

The Relationship Between Electronic Commerce Adoption and Shipping Cost of Manufacturing Companies in Nigeria

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ABSTRACT: The study examined the relationship and impact of E-commerce adoption on the shipping cost using the Nigerian manufacturing companies as a case study. Cost of logistics in which shipping/delivery cost has been recognised to be the major constraints to the development of E-commerce i.e., shipping /delivery cost is one of the major concerns for the patronage of online market as it include all services required to transport products purchased online from a retailer to the customer's delivery destination hence the study focussed on shipping cost variables

which include: E-commerce platform usage, average shipping cost, cost variation by distance, carrier selection criteria, bulk shipping efficiency, shipping cost negotiations, shipping cost allocation and consumer shipping charges as shipping play a crucial role in E-commerce as its core link. The study was carried out in Lagos state, Nigeria and the population of the study include 10 manufacturing companies categorised as consumer goods companies based in Lagos State of Nigeria listed by the Nigeria Group Exchange, 2022. Simple random technique was used to select 565 respondents, the data collected for the study was obtained using a well – structured questionnaire. The data was analysed using both one sample t-test and Pearson Product Moment Correlation (PPMC) coefficient analysis. E-commerce had significant correlation on cost variation by distance (.146), carrier selection criteria (.092), shipping cost negotiations (.278), shipping charges (.239), shipping cost allocation (.166) thus it is imperative to strike a balance between covering logistics costs and maintaining competitive pricing for a realistic E-commerce pricing strategy. The findings showed that a significant correlation exist between e-commerce adoption and the shipping cost. Thus, these findings imply that the adoption of E-commerce impacts various dimensions of shipping costs though it indicates that while E-commerce can increase certain costs, it also enhances efficiency and provides opportunities for strategic cost management and negotiations in shipping operations.

KEYWORDS: E-commerce, shipping cost, logistics, consumer goods, Nigeria

1.0 INTRODUCTION

E-commerce or electronic commerce is the buying, selling, and exchanging of goods and services over computer networks through which transactions or terms of sale are performed electronically (Rosen 2002). This concept that is making remarkable impact on almost every aspect of human endeavours has an intended goal of breaking the barrier of location and distance between manufactures and the buyers, hence logistics has a major role to play in achieving this goal.

E-commerce is an activity that makes use of a computer network(internet) in order to exchange information about products and services including the price offers and to buy and sell products, services and information online (Basbas, 2006). Hence, e-commerce can be viewed as a business model that creates an enabling platform for organizations and individuals to engage in buying and selling of goods and services over the Internet, using computers, tablets, smartphones, and other smart Internet-enabled devices. This does not deal with distribution or logistics, but rather facilitate the linkage between buyers and sellers over the Internet. E-commerce is believed to have a relationship with logistics activities which include; distribution, transportation, packaging, branding, order processing, delivery, warehousing, among others.

Shipping cost therefore represents the immediate expenses associated with transferring an item from a shelf in a store or warehouse to the customer's doorstep. With the recent rise in internet-based businesses, people now pay attention to shipping costs and other completion concerns, which are variables that influences a consumer's perception prior to purchasing, and considering how shipping operate, such fees vary depending on distance, but with some sense of notoriety all over the world amongst online businesses and online consumers, shipping fees have been observed to be the triggers for consumers to double

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their volumes of purchase. The triggers and purchase decision amongst consumers are influenced by the shipping cost and to increase effective and efficient systems that surround it within e-commerce businesses is by finding out the specificity of which variables makes a shipping fee attractive to various online consumers (Hernandez, Isidro, Manapul and Fernandez, 2022).

