Warehouse Optimization and Customer Satisfaction of Large Scaled Manufacturing Firms in Rivers State of Nigeria

Ikegwuru, Mac-Kingsley (PhD).
Department of Marketing, Faculty of Management Sciences,
Rivers State University, Port Harcourt

And

Beatrice Chinyere Acee-Eke (PhD).
Department of Marketing, Faculty of Management Sciences,
Rivers State University, Port Harcourt.

Abstract

The purpose of this study was to find out how warehouse optimization relates with customer satisfaction in large scaled manufacturing firms in Rivers State of Nigeria. The study employed the descriptive survey research method and a sample size of 296 retailers of selected large scaled manufacturing firms products in Port Harcourt by means of the judgmental sampling technique. The sources of data were both primary and secondary. The primary source of data was the questionnaire, and the statistical tools adopted for analysis was the Pearson's correlation analysis which was used to gauge the relationship between warehouse optimization and customer satisfaction in large scaled manufacturing firms in Rivers State, while the analysis of variance was used to ascertain the difference in mean on responses on the study variables. The study reveals a strong, positive and significant relationship between warehouse optimization and customer satisfaction and concludes that warehouse optimization in large scaled manufacturing strongly, positively and significantly relates with customer satisfaction. The study recommends amongst others that large scaled manufacturing firms should review its operation strategies and balance its warehouses optimization to achieve customer satisfaction.

Key words: Customer satisfaction, Large scaled manufacturing firms, Port Harcourt, Warehouse optimization.

Introduction

Over the years warehousing has evolved to become a critical factor for many companies to endear competitive advantage (Tompkins & smith, 1998). The presence of modern inventory management philosophies such as lean, just in time, warehouse management system, automation and control systems which are intended to improve on return on investment by optimizing the inventory levels and helping reduce the overall warehousing costs which has revolutionized the warehouse practice as well as the strategic role of the warehouse (Kare, Veeramachaneni & Rajuldevi, 2009).

Warehousing is one of the most important and critical linkage of modern supply chains, although, it is an activity of high financial cost firms, standing for approximately 2-5% of total logistical costs (Frazelle 2002). Therefore planning, managing and optimizing of today's warehouse require a more integrated, scientific and professional approach than ever before (Kare et al., 2009). The ultimate objective of optimizing and managing warehouse layout and operations is to economically promote and preserve product quality as the products move across the supply chain by ensuring order accuracy through effective use of space, equipment, labor, tools, and accessibility of all items and protection of all items (Tompkins & Smith, 1998). Warehouse layout and operational optimization involve examining two different but related element of space utilization: Storage capacity or layout of the buildings and operational efficiency. Layout is direct function of the physical aspects of the layout, the width of the aisles, the storage methods and the types of storage aids. Operational efficiency on the other hand can be termed as how well

the storage capacity is being utilized, which is directly a result of how warehouse resources are managed (Benson, 2010).

However warehouse optimization still remains a goal not reality (Aberdeen, 2000). This is because many warehouses, especially third party warehouses in Nigeria still grapple with the issue of how to optimize their warehouses to satisfy customer requirements, given so many constraints that affect their operations. Lack of adequate storage space, stringent working rules, increased cost of installing and implementing a warehouse management system and lack of expertise are also cited as other reasons why organizations outsource their warehouse management to third party logistics providers (Tozay, 2012). The telecommunication firms in Nigeria are still grappling with the issue of optimization of its warehouses (KPA, 2012). Warehouse optimization problem is a universal problem and many scholars have developed both qualitative approach (Dharmapriya & Kulatunga, 2011; Noble, 2011; Karasek, 2013) as well as quantitative models (Vrysagotis & Kontis, 2011; Raidl & Pferschy, 2010; Kljajic et al., 2000) to address and solve warehouse optimization problems. This present study is an attempt to add to the existing stock of knowledge on warehouse optimization and customer satisfaction. The study therefore, investigates the relationship between warehouse optimization and customer satisfaction in large scaled manufacturing firms in Port Harcourt.

