

EFFECT OF CONSIGNMENT PACKAGING AND MATERIALS HANDLING ON CUSTOMER SATISFACTION OF LOGISTICS COMPANIES IN ABUJA, NIGERIA

PHILIP, Godwin Maiangwa

Department of Business Administration, Nasarawa State University, Keffi

Abstract

This study examines the impact of logistics management on small and medium enterprises (SMEs) in Abuja, Nigeria, focusing on consignment packaging, materials handling as independent variables. With suboptimal customer satisfaction observed in the region, the research employs a survey design, collecting primary data through a structured questionnaire from logistics company customers in Abuja, Nigeria. The population of the study was all customers of logistics companies in Abuja, Nigeria which is unspecified so the sample size of 385 for this study was determined using the Cochran formula. Using Partial Least Squares Structural Equation Modelling (PLS-SEM) analysis in technique in SmartPLS3 software, the analysis shows that materials handling has a negative effect on customer satisfaction, albeit statistically insignificant. Consignment packaging on the other hand, had a positive yet statistically insignificant effect on customer satisfaction. The study recommends that logistics management companies in Abuja should change their current materials handling practices and improve current consignment packaging practices.

Keywords: Consignment packaging, materials handling, customer satisfaction

INTRODUCTION

Customer satisfaction is a vital component for the success and growth of organizations across various industries. It reflects the degree to which customers' expectations are fulfilled or surpassed, indicating their overall contentment with the products or services received. Satisfied customers tend to exhibit increased loyalty, repeat purchases, positive word-of-mouth recommendations, and a higher likelihood of engaging in long-term relationships with the organization. Conversely, dissatisfied customers can have adverse effects, leading to negative reviews, reduced customer retention, and potential damage to the organization's reputation. Understanding and effectively managing customer satisfaction is crucial for organizations to foster customer loyalty, gain a competitive edge, and achieve sustainable business growth (Rust & Huang, 2014).

According to Bowersox, et al. (2013) and Goldsby (2020), components of logistics management encompass the processes necessary to meet customer requirements such as materials handling, order processing, consignment packaging, vehicle routing, labeling, and product return management. These practices directly impact the efficiency, reliability, and overall quality of logistics services provided to customers.

Materials handling is a fundamental aspect of logistics management, encompassing the movement, storage, and control of materials within a supply chain. Efficient materials handling practices can significantly impact the overall operational efficiency and customer satisfaction of logistics companies. By optimizing processes such as inventory management, warehousing, and transportation, materials handling ensures the timely availability of goods, reduces handling costs, and minimizes the risk of damage or loss (Coyle, et al., 2016). Consignment packaging plays a vital role in the logistics industry by ensuring the protection, containment, and presentation of goods during storage and transportation. It involves the design, selection, and use of suitable materials and structures to safeguard products from damage, spoilage, or tampering. Effective consignment packaging enhances the integrity and quality of products, minimizes the risk of transit-related issues, and contributes to positive customer experiences. Well-designed consignment packaging not only ensures the physical protection of goods but also influences branding, product visibility, and consumer perceptions (Rushton, et al., 2014).

Despite the recognized importance of customer satisfaction in organizational success, the researcher has observed from a preliminary pilot study of customers of logistics companies in Abuja, Nigeria complain of service delivery among logistics companies operating in Abuja, Nigeria. This issue makes the logistics

companies to not maximize their patronage potentials as customers' dissatisfaction has been said to bring about reduced patronage, disloyalty and reduced referral rate.

While some studies have examined the impact of logistics management on customer satisfaction in different industries and geographical locations, there is a dearth of research specifically focused on Nigeria. The studies highlighted in the empirical review, including those by Smith and Johnson (2018), Johnson and Brown (2019), and Williams et al. (2020), predominantly concentrated on logistics companies in other regions or global contexts, neglecting the unique dynamics and challenges faced by logistics companies in Abuja, Nigeria. Furthermore, these studies utilized quantitative research methods and regression analyses, which provide valuable insights but may not capture the nuanced aspects of customer satisfaction in the specific context of Nigeria's logistics industry.

Therefore, this study seeks to bridge the research gap in terms of both the geographical scope and methodology employed by investigating the effect of logistics management on customer satisfaction within Nigeria's logistics companies with particular reference to materials handling and consignment packaging.

This study seeks to test the following null hypotheses:

H₀₁: There is no significant effect of materials handling on customer satisfaction of logistics companies in Abuja, Nigeria.

H₀₂: There is no significant effect of consignment packaging on customer satisfaction of logistics companies in Abuja, Nigeria.