1.1 Statement of the Problem

E-commerce is gradually becoming prevalent in Nigeria especially in this era of cashless policy but the cost of logistics activities in order to have a smooth ordering and delivery process is still a major constraint thus companies must attach relevance to the principle of freight management that deals with overseeing and managing a cost-efficient operation and delivery of goods. Recently, with the rapid development of social platforms, social e-commerce enterprises are also rising. However, in the process of development, logistics cost has become a big constraint and since the prevalence of e-commerce, its development momentum cannot be underestimated

There is a growing customer preference for real-time shipment information, hassle-free product returns, and adaptable delivery choices. The nature of the industry, including products fulfilling similar client needs, is identified as a factor influencing logistics expectations, requirements, and overall service levels within the industry (Arkadiusz and Swiatoweic-Szczepanska, 2021) hence, the need to meet supply chain demands and timely delivery of goods to their destination has greatly increased because online shoppers across the globe place orders every minute and it is expected that the shipping is fulfilled in a timely manner.

The rising trend of E-commerce leads to a changing customer buying behaviour from physical stores to online stores and so creates more demand of the delivery of goods and packages delivered by distributing companies thus to maximize sales volume, the shipping charge must be dressed up to attract customers for the goods (Guo, Hu, Zou, Li, Cheng & Li, 2020). Shipping cost is thus a major factor in e-commerce, as it can increase cart abandonment rates and the order level.

1.2 Objective of the Study

The objective of the study is to examine the impact and relationship between E-commerce adoption and shipping cost on Nigerian manufacturing companies.

1.3 Scope of the Study

This study was carried out among consumer goods companies operating in Lagos State, Nigeria and quoted in the Nigeria Group Exchange (NGX). this research specifically targeted the interactions between consumer goods companies (those that are categorized as staple foods and beverages) and third-party e-commerce platforms operating in Nigeria, such as Jumia, Konga, KARA, Pay Porte, OLX Nigeria, Ajebomarket, PARA, Jiji etc

The study examined shipping cost as a major logistics cost that impacts on the adoption of E-commerce on these selected logistics outcomes that revolves round customer satisfaction, cost management and operational efficiency; shipping cost as it deals with how e-commerce adoption by the Nigerian manufacturing companies impacted the various cost components associated with shipping to the third-party e-commerce companies.

2.0 LITERATURE REVIEW

The substantial adaptability of the internet has facilitated the emergence of what is commonly known as e-commerce, leading to a decline in conventional business management approaches. Indeed, influenced by the web, businesses are perceived as a reconfiguration of the established relationships among producers, wholesalers, distributors, and retailers (Farook, 2001). The availability of the 'Cash on Delivery' option further motivates e-retailers and the shopping experience extends beyond ordering, culminating only when customers receive the expected products on time (Farook, 2001). E-commerce therefore has created a platform for individuals to purchase and sell goods and services online. With the continuous advancement of technology, an increasing number of people are acquiring smartphones and internet access, expanding the future prospects within the e-commerce industry. Recent studies indicate that the e-commerce market in Nigeria has reached an annual revenue of approximately \$13 billion and is anticipated to reach \$75 billion by 2025 (Alade, 2023).

Effective management and a closely coordinated connection between e-commerce and logistics (shipping) play a crucial role in enhancing customer satisfaction and the success of e-commerce transactions. The performance of an e-commerce company is strongly linked to its logistical efficiency (Angelina and Abigail, 2020). Devaraj (2022), the logistics sector has experienced substantial growth in recent years, driven significantly by the expansion of E-commerce. The swift rise of online retail has presented new challenges for logistics companies, compelling them to adjust their operations to cater for the requirements of E-commerce customers. The logistics sector plays a vital role in ensuring the seamless functioning of global economies and businesses. The surge in E-commerce has markedly influenced the logistics sector, necessitating companies to modify their approaches to align with the preferences of online customers, the transformations in the shipping of goods have had a significant

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impact on the economy. The development of extensive ports has facilitated swift and cost-effective import and export processes for companies, making the transportation of goods a crucial determinant of a country's economic prosperity.

Shipping fees are important aspect of online retailers that cannot be overlooked as they have influenced purchase outcomes in a multi- category shopping environment such as e-commerce sites (Chen and Ngwe, 2018) hence it is necessary to charge a reasonable shipping fee in order to maximize sales volume and attract customers (Guo *et al*, 2020).