Statement of the Problem

Today businesses experience enormous changes in customer's needs and expectations. Contemporary customer depicts intelligence or good judgment and demands more and more in terms of delivery time, quality, availability, reliability, product diversity and service (Pujawan 2004; Kumar & Deshmukh 2006).The needs of these customers can radically change in every moment, even when the product is in development (Cooper 2000; MacCormack et al. 2001). Times of peak demand can be a challenge, pushing fulfillment operations to the limit in the rush to serve immense order volumes and meet promised service levels. The ultimate measure of success is getting product to the right place at the right time, leading to satisfied customers and repeat business. Warehouse optimization has issues that affect customer satisfaction levels and many large retailers are expecting manufacturers to provide them with perfect order deliveries. The problem statement of this study is described in the following expression: "Can warehouse optimization bring about customer satisfaction?"
This study therefore, examines the relationship between warehouse optimization and customer satisfaction with the goal of having complete orders and on time deliveries. This study's purpose is to find ways to improve warehouse optimization, thereby increasing customer satisfaction large scaled manufacturing firms.

Objective of the Study
The objective of the study is to investigate the relationship between warehousing optimization and customer satisfaction in large scaled manufacturing firms in Port Harcourt.
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Review of Related Literature
Theoretical Review
The theoretical framework for this study is anchored on the resource based view of the firm. The resource based view is an approach to achieving competitive advantage that emerged in 1980s and1990s, after the major works published by Wernerfelt, ("The Resource-Based View of the Firm"), Prahalad and Hamel ("The Core Competence of The Corporation"), Barney (1991) ("Firm resources and sustained competitive advantage") and others. The resource-based view (RBV) is a model that sees resources as key superior firm performance. If a resource exhibits VRIO attributes, the resource enables the firm to gain and sustain competitive advantage.

The resource-based view (RBV) as a basis for the competitive advantage of a firm lies primarily in the application of a bundle of valuable tangible or intangible resources at the firm's disposal (Wernerfelt, 1984; Rumelt; Penrose, 1959). To transform a short-run competitive advantage into a sustained competitive advantage requires that these resources are heterogeneous in nature and not perfectly mobile (Peteraf, 1993). Effectively, warehouse optimization can translate into a valuable resource that is capable of matching customers' requirements.

Warehouse

Tompkins and Smith (1998) defined a warehouse as an independent organization specializing in integrated warehousing operations that are scaled and customized to customer needs based on the market conditions and the demand and delivery requirements for their products and materials. There is increased demand for third party warehouse services as firms gravitate towards concentrating on core competences and realigning or right-sizing their operations. W arehouses are known to offer flexibility, relieve frustration in areas that firms have limited (or no) competency, save money and reduce inventory (Tompkins & Smith, 1998).

Warehouse Optimization

A warehouse or a distribution center is a commercial building used for the storage of goods. The principal element of warehousing is order processing which generally refers to the work flow associated with delivering products ordered by a customer to a shipping carrier. Frazelle (2002) states that warehouses are important for a supply chain because they provide storage for raw materials, components, work-in-process, and finished goods; operate as distribution and order fulfillment centers; and perform localized and value added warehousing.

Warehouse optimization generally focuses on how well the warehouse utilizes the existing storage capacity, measuring the impact of our choices of material handling equipment, labour, methods, procedures, and support systems (Benson, 2010). Operation strategies refer to those decisions about operations that have global effects on design decisions, and include the choice between randomized storage or dedicated storage, whether or not to do zone picking, and the choice between sort-while-pick or sort after-
pick (Gu et al., 2010). Warehouse optimization seeks to improve efficiency and effectiveness of a warehouse process.

There is a need to optimize the technology, operation and the manpower in order to get good results and high efficiency (Kare et al., 2009). Gill (2006) observes that warehouse management and inventory control are the areas within supply chain with the greatest savings potential when it comes to optimization of supply chain. Recent investigations also reveal that about 33 per cent of logistical costs can be attributed to the costs arising in inventory management and therefore, a proper investigation of savings that might be achieved within this part of supply chain is necessary and is in many cases profitable (Raidl & Pferschy,2010).