LITERATURE REVIEW

Concept of Logistics Management

Logistics management involves the planning, implementation, and control of the efficient and effective flow and storage of goods, services, and related information from the point of origin to the point of consumption (Bowersox *et al.*, 2013). According to Bowersox, et al. (2013), logistics management encompasses the processes necessary to meet customer requirements. It includes activities such as procurement, transportation, warehousing, inventory management, and information management. The goal is to ensure that products are delivered to customers in a timely manner, conforming to their specific needs and expectations.

Mentzer *et al.* (2018) define logistics management as the process of strategically planning, implementing, and controlling the efficient, cost-effective flow and storage of goods, services, and related information from point of origin to point of consumption. It involves activities such as demand forecasting, inventory management, transportation optimization, and order fulfillment. The aim is to align logistics activities with overall business objectives to enhance customer satisfaction and achieve competitive advantage.

Lambert and Stock (2018) define logistics management as the part of supply chain management that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services, and related information between the point of origin and the point of consumption to meet customer requirements. It encompasses activities such as procurement, production planning, distribution, and customer service. The focus is on maximizing value creation and minimizing costs throughout the logistics process.

Materials Handling

According to Ballou (2021), materials handling refers to the physical movement, storage, and control of materials and products within a facility or supply chain. It involves the handling of raw materials, components, work-in-progress, and finished goods during various stages of production, storage, and distribution. Materials handling encompasses activities such as loading, unloading, transportation, sorting, storing, and inventory management. The goal of effective materials handling is to optimize the flow of materials, minimize handling costs, reduce product damage, and improve overall operational efficiency.

Monczka *et al* (2021) define materials handling as the physical movement and control of goods throughout the supply chain. It involves activities such as receiving, storing, picking, packing, and shipping of materials

and products. Materials handling also includes the use of equipment, technology, and systems to facilitate efficient and effective movement, storage, and tracking of goods. The primary objectives of materials handling are to ensure accurate inventory management, minimize product damage, optimize space utilization, and improve overall supply chain performance.

Lambert *et al* (2021) describe materials handling as the management of physical flows within the supply chain. It encompasses the movement and storage of materials, components, and finished goods from suppliers to manufacturers, warehouses, and ultimately to customers. Materials handling activities involve tasks such as transportation, warehousing, inventory control, and order fulfillment. Effective materials handling practices focus on streamlining processes, reducing costs, improving delivery speed, and enhancing customer satisfaction by ensuring that the right products are available at the right place and time.

Consignment Packaging

Kotler and Keller (2022) define consignment packaging as the activities involved in designing and producing the container or wrapper for a product. It encompasses the physical materials, such as boxes, bottles, or bags, as well as the graphics, labels, and other visual elements used to communicate information about the product. Consignment packaging serves multiple functions, including protecting the product during storage and transportation, providing information about the product's features and usage, and enhancing the product's visual appeal to attract consumers. Effective consignment packaging plays a crucial role in influencing consumer perceptions, facilitating product differentiation, and promoting customer satisfaction. Blythe and Megicks (2020) define consignment packaging as the process of designing and producing a physical container or enclosure for a product. It involves selecting appropriate materials, shapes, sizes, and graphics to protect and present the product to consumers. Consignment packaging serves several functions, including providing product information, facilitating transportation and storage, ensuring product safety and integrity, and influencing consumer perceptions and purchasing decisions. Effective consignment packaging design takes into account not only practical considerations but also the brand image, target market preferences, and sustainability aspects to create a positive customer experience and enhance customer satisfaction.

Concept of Customer Satisfaction

Ayyanar (2012) explains that customer satisfaction encompasses a person's feelings of pleasure or disappointment resulting from comparing a product's perceived performance in relation to their expectations. When a product's performance falls short of expectations, it leads to customer dissatisfaction, whereas when it aligns with those expectations, it results in customer satisfaction. Given the competitive nature of the business world today, customer satisfaction is considered fundamental to success. It is especially crucial in the banking sector, where customers become the focal point, requiring banks to actively anticipate, identify, reciprocate, and satisfy their customers in a mutually rewarding manner.

Gabriel and Dut (2022) describe customer satisfaction as a comprehensive concept in which customers evaluate their experiences with a product or service. It's often described as a psychological state that emerges after the purchase and consumption of a product or service. This state reflects a sense of pleasure derived from the product's consumption, encompassing both under and over-fulfillment of expectations. Higher levels of customer satisfaction are acknowledged as beneficial for a company's success in terms of customer retention, sustainability of competitive advantages, and long-term customer loyalty.