Shipping cost is an important element of e-commerce that has the ability of influencing the customers decision, experience and the profit of the organisation., It can be calculated based on the weight, dimensions, distance, speed delivery etc. Shipping cost within the context of E- commerce comprises of all the services and operations required to transport products online from a vendor to the pick-up point or door step of the customer thus it is pertinent to note that, shipping cost is a cost that has to be borne by either the business or customer as there is likely nothing as free shipping (Lauren, 2023). Hernandez *et al* (2022) established that most customers are convinced to buy more when offered and given a lower shipping fee and promotions such as free shipping, discounted shipping etc thus free shipping promotions are helpful for businesses as a tool for attracting potential customers into trying out their e-commerce and this finding was corroborated by Debutify (2023) who stated that if shipping costs can greatly influence customer behaviour, high shipping costs can create a sense of dissatisfaction and make customers hesitant to complete a purchase hence by lowering shipping costs, businesses can alleviate customer concerns and encourage them to proceed with their purchase. Magda (2022) also stated that shipping is a huge and important factor when it comes to increase of sales in e-commerce and again, customers tend to change their mind about a purchase when suddenly they see a surprising shipping cost.

2.1 Conceptual Framework

The conceptual framework of this study as shown in Figure 1 shows the relationship between E-commerce adoption (independent variable) and shipping cost (dependent variable) within the confines of Nigerian consumer goods companies. The framework is focussed on how E- commerce adoption influence the incorporating variables (shipping cost) such as average shipping cost, cost variation by distance, carrier selection criteria, bulk shipping efficiency, shipping cost negotiations, cost allocation, and customer shipping charges. Shipping cost has been observed to be an important element when making decision on e-commerce adoption.

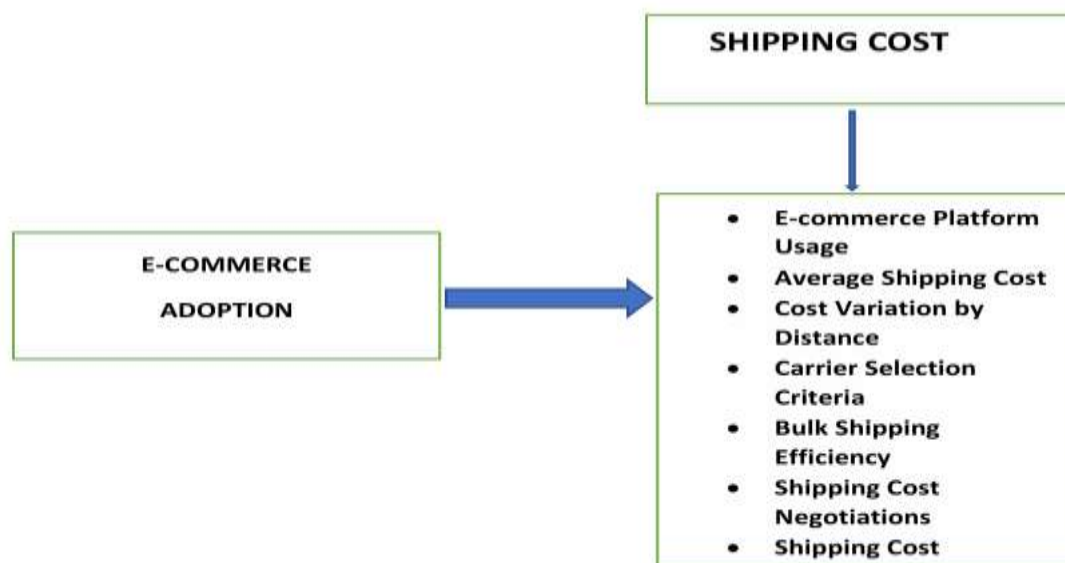


Figure 1: Conceptual Framework Source: Omorinde, (2025).