Customer Satisfaction

Customer satisfaction is considered as the most satisfactory performance variables by managers (Lu & Yang, 2010). Accordingly, Kiefer and Novack (1999) state that understanding the influence of some measures in customer's reaction is far more important than any internal measure alone. De Koster and Balk (2008) measure customer perception by using DEA. The authors verify the contribution of some activities (like cross-docking, cycle counting, and return handling) to the increase of customer perception. Lu and Yang (2010) consider customer response as attributes of logistics service capabilities. Customer response encompasses pre-sale customer service, post-sale customer service and responsiveness to customer.

For the purpose of this study, customer satisfaction is defined as customer's positive or negative feeling about the value of using warehouse's optimization in a series of situation experiences.

Warehouse Optimization and Customer Satisfaction

If the retailer does not have a good inventory system, they will not be able to forecast demands with any kind of accuracy. This might result in running out of stock every so often (Levinson, 2005). Better warehouse optimization leads to efficient inventory management which enables better customer satisfaction (Eckert, 2007). Customers are satisfied when suppliers fulfill their orders on time (Wilding, 2003). This makes channel partners keep buffer stocks to fulfill customer orders or enter into long term relationships which require commitment and trust (Wang,2002). Having warehouse optimized and customers desired products on hand when they want them are critical to customer satisfaction. More and more chain partners are using inventory-management information to improve their ability to fulfill key customer demand and having the right product at the right time (Anonymous, 1998). Understanding consumer behaviors and market trends can help chain partners to satisfy customer needs and to manage inventory information efficiently

Empirical Review

There are a good number of works that are related to this topic, but two studies are of particular relevance and interest. The first study is the one done by Kariuki (2014) who investigated third-party warehouse layout and operation optimization in Nairobi. The study adopted a case study approach using Bollore Africa logistics limited Nairobi, obtaining a 75% response rate. The analysis was executed using descriptive statistics, ratios and correlation analysis procedures. The findings reveal that most warehouses used random storage, mechanical devices and casual labour to optimize their operations. Besides, the study found a strong positive relationship between level of optimization and storage system adopted. The study therefore recommended amongst others that third party warehouse should decide on the two trade-offs; Time and space, relying on their constraints and adopt the storage strategy that tenders the highest optimization.

In the second study, Magutu, Chirchir and Mulama (2013) examined the effects of logistic outsourcing practices on the performance of large scale manufacturing firms and observed that warehousing and material handling were among the logistic functions most outsourced by large scale firms in Nairobi. The study found that the outsourcing had an effect on the performance of the organization. The study however focused on the outsourcing organization without addressing the methodology and policies the third party warehouses should implement to ensure that the outsourcing organizations attain high performance and remain competitive in the market.

Gap in Literature

The study of Kariuki (2014) was on third-party warehouse layout and operation optimization in Nairobi. The study adopted a case study approach using Bollore Africa logistics limited Nairobi, The analysis was executed using descriptive statistics, ratios and correlation analysis procedures. This present study employed a survey approach amenable to the use of questionnaire. The study adopted descriptive statistics, correlational and analysis of variance techniques for data analysis.

Magutu etal. (2013) examined the effects of logistic outsourcing practices on the performance of large scale manufacturing firms in Nairobi Kenya. This present study borders on warehouse optimization and customer satisfaction in large scaled manufacturing firms in Rivers State.

There is a lack of empirical studies on warehouse optimization and customer satisfaction in large scaled manufacturing firms in Rivers State, for which this present study seeks to fill the knowledge gap in the area of warehouse optimization and customer satisfaction in large scaled manufacturing firms in Rivers State.

From the review of literature, the study formulated the following hypothesis:

H01: Warehouse optimization does not significantly effect customer satisfaction.

Methodology

This section discussed the research design, target population and sample design as well as data collection instruments and procedures and data analysis.

Research Design

The study borders on the relationship between warehouse optimization and customer satisfaction in telecommunication firms in Port Harcourt. The study adopted a descriptive approach as a descriptive research design is used when data are collected to describe persons, organizations, settings or phenomena (Creswell, 2003). Descriptive design was ideal for this research due to the fact that the study involved identifying the relationship between warehouse optimization and customer satisfaction in telecommunication firms in Port Harcourt.