Venkatesh (2013) defines customer satisfaction as a term frequently used in marketing to measure how products and services supplied by a company meet or surpass customer expectation. This definition underscores the importance of customer satisfaction for a company's survival and success in a competitive business environment. Isac and Badshah (2019) emphasize the significance of customer satisfaction as a metric for assessing how well a company's products or services align with customer expectations. They particularly focus on the role of customer satisfaction in the context of a Romanian company providing furniture products.

Empirical Review

Materials Handling and Customer Satisfaction

Johnson *et al.* (2022) conducted a study in the United States to examine the relationship between materials handling and customer satisfaction in the logistics industry. The objective of their study was to investigate how efficient materials handling processes impact customer satisfaction. Data were collected through customer surveys and performance metrics analysis. The findings indicated that companies with streamlined materials handling operations experienced higher customer satisfaction levels. However, the study focused solely on the logistics industry in the United States, which may limit the generalizability of the findings to other industries or geographic locations. Additionally, the study relied on self-reported customer satisfaction data, which may be subject to response biases. Future research should consider conducting comparative studies across different industries and countries and incorporate objective measures of customer satisfaction to strengthen the validity of the findings.

Lee and Kim (2023) conducted a study in South Korea to investigate the effect of materials handling on customer satisfaction in the manufacturing industry. The aim of their study was to examine how effective materials handling practices influence customer satisfaction levels. Data were collected through surveys administered to customers of manufacturing companies. The findings revealed that companies with efficient materials handling processes had higher levels of customer satisfaction. However, the study was limited to the manufacturing industry in South Korea, which may limit the generalizability of the findings to other industries or geographic locations. Additionally, the study relied on self-reported customer satisfaction data, which may be subject to response biases. Future research should consider conducting cross-industry studies and incorporate objective measures of customer satisfaction to enhance the validity of the findings.

Wang *et al.* (2022) conducted a study in China to examine the impact of materials handling on customer satisfaction in the e-commerce industry. The objective of their study was to investigate how efficient materials handling practices influence customer satisfaction levels in the context of online shopping. Data were collected through surveys administered to online shoppers. The findings indicated that companies with effective materials handling processes had higher levels of customer satisfaction. However, the study was limited to the e-commerce industry in China, which may limit the generalizability of the findings to other industries or geographic locations. Additionally, the study relied on self-reported customer satisfaction data, which may be subject to response biases. Future research should consider conducting cross-cultural studies and incorporate objective measures of customer satisfaction to enhance the validity of the findings.

Consignment packaging and Customer Satisfaction

Jackson and Adams (2022) conducted a study in Australia to examine the relationship between consignment packaging attributes and customer satisfaction in the healthcare industry. The study aimed to investigate the impact of consignment packaging design, labeling, and information accuracy on customer satisfaction. Data were collected through surveys administered to healthcare product consumers. The findings indicated that visually appealing consignment packaging, clear and accurate labeling, and comprehensive product information positively influenced customer satisfaction (Jackson & Adams, 2022). However, the study's focus on the healthcare industry in Australia may limit the generalizability of the findings to other industries or geographical locations. Additionally, relying on self-reported customer satisfaction data may introduce response biases. Future research should consider conducting cross-industry studies and incorporating objective measures of customer satisfaction to enhance the validity and applicability of the findings.

Gupta and Patel (2021) conducted a study in India to explore the impact of consignment packaging attributes on customer satisfaction in the pharmaceutical industry. The study aimed to examine the influence of consignment packaging aesthetics, functionality, and safety features on customer satisfaction. Data were collected through surveys administered to pharmaceutical product consumers. The findings revealed that visually appealing consignment packaging, user-friendly design, and reliable safety features positively influenced customer satisfaction. However, the study's focus solely on the pharmaceutical industry in India may limit the generalizability of the findings to other industries or cultural contexts. Additionally, relying on self-reported customer satisfaction data may introduce subjective perceptions. Future research should consider exploring consignment packaging attributes in different industry sectors and across various

countries and incorporate objective measures of customer satisfaction to enhance the reliability and validity of the findings.

Thompson and Roberts (2023) conducted a study in the United Kingdom to investigate the relationship between consignment packaging attributes and customer satisfaction in the personal care industry. The study aimed to examine the impact of consignment packaging design, functionality, and eco-friendliness on customer satisfaction. Data were collected through surveys administered to consumers of personal care products. The findings indicated that visually appealing consignment packaging, practical design features, and sustainable consignment packaging practices positively influenced customer satisfaction. However, the study's focus solely on the personal care industry in the United Kingdom may limit the generalizability of the findings to other industries or geographical locations. Additionally, relying on self-reported customer satisfaction data may be influenced by subjective perceptions. Future research should consider conducting cross-industry studies and incorporating objective measures of customer satisfaction to strengthen the validity and generalizability of the findings.