3.0 METHODOLOGY

This study explored the relationship existing between E-commerce adoption and shipping cost within the consumer goods manufacturing companies in Nigeria. Nigeria is a federal republic comprising of 36 states and the federal capital territory, where its capital is located in Abuja, it is located on the western coast of Africa and it has diverse geography (Morse, 2023). Hundreds of languages are spoken in Nigeria and has a population 233,560,000. i.e., the study was carried out in one of the major cities in Nigeria (Lagos state).

The study population include the members of staff of the transport department, sales department, logistics department and warehouse/distribution department in the manufacturing companies enlisted by the Nigeria Group Exchange as the activities

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of these departments is seen to directly influence e-commerce adoption.

The sample size of the study was drawn from the 718 respondents from the departments of transport, sales, logistics and warehouse/distribution of the selected consumer goods manufacturing companies. Primary data which was used majorly for the study was collected from the 718 administered questionnaires in which only 565 questionnaires were duly filled and returned. The 565 questionnaire is thus the sample size and what was used for the purpose of data analysis. Both descriptive and inferential statistical methods which include one sample t-test and Pearson Product Moment Correlation analysis was used to examine and establish the relationship between E-commerce adoption and shipping cost of manufacturing companies in Nigeria.

4.0 RESULTS

Analyzing the One-Sample Test results for the measurement of shipping cost product, it was observed in Table 1 that there is a significant enhancement in various aspects of shipping logistics. The average shipping cost, with a mean difference of 4.07257, indicates considerable improvements in managing shipping expenses. This aligns with the findings of Bowersox, Closs and Cooper (2013), who highlight the importance of efficient cost management in logistics for enhancing profitability and competitive advantage. Cost variation by distance, with a mean difference of 1.67788, demonstrates effective management of distance-related shipping expenses. This efficiency is crucial in global trade and logistics, a concept extensively explored by Chopra and Meindl (2016). Carrier selection criteria, reflected in a mean difference of 2.88850, underscore the strategic decision-making in choosing shipping partners. These findings correlate with the insights of Christopher (2016), emphasizing the significance of selecting reliable and cost-effective carriers in supply chain management.

Furthermore, Bulk shipping efficiency, indicated by a mean difference of 1.77699, suggests improved handling of bulk shipments. This efficiency in bulk logistics is crucial for reducing per-unit shipping costs, a key aspect of logistics management discussed by Coyle, Langley, Novack, and Gibson (2017). Shipping cost negotiations, with a mean difference of 1.33805, highlight the importance of active engagement in renegotiating shipping rates, a critical factor in cost control identified by Lambert and Stock (2018). Shipping cost allocation, with a mean difference of 2.00177, shows meticulousness in allocating costs across products. Accurate cost allocation is essential for effective pricing strategies and it is a pillar of financial management that helps to govern how organizations assign costs to various departments projects or products to ensure transparency and accountability as explained by Erik (2023).

However, customer shipping charges, with a mean difference of 3.11681, indicate a strategic approach to managing how shipping charges impact customer purchasing behavior, a factor that significantly impact on the order incidence and order size as outlined by Michael (2006). Thus, these results reflect a comprehensive approach toward optimizing shipping costs, emphasizing strategic carrier partnerships, cost-effective shipping practices, and customer-centric approaches, key themes in modern logistics and supply chain management.

Table 1: One-Sample Test for the measurement of Shipping Cost of Product

	Test			Value = 0	95% Confidence Interval of the Difference	
	T	Df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Average Shipping Cost	148.390	564	.000	4.07257	4.0187	4.1265
Cost Variation by Distance	52.509	564	.000	1.67788	1.6151	1.7406
Carrier Selection Criteria	67.707	564	.000	2.88850	2.8047	2.9723
Bulk Shipping Efficiency	101.381	564	.000	1.77699	1.7426	1.8114
Shipping Cost Negotiations	58.200	564	.000	1.33805	1.2929	1.3832
Shipping Cost Allocation	172.327	564	.000	2.00177	1.9790	2.0246
Customer Shipping Charges	193.955	564	.000	3.11681	3.0853	3.1484

Source: Author's Compilation (2025)