Population and Sampling procedures

The target population was twenty (20) large scaled firms in Port Harcourt. The study targeted 296 retailers who are the customers of the large scaled manufacturing firms under study, who were selected by means of the judgmental sampling technique. This technique allowed the researchers to select the retailers involved in the research sample who have adequate knowledge on the issues considered in this study.

Data Collection

The study collected both primary and secondary data. Primary data was collected through the use of questionnaires. The first part contained questions on the bio data as well as general questions on the subject matter; the second and third sections contained questions on the specific objectives of the study. For the purpose of this study, the manufacturers' response to the retailers' needs and requests were used for detecting the level of customer satisfaction. The secondary data was obtained from journals, conference papers, newsletters and the Internet.

Data Analysis Technique

The study collected quantitative data and this was analyzed using descriptive statistics, Pearson's correlation coefficient techniques and analysis of variance. The findings were presented in pie charts and tables. 1

Data Analysis and Results

Demographic Analysis of Respondents

Table 1 depicts that the demographic analysis envelopes gender, age bracket, educational status, occupational status, religious affiliation, and monthly income range.

1. Gender of Respondents

Table 2: Frequencies showing Gender of Respondents (n=296)

S/N	Age Bracket	Frequency		Percentage (%
(i)	Male <20	169		57
(ii)	Female	127	.	43
	Total	296		100

Source: SPSS 22.0 Window output (based on 2019 field survey data

As shown in table 1, 169 males representing 57% of total respondents responded to the survey instrument, while 127 females representing 43% of the respondents participated in the survey. This is further illustrated in figure 1.
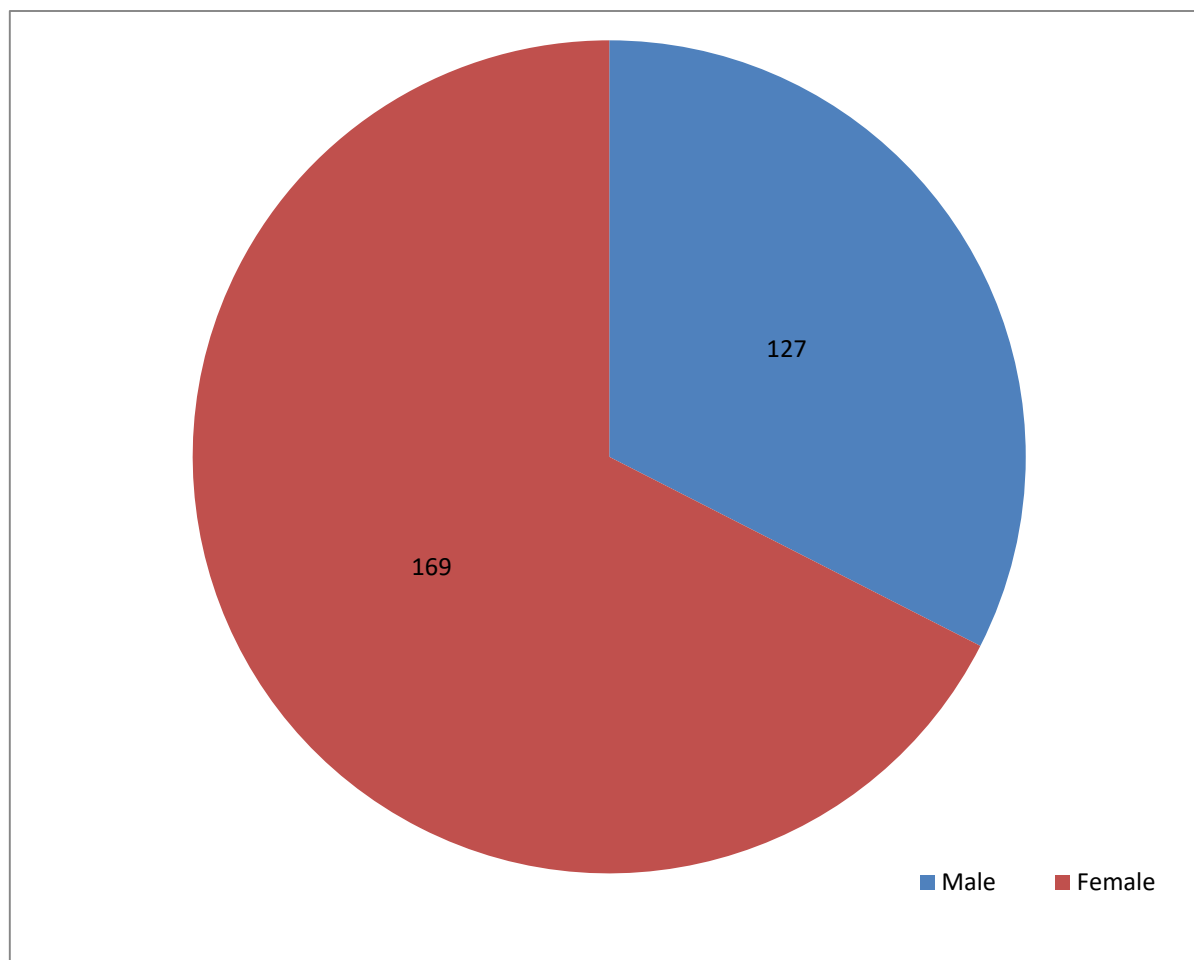