Expectation-Confirmation Theory (ECT)

Expectation-Confirmation Theory is a theoretical framework developed by Richard L. Oliver in the field of consumer behavior. The theory aims to explain how individuals form and revise their attitudes and satisfaction levels based on the confirmation or disconfirmation of their expectations. It suggests that customer satisfaction is influenced by the confirmation of pre-purchase expectations, which leads to the formation of post-purchase satisfaction judgments.

The major proposition of Expectation-Confirmation Theory is that individuals evaluate their satisfaction by comparing their initial expectations with their actual experiences. According to ECT, satisfaction occurs when the actual performance of a product or service meets or exceeds the customer's prior expectations. Confirmation of expectations reinforces positive attitudes and satisfaction, while disconfirmation, where performance falls short of expectations, can lead to dissatisfaction.

In the context of the study on the effect of logistics management on customer satisfaction, Expectation-Confirmation Theory can provide insights into how customers evaluate their experiences with logistics companies. Prior to engaging with a logistics company, customers may form expectations about various aspects of the service, such as delivery time, order accuracy, and customer support. If the logistics management processes align with or exceed these expectations, it can confirm the customer's initial expectations and contribute to higher satisfaction. On the other hand, if there is a significant discrepancy between expectations and actual experiences, it may result in disconfirmation and lower satisfaction.

Critiques of Expectation-Confirmation Theory highlight some limitations of the framework. One criticism is that the theory does not account for the dynamic nature of expectations. Expectations can change over time and be influenced by multiple factors, including previous experiences, marketing communications, and social influences. Additionally, the theory assumes a linear relationship between expectations, confirmation, and satisfaction, which may not always hold true. The complexity of customer satisfaction involves various psychological, emotional, and situational factors beyond mere confirmation or disconfirmation.

Despite these critiques, Expectation-Confirmation Theory provides a useful lens to understand the role of customer expectations in the context of logistics management and customer satisfaction. By considering the theory's propositions, researchers and practitioners can explore how logistics operations meet or exceed customer expectations and identify areas where improvements are needed to enhance customer satisfaction. This study adopts the expectation-confirmation theory to best underpin the research because the theory's propositions are on customers' assessment of products and services just like of the practices of logistics companies such as materials handling, order processing, consignment packaging, and product returns management.

METHODOLOGY

This study employed a survey research design. The population of this study is all customers of logistics companies in Abuja, Nigeria which is unspecified because the researcher could find no record for the exact number of all customers of logistics companies in Abuja, Nigeria. The sample size for this study was therefore determined using the Cochran (1977) formula for attaining sample size from infinite or unspecified populations;

$$n = pq \left(\frac{z}{e} \right)^2$$

Where, **n** = the required sample size; **z** = confidence level at 95% (standard value of 1.96); **p** = probability value (0.5); **q** = (1-P); **e** = margin of error the study was ready to accept 5% (standard value of 0.05)

$$n = 0.5 \times 0.5$$

$$n = 384.6 \text{ or } 385 \left(\frac{1.96}{0.05} \right)^2$$

The sample size of the study is therefore 385 respondents.

The data type to be used in this study is the primary data. The data were collected with the use of structured close ended questionnaire which the researcher made use of likert scale that ranges from strongly agree, agree, undecided, disagree, and strongly disagree (Likert, 1932). The questionnaires were purposively distributed to respondents in the study area electronically via Google forms.

The Partial Least Square Structural Equation Modelling (PLS-SEM) was used to model the regression analysis for testing the hypotheses to determine if there is an effect relationship between each of the independent variables and the dependent variable. The proposed relationship tested by the study is represented by the following hypothesized model:

