlation Coefficient Sig. (2 tailed) N	.623** .002 143	1.000 . 143

\*\*Correlation is significant at 0.01 levels (2 tailed)

\*Correlation is significant at 0.05 levels (2 tailed)

**Source:** SPSS-generated Output

Table 2 reveals that warehouse layout optimization has a strong and positive correlation with cost efficiency of indigenous shipping companies ( $\rho = .623^{**}$ ) and the symbol \* indicates that this correlation is significant at 0.01 level. As a result of this, we then reject the null hypothesis ( $H_{02}$ ) and accept the alternate hypothesis which states that there is a significant relationship between warehouse layout optimization and cost efficiency of indigenous shipping companies in South-West Nigeria.

**Table 3: Result of correlation analysis between warehouse space optimization and operational efficiency of indigenous shipping companies**

			Warehouse Space Optimization	Operational Efficiency
Spearman Rank (rho)	Warehouse Space Optimization	Correlation Coefficient Sig. (2 tailed) N	1.000 . 143	.811** .003 143
	Operational Efficiency	Correlation Coefficient Sig. (2 tailed) N	.811** .003 143	1.000 . 143

\*\*Correlation is significant at 0.01 levels (2 tailed)

\*Correlation is significant at 0.05 levels (2 tailed)

**Source:** SPSS-generated Output

Table 3 indicates that warehouse space optimization has a very strong and positive correlation with operational efficiency of indigenous shipping companies ( $\rho = .811^{**}$ ) and the symbol \* implies that this correlation is significant at 0.01 level. Consequently, null hypothesis ( $H_{03}$ ) is rejected and the alternate hypothesis is accepted. This implies that we then accept there is significant relationship between warehouse space optimization and operational efficiency of indigenous shipping companies in South-West Nigeria.



**Table 4: Result of correlation analysis between warehouse space optimization and cost efficiency of indigenous shipping companies**

			Warehouse Space Optimization	Cost Efficiency
Spearman Rank (rho)	Warehouse Space Optimization	Correlation Coefficient Sig. (2 tailed) N	1.000 . 143	.848** .004 143
	Cost Efficiency	Correlation Coefficient Sig. (2 tailed) N	.848** .004 143	1.000 . 143

\*\*Correlation is significant at 0.01 levels (2 tailed)

\*Correlation is significant at 0.05 levels (2 tailed)

**Source:** SPSS-generated Output

Table 4 shows a very strong and positive correlation between warehouse space optimization and cost efficiency of indigenous shipping companies ( $\rho = .848^{**}$ ) and this correlation is significant at 0.01 level as indicated by the symbol \*\*. Hence, null hypothesis ( $H_{04}$ ) is rejected and the alternate hypothesis is accepted. This implies that there is a significant relationship between warehouse space optimization and cost efficiency of indigenous shipping companies in South-West Nigeria.

## DISCUSSION OF FINDINGS

It was discovered in this study that warehouse layout optimization has a significant relationship with operational efficiency of indigenous shipping companies in South-West Nigeria. This finding was derived from the result of the correlation analysis carried out on two variables. The result revealed that warehouse layout optimization is strongly and positively correlated to operational efficiency of indigenous shipping companies ( $\rho = .712^{**}$ ) and this correlation is significant at 0.01 level. Based on this result, the null hypothesis ( $H_{01}$ ) was rejected and the alternate hypothesis was accepted. This implies that there is significant relationship between warehouse layout optimization and operational efficiency of indigenous shipping companies in South-West Nigeria. This finding is supported by Karasek (2015) and Ackah and Agboyi (2015) as they revealed that warehouse layout optimization significantly enhance operational efficiency.

This study also found a significant relationship between warehouse layout optimization and cost efficiency of indigenous shipping companies in South-West Nigeria. This finding was obtained from the result of the correlation analysis carried out on the two variables. The result revealed that warehouse layout optimization has a strong and positive correlation with cost efficiency of indigenous shipping companies ( $\rho = .623^{**}$ ) and this correlation is significant at 0.01 level. As a result of this, we then rejected the null hypothesis ( $H_{02}$ ) and accepted the alternate hypothesis which states that there is significant relationship between warehouse layout optimization and cost efficiency of indigenous shipping companies in South-West Nigeria. This finding is consistent with the postulations of Gill (2016) and Karasek (2013) who



maintained that warehouse layout optimization helps companies to reduce their operational costs.

A significant relationship was reported between warehouse space optimization and operational efficiency of indigenous shipping companies in South-West Nigeria. This finding was obtained from the result of the correlation analysis carried out on the two variables. The result revealed that warehouse space optimization has a very strong and positive correlation with operational efficiency of indigenous shipping companies ( $\rho = .811^{**}$ ) and this correlation is significant at 0.01 level. Consequently, null hypothesis ( $H_{03}$ ) was rejected and the alternate hypothesis was accepted. This implies that we then accepted there is significant relationship between warehouse space optimization and operational efficiency of indigenous shipping companies in South-West Nigeria. This finding is supported by Robinson (2018) and Kariuki (2014) as their studies revealed that warehouse space optimization has significant impact on operational efficiency of firms.

Finally, it was revealed that warehouse space optimization is significantly related to cost efficiency of indigenous shipping companies in South-West Nigeria. This finding emerged from the result of the correlation analysis carried out on the two variables. The result revealed that a very strong and positive correlation between warehouse space optimization and cost efficiency of indigenous shipping companies ( $\rho = .848^{**}$ ) and this correlation is significant at 0.01 level. Hence, null hypothesis ( $H_{04}$ ) was rejected and the alternate hypothesis was accepted. This implies that there is significant relationship between warehouse space optimization and cost efficiency of indigenous shipping companies in South-West Nigeria. This finding is in line with the findings of Ackah and Agboyi (2015) and Ali and Asif (2012) which revealed that optimizing the warehouse space optimization significantly enhance cost efficiency of firms.

## CONCLUSIONS

This study examined the relationship between warehouse optimization and organizational efficiency of indigenous shipping companies in South-West Nigeria. From the result of the analysis carried out, it was revealed that significant relationship exists between warehouse layout optimization and operational efficiency of indigenous shipping companies in South-West Nigeria. The study also found a significant relationship between warehouse layout optimization and cost efficiency of indigenous shipping companies in South-West Nigeria. A significant relationship was also reported between warehouse space optimization and operational efficiency of indigenous shipping companies in South-West Nigeria. It was also reported that warehouse space optimization has significant relationship with cost efficiency of indigenous shipping companies in South-West Nigeria. Therefore, it was concluded that warehouse optimization is significantly related to organizational efficiency of indigenous shipping companies in South-West Nigeria.



## RECOMMENDATIONS

Based on the findings and conclusions, the following recommendations are made:

1. That, indigenous shipping companies in Nigeria should optimize their warehouse operations as it would enhance their organizational efficiency.
2. That, indigenous shipping companies in Nigeria should optimize their warehouse layout and design as it would not only enhance their operational efficiency but also enhance their cost efficiency.
3. That, indigenous shipping companies in Nigeria should optimize their warehouse space as it would enhance efficient utilization of the available space in the warehouse and avoid the cost of hiring a third party warehouse.
4. That, indigenous shipping companies in Nigeria should streamline their warehousing processes as it would not only reduce operational costs but would also enhance their operational efficiency.
5. Finally, it is recommended that indigenous shipping companies in Nigeria should efficient utilize their warehouse space as it would enable them accommodate more goods and achieve organizational efficiency.

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