 Figure 1 Gender of Respondents

Source: SPSS 22.0 Window output, 2019

2. Age of Respondents
Respondents were asked to indicate their age bracket. The retrieved questionnaires by respondent's age bracket are summarized in table 2

Table 2: Frequencies showing Age Bracket of Respondents (n=296)

S/N	Age Bracket	Frequency	Percentage (%)
1	<20	38	13
2.	21-30	92	31
3.	31-40	95	32
4.	41-50	35	12
5.	51-60	27	9
6.	>60	9	3
	Total	296	100

Source: SPSS 22.0 Window output (based on 2019 field survey data).

As table 2 shows, out of the 296 retrieved questionnaires, respondents under the age bracket (31-40) are the highest, representing approximately 32 percent, closely followed by respondents under the age bracket (21-30) who represent approximately 31 percent and respondents under the age bracket (< 20) who represent about 13 percent of the respondents.   Respondents under the age bracket (41 – 50) represents approximately 12 percent while respondents under (51 -60) and (> 60) represent approximately 9 percent and 3 percent respectively. A clearer view of this information is shown in the pie chart in figure
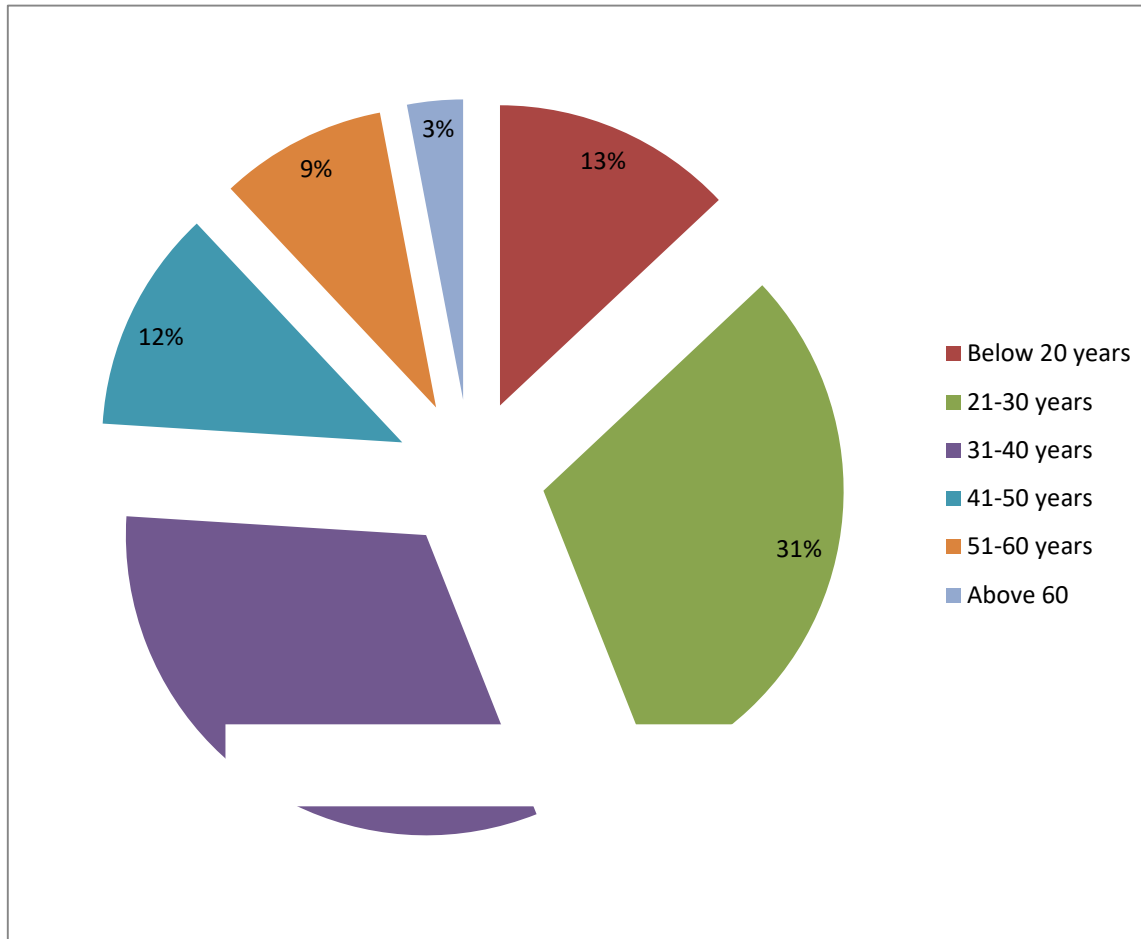