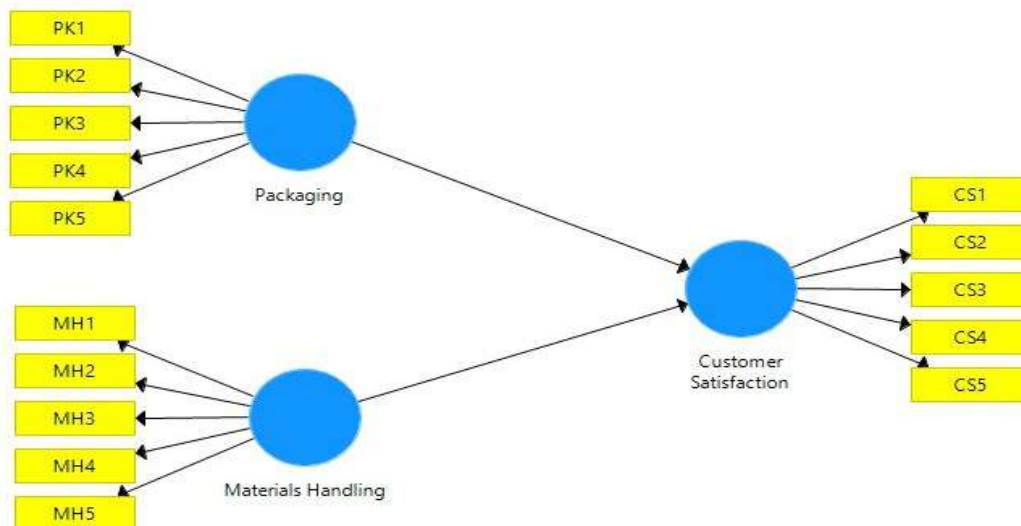


Fig 3.1: Hypothesized model of the Study

Source: Author's Computation in SmartPLS3 (2023)

RESULTS AND DISCUSSION

The study collected data on logistics management and customer satisfaction of logistics companies in Abuja Nigeria. The data was collected electronically using Google Forms data collection tool. The study collected responses from three hundred and eighty-five (385) respondents in line with the recommended sample size of the study. The data was analyzed using structural equation modelling (SEM) in SmartPLS3 statistical software.

Table 3 shows the descriptive statistics of the measurement variables of the data collected. A total of fifteen (15) questions were set in the questionnaire, out of which all loaded correctly after the factor analysis. No questionnaire items were removed from further analysis. The questionnaire responses were based on 5-point Likert scales of Strongly Disagreed, Disagreed, Undecided, Agreed and Strongly Agreed. These scales were coded as 1, 2, 3, 4, and 5 respectively.

The table 3 showed the mean responses to each of the question for all the respondents, the median, the minimum, the maximum, and the standard deviation of the responses. The median is the proper measure of the average in this instance because of outliers. Although, from the minimum and maximum values, there is no sign of outliers, but it is still necessary to state that the best measure of average for an ordinal response is median. Furthermore, the table also showed that there were no missing values for all the responses.

Table 1: Summary Statistics of the Measurement Variables for the Study

Item	Measurement Factor	Missing	Mean	Median	Min	Max	Standard Deviation
MH1	Efficient handling of materials to minimize damage or loss.	0	3.395	3	1	5	1.158
MH2	Proper equipment and techniques for safe and secure material handling.	0	4.096	5	1	5	1.141
MH3	Effective organization of materials for easy accessibility.	0	3.636	4	1	5	1.150
MH4	Well-trained staff for efficient and accurate material handling.	0	4.177	4	1	5	0.996
MH5	Timely tracking and monitoring of materials for timely delivery.	0	4.504	5	1	5	0.973
PK1	Appropriate consignment packaging materials for product protection.	0	4.244	5	1	5	0.979
PK2	Space-optimized consignment packaging to reduce excessive materials.	0	4.078	4	1	5	1.081
PK3	Consideration of environmental sustainability in consignment packaging choices.	0	4.218	5	1	5	0.993
PK4	Clear labeling with necessary information on packages.	0	4.294	5	1	5	1.024
PK5	Feedback-driven improvements in consignment packaging quality.	0	4.192	5	1	5	1.029
CS1	I am satisfied with the logistics company's services.	0	4.062	4	1	5	1.022
CS2	The logistics company meets my expectations for service quality.	0	3.901	4	1	5	0.937
CS3	The customer service of the logistics company is responsive and helpful.	0	3.631	4	1	5	0.990
CS4	The logistics company resolves issues or complaints effectively.	0	3.94	4	1	5	0.931
CS5	I feel valued as a customer by the logistics company.	0	3.971	4	1	5	0.930

Source: Researcher's Computation in SmartPLS (2023)

In summary, table 3 above shows that there are no missing values, all the minimum values were 1 (strongly disagree) and all the maximum values were 5 (strongly agree). All the means and medians of all the construct items were close and their rounded values are the same ranging from 3-5 (undecided, agreed and strongly agreed) with standard deviations all less than 1.2. These values do not indicate the presence of any outliers, showing that the data is good for further analyses.

