

Green Logistics Practices and Their Impact on Product Sustainability in Fast-Moving Customer Goods Firm in Lagos State, Nigeria



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ABSTRACT: This research examined product sustainability and green logistics practices of selected FMCG enterprises in Lagos State, Nigeria. FMCGs prioritize efficiency and sustainability. Many studies have focused on non-FMCG enterprises and developed nations, not rising nations. This study was survey-based. This survey included 13,782 managerial staff from eight listed FMCG corporations in Lagos State, Nigeria. Taro Yamane formula calculated 519 sample size. Simple random sampling was utilized. Data was collected using a validated questionnaire. The Cronbach's alpha reliability coefficient for the constructs varied between 0.78 and 0.94. The percentage of response was 96.7%. The data were analyzed using descriptive statistics as well as inferential statistics, including multiple and hierarchical regression. The findings revealed that green logistics practices had significant effect on the product sustainability of selected FMCG firms in Lagos State, Nigeria ($Adj.R^2 = 0.03$; $F(5, 496) = 4.977$, $p < 0.05$). The study concluded that green logistics practices promote product sustainability of selected FMCG firms in Lagos State, Nigeria. This study recommended that the management of FMCG firms in Lagos State, Nigeria should adopt a holistic approach to product sustainability, integrating green logistics practices into a broader sustainability strategy to enhance their long-term sustainability.

KEYWORDS: Green logistics practices, Green production, Green transportation, Green Procurement, Product sustainability.

1. INTRODUCTION

The FMCG industry had a drop of 3.4% in 2022 within the sub-Saharan Africa area. This decline may be attributed to the unequal effects of terms of trade and cost of living on the region. The rise in food costs, which constituted almost 50% of the total inflation rate of 13%, had a detrimental effect on the sustainability of the FMCG industry (World Bank, 2023). The FMCG sector experienced significant challenges due to annual inflation rates exceeding 30% in certain countries such as Ghana and Rwanda. Additionally, food price inflation surpassed 20%, and currency depreciation occurred as a result of unfavourable terms of trade, loss of foreign reserves, capital outflows, and high debt levels in Ethiopia, Ghana, and Malawi. These factors collectively had a detrimental effect on the sustainability of firms operating within these sectors (World Bank, 2023). Africa is well-positioned to have a dominant presence in the FMCG industry. In 2016, two-thirds of Africa's \$1.4 trillion retail spending was allocated to FMCG, which accounted for almost all of Africa's household costs. This significant increase in spending greatly contributes to the long-term viability of firms in the area (Umuhzo et al., 2020).

The growth FMCG sector in South Africa experienced a deceleration of 1.9% in 2022. This deceleration can be attributed to several factors, including the escalating cost of living, a decline in terms of trade, power outages, and the devaluation of the rand against the USA dollar. Consequently, the sustainability of firms operating within the FMCG sector in South Africa has been adversely affected (World Bank, 2023). There has been a progressive shift among South African consumers towards adopting healthier lifestyles in their selection of fast-moving consumer products, a trend that has been accelerated by emergence of the COVID-19 pandemic. The proportion of South African consumers who expressed a preference for consuming nutritious food in 2019 was comparable to that seen in other established and emerging consumer markets, including the United States, China, the United Kingdom, Brazil, and India. According to a poll done by McKinsey in 2020, a significant majority of customers, namely 63%, of fast-moving consumer goods consumers expressed their willingness to purchase ecologically sustainable items. It is anticipated that the use of digital channels for the purpose of purchasing groceries and other consumer items will persist after the COVID-19 pandemic. The majority of individuals expressed their intention to continue engaging in online shopping until the epidemic has

Green Logistics Practices and Their Impact on Product Sustainability in Fast-Moving Customer Goods Firm in Lagos State, Nigeria

abated. On average, consumers in South Africa exhibited a higher degree of price sensitivity in comparison to customers in other rising global economies.