4.1 Analysis of the Relationship between e-commerce and shipping cost

Table 2 presents the correlation analysis for the use of e-commerce and various aspects of shipping costs. The finding employs Pearson Correlation to evaluate the relationships, yielding significant insights into the dynamics of e-commerce and shipping logistics. The positive correlation between e-commerce platform usage and average shipping cost (.116**), cost variation by

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distance (.146**), and carrier selection criteria (.092*) suggests that as e-commerce platforms are increasingly used, there is a corresponding increase in these aspects of shipping costs. This could be due to the broader reach and increased demand generated by e-commerce platforms, potentially leading to higher shipping costs and more variability depending on distance. However, these costs are often offset by the efficiencies and wider market access provided by e-commerce, as indicated in studies on digital commerce and logistics (Chopra & Meindl, 2016).

Furthermore, the positive correlation between e-commerce platform usage and bulk shipping efficiency (.141**) implies that e-commerce platforms enhance the efficiency of bulk shipping operations. This is likely due to the improved logistics coordination and planning capabilities afforded by digital platforms, aligning with findings in logistics management literature (Bowersox, Closs, & Cooper, 2013). Additionally, a strong positive correlation is observed with shipping cost negotiations (.278**), indicating that higher e-commerce adoption might lead to more active and potentially beneficial negotiations regarding shipping costs. This could be a result of the larger volume of transactions and shipments handled through e-commerce platforms, granting businesses more leverage in negotiations, as discussed in supply chain management research (Christopher, 2016). The positive correlation between e-commerce platform usage and shipping cost allocation (.166**) indicates a strategic approach to allocating shipping costs across different products or services, essential in the cost-sensitive e-commerce landscape. This finding aligns with the emphasis on cost allocation strategies in contemporary e-commerce studies (Lambert & Stock, 2018). Lastly, the positive correlation with customer shipping charges (.239**) suggests that increased e-commerce usage could be associated with higher shipping charges for customers. While this might seem counterintuitive, it reflects the complex balance e-commerce platforms must strike between covering logistics costs and maintaining competitive pricing, as highlighted in e-commerce strategy discussions (Johnson & Whang, 2002).

In essence, the findings illustrate that e-commerce adoption impacts various dimensions of shipping costs, indicating that while e-commerce can increase certain costs, it also enhances efficiency and provides opportunities for strategic cost management and negotiations in shipping operations.

Table 2: Correlations Matrix for the Relationship between E-commerce and Shipping Cost

		EPU	ASC	CVD	CSC	BSE	SCN	SCA	csc
EPU	Pearson Correlation	1							
	Sig. (2-tailed)								
	N	565							
ASC	Pearson Correlation	.116**	1						
	Sig. (2-tailed)	.006							
	N	565	565						
CVD	Pearson Correlation	.146**	.405**	1					
	Sig. (2-tailed)	.000	.000						
	N	565	565	565					
CSC	Pearson Correlation	.092*	-.639**	-.521**	1				
	Sig. (2-tailed)	.028	.000	.000					
	N	565	565	565	565				
BSE	Pearson Correlation	.141**	-.619**	-.227**	.495**	1			
	Sig. (2-tailed)	.001	.000	.000	.000				
	N	565	565	565	565	565			
SCN	Pearson Correlation	.278**	.488**	.126**	-.357**	-.618**	1		
	Sig. (2-tailed)	.000	.000	.003	.000	.000			
	N	565	565	565	565	565	565		
SCA	Pearson Correlation	.166**	-.001	.011	-.006	-.104*	.008	1	
	Sig. (2-tailed)	.000	.986	.791	.894	.013	.854		
	N	565	565	565	565	565	565	565	
Csc	Pearson Correlation	.239**	.137**	.002	-.076	-.181**	.065	-.221**	1
	Sig. (2-tailed)	.000	.001	.970	.070	.000	.121	.000	
	N	565	565	565	565	565	565	565	565

Source: Author's Compilation,
(2025)

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

*. Correlation is significant at
the 0.05 level (2-tailed).