The assessment of Partial Least Squares Structural Equation Modelling (PLS-SEM) results involves a two-step approach: (1) the evaluation of the measurement models and (2) the assessment of the structural model (Chin, 2010; Hair *et al.*, 2016). The measurement model assessment involves the evaluation of construct measures' reliability and validity. This assessment draws on different measures, depending on whether a construct is measured reflectively or formatively.

Evaluation of Reflective Measurement Models

The assessment of reflective measurement models involves evaluating the measures' reliability (i.e., indicator reliability and internal consistency reliability), and the validity (i.e., convergent and discriminant validity).

Indicator Reliability

The indicator loadings should be larger than 0.7 to ensure indicator reliability. Table 4 shows that most of the item loadings exceeded the recommended value of 0.7 (Chin, Peterson., & Brown, 2008). This indicates that the construct explains more than 50 percent of the indicator's variance, thus providing acceptable item reliability.

Table 2: Reliability of the Indicators

	CS	MH	PK
CS1	0.778		
CS2	0.823		
CS3	0.714		
CS4	0.793		
CS5	0.819		
MH1		0.754	
MH2		0.747	
MH3		0.716	
MH4		0.754	
MH5		0.739	
PK1			0.753
PK2			0.746
PK3			0.783
PK4			0.793
PK5			0.826

Source: Researcher's Computation in SmartPLS (2023)

Construct Reliability

To establish internal consistency reliability of the construct, Cronbach's alpha and composite reliability (CR) should be higher than the threshold of 0.7. It is clear from table 4 that all the latent indicators are reliable since their values are higher than the threshold value of 0.7. As an alternative to Cronbach's alpha and composite reliability, Dijkstra and Henseler (2015) proposed rho_A as an approximately exact measure of construct reliability, which usually lies between Cronbach's alpha and the composite reliability. Hence, rho_A may represent a good compromise if one assumes that the factor model is correct.

Convergent Validity

Convergent validity is the extent to which the construct converges in order to explain the variance of its items. To assess convergent validity, the average variance extracted (AVE) should be larger than 0.5. In table 5, all the constructs value of the average variance extracted AVE are larger than 0.5 which shows that the constructs of the study satisfied the condition of convergent validity. It also indicates that all the construct explains 50 percent or more of the variance of the items that make up the construct.

Table 3: Construct Reliability and Validity of the Indicators

Indicators	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Customer Satisfaction	0.845	0.846	0.890	0.618
Materials Handling	0.748	0.763	0.831	0.599
Consignment packaging	0.840	0.844	0.886	0.610

Source: Researcher's Computation in SmartPLS (2023)

In summary, the composite reliability values, which depict the degree to which the construct indicators indicate the latent construct, exceeded the recommended value of 0.7 while average variance extracted, which reflects the overall amount of variance in the indicators accounted for by the latent construct, exceeded the recommended value of 0.5 (Hair *et al.*, 2013). Also, the Cronbach alpha internal consistency

reliability values are also all above the recommended 0.7 (Chin *et al.*, 2008). This is supported by the rho_A internal consistency reliability values that are also all above the recommended 0.7 (Ringle, *et al.*, 2015).

Discriminant Validity

Discriminant validity is the extent to which a construct is empirically distinct from other constructs in the structural model. There are many traditional methods for discriminant validity assessment, such as cross loadings and the Fornell-Larcker criterion (Fornell & Larcker, 1981), but researchers are advised to apply the Heterotrait-Monotrait (HTMT) criterion (Henseler *et al.*, 2014). This is because traditional methods fail to indicate a lack of discriminant validity, even when two constructs are perfectly correlated, rendering this criterion's use ineffective for empirical research. For this thesis, table 6 shows the HTMT criterion for all the latent constructs. The discriminant validity of the construct is valid if the upper bound of the 95% confidence interval of HTMT is lower than 0.9. From table 6, this condition is satisfied.

Table 4: Discriminant Validity (Heterotrait-Monotrait Ratio (HTMT) Criterion)

	CS	MH	PK
CS			
MH	0.723		
PK	0.716	0.837	

Source: Researcher's Computation in SmartPLS (2023)

Collinearity Test

Before assessing the structural relationships, collinearity was examined to make sure it does not bias the regression results. This was done using the Variance Inflation Factor (VIF). VIF values above 5 are indicative of probable collinearity issues among the predictor constructs (Mason & Perreault 1991; Becker *et al.* 2013). Ideally, the VIF values should be close to 3 and lower. If collinearity is a problem, a frequently used option is to create higher order models that can be supported by theory (Hair *et al.*, 2016).