Figure 2: Age Bracket of Respondents (n=296)

Source: SPSS 22.0 Window output (based on 2019 field survey data).

Storage Systems used by Large Scaled Manufacturing Firms in Rivers State

Additionally, the study sought to know the type of storage system used by Large scaled manufacturing firms in Rivers State. The study found that 33% of the warehouses used random storage system, 30% adopted class based system while 22% had a combination of any two storage system and 15% of the warehouses were dedicated to specific goods as shown in Table 3.

Table 3: Storage Systems used by Large Scaled Manufacturing Firms 　　**(n=296)**

Storage Systems	Frequency	Percentage
Random Storage System	98	33
Class Based System	89	30
Combination of Storage/Class Based Systems	65	22
Specific Goods	44	15
Total	**296**	**100.0**

Relationship between Warehouse Optimization and Customer Satisfaction

The study set to investigate the relationship between warehouse optimization and customer satisfaction. The levels of optimization in the warehouses were analyzed against customer satisfaction and using SPSS system, pearsonian correlation was derived. The association was also tested for significance at 5% level of significance with a 2-tailed test. Thus, the critical values were set at 0.000 beyond which the association was concluded as being statistically insignificant or vice versa as shown in table 5.

Table 4: Relationship between warehouse optimization in customer satisfaction　(n=296).

		Warehouse Optimization	Customer Satisfaction
Warehouse Optimization	Pearson's correlation	1	.9988
	Sig. (2-tailed)		.0000
	N	296	296
Customer Satisfaction	Pearson's correlation	.9988	1
	Sig. (2-tailed)	.0000	
	N	296	296

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

Table 5 shows that the correlation coefficient between warehouse optimization and customer satisfaction is r=0.99 implying there is a very strong positive and significant correlation. This implies that an increase in warehouse optimization has significant relationship with customer satisfaction. The study also used ANOVA to test the difference in mean between warehouse optimization and customer satisfaction in this section. The results were presented in table 6.

Table 5: One way ANOVA for the difference in mean between warehouse optimization and customer satisfaction (n=296).