5 DISCUSSIONS OF RESULTS

Table 2 which provides Pearson Correlation coefficients for various shipping cost factors in relation to e-commerce platforms used. The coefficients, along with their significance levels, offer insights into how e-commerce adoption correlates with different aspects of shipping costs.

The positive correlations observed in the table, such as between e-commerce platforms used and average shipping cost (.116**), cost variation by distance (.146**), and carrier selection criteria (.092*), indicate a significant relationship. Similarly, e-commerce platform usage shows positive correlations with bulk shipping efficiency (.141**), shipping cost negotiations (.278**), shipping cost allocation (.166), and customer shipping charges (.239). The significance levels (mostly at .000 or .001) reinforce the strength of these relationships, suggesting that they are not due to chance. These correlations imply that as e-commerce usage increases, there are observable increases in various shipping cost-related aspects.

However, for instance, higher e-commerce adoption could lead to increased efficiency in bulk shipping and more strategic shipping cost allocation, which can be crucial for optimizing logistics in an e-commerce environment. This aligns with the findings in logistics and supply chain literature that emphasize the transformative impact of e-commerce on shipping and logistics operations (as discussed by authors like Sheffi, 2020, Bask and Tolonen, 2019). These studies underscore how digital platforms facilitate better integration and efficiency in shipping processes, leading to more strategic and data-driven decision-making in areas such as carrier selection and shipping cost negotiations. Furthermore, the positive correlation between e-commerce platform usage and customer shipping charges (.239**) suggests that with the growth of e-commerce, there might be an increase in shipping charges passed on to the customer. This could be due to the broader range of services and convenience offered through e-commerce, as well as the need to cover the logistical costs associated with fast and reliable shipping, a trend explored in studies on e-commerce pricing strategies (Cachon & Swinney, 2021).

In essence, the results from the findings provide substantial evidence that the positive correlations across multiple aspects of shipping costs highlight the multifaceted impact of e-commerce on shipping operations, reflecting the increasing importance of e-commerce platforms in shaping shipping cost strategies in the digital era.

6 CONCLUSION AND RECOMMENDATIONS

The positive correlations of e-commerce platform usage with different shipping cost factors – including average shipping cost, cost variation by distance and carrier selection criteria – indicate a considerable and intricate connection. These structurally related correlations suggest that the shipping cost dynamics do change in a subtle manner with increased e-commerce adoption. With the development of e-commerce, shipping costs will get higher but this will also improve efficiency in big amounts shipping and rational cost pricing which were discussed in logistics and supply chain studies (for instance, Cachon and Swinney, 2021; Sheffi, 2020). The positive correlation with customer shipping charges highlights the role e-commerce had on pricing strategies and other customer-facing elements of shipping, suggesting that future growth in e-commerce may result in higher shipping rates for customers – probably as a result of improved service offerings and logistical demands. These results are consistent with the transformative role of e-commerce for logistics activities, as authors such as Bask and Tolonen (2019) argue that digital platforms enable shipping processes to be approached more strategically and data-driven decision making. It is however important to note that the advancement of E-commerce has revolutionized the way and manner of shopping.

As regards shipping costs, the incorporation of e-commerce into business has shown intricate dynamics. The acceptance of e-commerce corresponds to delivery cost indicators including average costs, costs that vary with distance, and criteria for selection of the carrier. This means that as e-commerce becomes stronger, there are indicative changes in shipping activities including the efficiency of bulk shipping and the more intelligent allocation of costs. With the growth of e-commerce, customer shipping charges have also started changing to show how logistics and pricing strategies in digital marketplace are transforming. This shift shows that E-commerce plays an important role not only in establishing shipping fees but also in influencing consumer perception on shipping costs.

In shipping cost management, e-commerce has introduced new efficiencies and strategic considerations.

7 POLICY IMPLICATION FOR THE STUDY

The findings of this study thus implies that Shipping cost dynamics require for a strategic review to be conducted at the same time as e-commerce adoption. Manufacturers should pay due attention to the impact of e-commerce on changes in shipping costs and carrier selection requirements and adjust their shipping practices in a proper manner i.e., there should be a strategic shipping cost management

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