Table 5: Inner VIF Values of the Study

Items	VIF
CS1	1.938
CS2	2.203
CS3	1.578
CS4	2.752
CS5	3.154
MH1	1.263
MH2	1.491
MH3	1.362
MH4	1.571
MH5	1.469
PK1	1.728
PK2	1.690
PK3	1.739
PK4	1.951
PK5	2.073

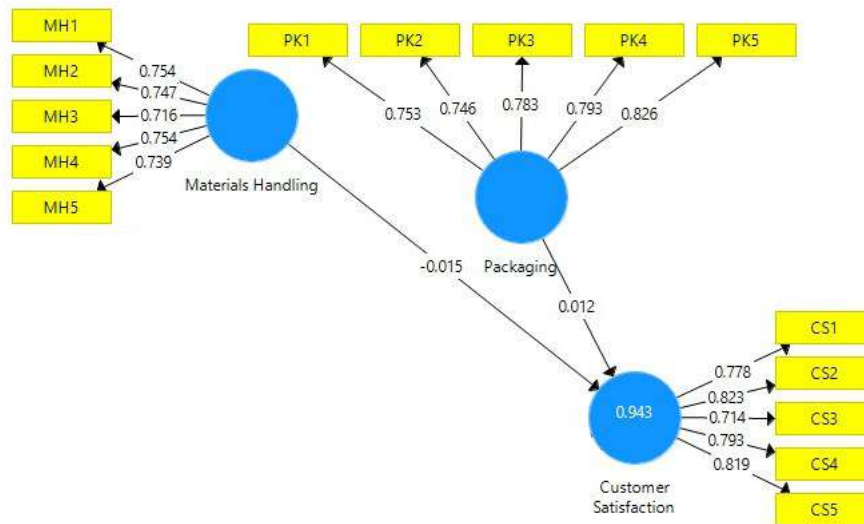
Source: Researcher's Computation in SmartPLS (2023)

From table 7 above, none of the VIF values is up to 5 which shows that they are no indication of probable collinearity issues among the predictor constructs for this thesis. In summary, the study tested for possible Multicollinearity problems with the data using Variance Inflation Factor (VIF) Test and Table 7 shows the collinearity between the items are all below the recommended 3.3 (Ringle, *et al.*, 2015), which shows that there is no multicollinearity problem with the data of the study. This means that all the items used are unique and not replicated.

Assessment of the Structural Model

To assess the structural model, Hair *et al.* (2013) suggested looking at the R^2 , beta, and corresponding t-values via bootstrapping procedure with a resample of 5000. They also suggested that, in addition to these basic measures, researchers should also report the predictive relevance (Q^2) and the effect sizes (f^2). Figure 4 showed the structural model results, the loadings and the R^2 values for customer satisfaction and customer loyalty. The resample of bootstrapping procedure was done using 5000.

Figure 2: Analysed Structural Model for the Variables of the Study



Source: Researcher's Development in SmartPLS (2023)

The path coefficient results are used for testing the hypotheses of the study as follows:

H₀₁ Materials handling has no significant effect on customer satisfaction of logistics companies in Abuja, Nigeria.

Table 6: Path Coefficient Results Extract for Hypothesis One

Hypothesis	Coefficient	T- Stats	P-Values
Materials handling -> Customer satisfaction	-0.015	0.737	0.461

Source: Researcher's Computation in SmartPLS (2023)

The results in Table 8 shows that the coefficient for the effect of materials handling on customer satisfaction is -0.015 with a p-value of 0.461 which is greater than the acceptable 5% significance level showing that there is insufficient statistical evidence to reject the null hypothesis one, so the study cannot adopt the corresponding alternative hypothesis. This means that there is a negative and insignificant effect of materials handling on the customer satisfaction of logistics companies in Abuja, Nigeria. This suggests that continuing with the current materials handling processes may lead to decreased customer satisfaction levels. This finding is inconsistent with those of Johnson *et al.* (2022) and Lee and Kim (2023) who conducted their studies in the United States and in South Korea respectively to examine the relationship between materials handling and customer satisfaction in the logistics industry. Their findings indicated that companies with streamlined materials handling operations experienced higher customer satisfaction levels.

H₀₂ Consignment packaging has no significant effect on customer satisfaction of logistics companies in Abuja, Nigeria.