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	653335.73606	1	65335.72605	1278.48183	.0000
With in Groups	1533, 07394	295	511.02465		
Total	6548687999	296			

a. dependent variable: customer satisfaction
b. Predictor: Warehouse optimization

Table 6 shows that there is difference in mean between warehouse optimization and customer satisfaction F(dfB,dfw) =F(295,1) =1278.48183, p<0.05. Significant value is 0.01, r (1,159). This agrees with the correlation result in table 5.

Discussion

The quantitative analysis results gave the correlation coefficient (testing association) and the significant value of the association (testing significance). The significance testing was critical in analyzing the correlation further by showing whether the correlation was purely due to chance factors or not. From the analysis, the correlation coefficient value obtained was 0.9988. This indicated that the two variables had a positive and strong correlation. Thus the association was confirmed to be statistically significant and therefore, it is improbable that we would get correlation this big if there was not a relation between the variables. Further, to establish whether there was a relationship between the level of warehouse optimization and customer satisfaction, the research analyzed the storage design against the level of optimization and found that the warehouses used random storage system (33%), class based system {30%), combination of any of the systems (22%), and the system for special goods (15%) as shown in Table 3.

Therefore, from the analysis derived above, basing on the aforementioned arguments, it is certain to posit that there exist a strong, positive and significant relationship between warehouse optimization and customer satisfaction. This means that the higher the degree of warehouse optimization the good the activities of the manufacturers to the retailers can result to the positive satisfaction expressed by customers; and finally as the retailers expectation met or increases beyond the ability of firm's performances then the level of customer satisfaction increases. Our finding supports that of Kariuki (2014) who found a strong positive relationship between level of optimization and storage system adopted.

Conclusion

The purpose of this study was to examine the relationship between warehouse optimization and customer satisfaction in large scaled manufacturing firms in Rivers State. The primary aim for warehouses and distribution centers is to facilitate the movement of goods from suppliers to customers while meeting the customers' demand in a timely and cost-effective manner. The data collected was analyzed using descriptive statistics and Pearson's correlation. The study deduced that random storage system, class based system, combination of any of the system and special goods system guarantee higher level of storage space utilization in warehouse optimization in large scaled manufacturing firms in Rivers State. The study performed correlation analysis, where a strong positive and

significant relationship was found between warehouse optimization and customer satisfaction. The research can thus infer that large scaled manufacturing firms stand to gain through warehouse optimization. In situations where firms adopt warehouse optimization, customer satisfaction is certainly guaranteed. The findings proved that the respondents were a good source of information as they had enough experience to provide reliable and accurate information for analysis. The research can therefore conclude that the information derived from the respondent is valuable, and that warehouse optimization in large scaled manufacturing firms strongly, positively and significantly relates with customer satisfaction.

Recommendations

The level of warehouse optimization in large scaled manufacturing firms is very high which can be attributed to the fact that they are bent on maximizing input against output. The research therefore recommends the following:

1. Large scaled manufacturing firms should review its operation strategies and balance its warehouses optimization to achieve customer satisfaction.

2. The study also recommends that warehouse managers should adopt a balanced and representative number of workforces in all areas of the warehouse that will result in higher level of machine utilization and warehouse optimization that enhances customer satisfaction in large scaled manufacturing firms.

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\About the Authors

Dr. **Mac-Kingsley Ikegwuru** has successfully defended his doctoral thesis in Marketing (Supply Chain Option) in the Department of Marketing, Rivers State University, Port Harcourt, Nigeria. He currently conducts research on brand, cloud computing, supply chain management and firm performance. He has authored or co-authored several articles in referred Journals. Mac-kingsley Ikegwuru is the corresponding author and can be contacted at bestvaluecrest@gmail.com

Dr. Beatrice Chinyere Acee-Eke has successfully defended her doctoral thesis in Marketing in the Department of Marketing, Rivers State University, Port Harcourt, Nigeria. She currently conducts research on green marketing, supply chain management and information adoption. She has authored or co-authored several articles in referred Journals. Beatrice Chinyere Acee-Eke can be contacted at bettyacee1@gmail.com