Table 7: Path Coefficient Results Extract for Hypothesis Two

Hypothesis	Coefficient	T- Stats	P-Values
Consignment packaging -> Customer satisfaction	0.012	0.561	0.575

Source: Researcher's Computation in SmartPLS (2023)

The results in Table 9 shows that the coefficient for the effect of Consignment packaging on customer satisfaction is 0.012 with a p-value of 0.575 which is greater than the acceptable 5% significance level

showing that there is insufficient statistical evidence to reject the null hypothesis two (H_{02}), so the study cannot adopt the corresponding alternative hypothesis. This means that there is a positive and insignificant effect of consignment packaging on customer satisfaction of logistics companies in Abuja, Nigeria. This suggests that, although consignment packaging plays a role in influencing customer satisfaction, its current practices may not be strong enough to have a measurable impact on the overall satisfaction levels. Consequently, there might be room for exploration and improvement in consignment packaging strategies to make a more pronounced and statistically significant difference in enhancing customer satisfaction within the logistics sector in Abuja. This finding is consistent with that of Jackson and Adams (2022) who conducted a study in Australia to examine the relationship between consignment packaging attributes and customer satisfaction in the healthcare industry, and found that visually appealing consignment packaging, clear and accurate labeling, and comprehensive product information positively influenced customer satisfaction.

Table 8: Predictive Power of Model Using R^2 and Q^2 Predict

	R^2	Q^2_{predict}
Customer satisfaction	0.943	0.938

Source: Researcher's Computation in SmartPLS (2023)

The R-square statistics shows the level of determinism of the outcome and mediating variables by the independent variables of the study. The R-square values for the study both have high predictive strengths and are higher than the recommended 40% according to Chin *et al*, (2008). Table 14 shows that the study has an R-square value of 0.943 for Customer satisfaction which indicates that the independent variables used for the study account for about 94.3% of the variability in the dependent variable (Customer satisfaction). Other factors not captured in the model may account for the remaining 5.7%. Furthermore, the Q^2 values corroborate the assertions of the R^2 results with 93.8% predictive power for Customer satisfaction. The Q^2 predict is another measure of predictive power of models that is very similar to the R^2 but more recent and gaining increasing popularity with PLS-SEM researchers who argue that the Q^2 may be a more efficient measure of predictive power (Ringle, *et al*, 2015). The Q^2 is usually computed in PLS-SEM analysis using the PLS-predict analysis in SmartPLS tool as was used by this study.

CONCLUSION AND RECOMMENDATIONS

The results of the structural equation modelling could not reject all the null hypotheses, so the study concludes that logistics management generally has no significant effect on Customer satisfaction in Abuja, Nigeria. Therefore, the study posits that the logistics management of the logistics companies Abuja, Nigeria have not enabled the customers to attain optimal satisfaction. More specifically, materials handling had a negative effect, even if it was insignificant. This means that they have not contributed consequentially or advantageously to customer satisfaction. This leads the study to conclude that materials handling is the likely causes of poor satisfaction of logistics services among customers of logistics companies in Abuja. Following closely as a possible cause of dissatisfaction is consignment packaging which had an insignificant effect on customer satisfaction, despite its effect being positive.

Drawing from the findings and conclusions in previous sections, the study hereby makes the following recommendations:

- i. The negative effects of materials handling suggest a need for change in current practices. The logistics companies should conduct a thorough review of their materials handling processes, identifying inefficiencies and implementing improvements. This might involve investing in updated technologies, employee training, or process reengineering to ensure that materials handling contributes positively to customer satisfaction.
- ii. Although consignment packaging showed a positive but insignificant effect, it is recommended to improve current consignment packaging practices. While the impact may not be statistically significant, enhancing consignment packaging strategies can still contribute to a more positive customer experience. Companies should explore ways to align consignment packaging practices more closely with customer expectations and

preferences, possibly through more sustainable or aesthetically pleasing consignment packaging options.

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APPENDIX A: QUESTIONNAIRE

S/N	Questions	SA	A	U	D	SD
	Materials Handling:					
1	Efficient handling of materials to minimize damage or loss.					
2	Proper equipment and techniques for safe and secure material handling.					
3	Effective organization of materials for easy accessibility.					
4	Well-trained staff for efficient and accurate material handling.					
5	Timely tracking and monitoring of materials for timely delivery.					
	Consignment Packaging					
1	Appropriate consignment packaging materials for product protection.					
2	Space-optimized consignment packaging to reduce excessive materials.					
3	Consideration of environmental sustainability in consignment packaging choices.					
4	Clear labeling with necessary information on packages.					
5	Feedback-driven improvements in consignment packaging quality.					
	Customer Satisfaction					
1	I am satisfied with the logistics company's services.					
2	The logistics company meets my expectations for service quality.					
3	The customer service of the logistics company is responsive and helpful.					
4	The logistics company resolves issues or complaints effectively.					
5	I feel valued as a customer by the logistics company.					

- Thank you for your time and cooperation –