The FMCG in Nigeria have struggled with some enterprise sustainability-related issues, which has affected the firm's sustainability. In Nigeria, there have been complaints from a variety of businesses that provide consumers with a range of options, from private goods to public services (Ogiemwonyi et al., 2020). There are fundamental challenges in the Nigerian marketplace include the absence of information and communication technology deployment and opposition to adopting technological advancements. (Akpan et al., 2016). The consumer goods sector in Nigeria, faces environmental sustainability constraints which has resulted in low sales, less profit-generating business activities, abundant availability of capital and a range of low-intensive products, as well as other issues such as high taxes and poor power generation that impede business, as previously mentioned (Cyril et al., 2020). Product sustainability examines the potential for goods to provide economic advantages for corporations, while also generating environmental and social benefits for society as a whole. Product sustainability seeks to achieve a harmonious equilibrium between the contributions made by goods to the triple-bottom-line, resulting in the creation of many mutually beneficial outcomes for various stakeholders (Dyllick & Rost, 2017). He et al., (2019) define product sustainability as the ecological implication of a product across the whole life cycle of a product, including the sourcing of raw materials, the manufacturing process, and the eventual discarding. The concept of product sustainability pertains to the capacity of a product to preserve a certain degree of quality over a prolonged duration. This can be achieved through several means, such as using durable materials, designing for easy repair and replacement, and using recycled or recyclable materials (Pekkanen et al., 2018). According to Saeed et al., (2019), product sustainability is the ability of a product to be maintained over its entire life cycle without being depleted or exerting a detrimental influence on the natural environment. Product sustainability shows the ability of a product to be sustainably produced, used, and disposed of. Hallstedt et al., (2020), suggested that product sustainability quantifies how well a product can be expected to perform over its lifetime. Sustainability is often thought of in terms of a product's environmental impact, but it can also encompass factors such as a product's durability, repairability, and ability to be recycled or reused (De-Souza & Dekkers, 2019).

The issue of sustainability difficulties inside fast-moving consumer goods corporations has been a subject of increasing discussion (Buallay, 2019). Despite the establishment of sustainability committees, sustainability policies, and sustainability reports, there are still unresolved inquiries on the appropriate methods for businesses to create, execute, and communicate their sustainability initiatives. Various investigations have been conducted on green logistics practices and firm sustainability in distinct geographical locations and contexts using industry (Al-Minhas et al., 2020; Chhabra et al., 2017). However, the extent to which green logistics practices affect firm sustainability of fast-moving consumer goods firms in Nigeria has not been adequately captured, this has created a knowledge gap worthy of investigation. This, therefore, justifies the need for a study of this nature to evaluate and deal with the issues observed. Various factors have been observed that militated against adequate implementation of green logistics practices among fast-moving consumer goods firms in Nigeria, which include, the industry factories of some of the firms contributing to air pollution. The quantity of toxic gases that factories release into the atmosphere increases health and environmental challenges. Adesoga and James (2019), identified some of the factors that prevent the successful execution of green logistics practices in Nigeria including crime, culture, language, technology, interconnectivity, trade regulations, legislation, taxation, and the scarcity of skilled personnel, and these challenges result to decline in firm sustainability.

The anticipated expansion of the logistics business is expected to provide positive effects on the enhancement of production, commerce, and consumption, hence fostering economic development. The implementation of product sustainability strategies can effectively capitalize on the increasing number of environmentally and socially conscious consumers. This approach has the potential to drive product differentiation, expand the customer base, and enhance markets and positioning for the brand (García-Sánchez et al., 2019; Lin et al., 2013). It has been suggested that consumers have cultivated a favourable disposition towards making use of ecologically friendly items due to the formation of brand associations. The rising consumption of green goods and green purchasing behaviour has garnered significant attention due to the escalating environmental deterioration. Green goods and services meet the growing need of consumers for environmentally friendly purchases, hence enhancing the competitiveness of the firm offering such products and services in the market (Chen & Tung, 2014). Nevertheless, it has been seen that the purchase of environmentally friendly items would substantially increase expenses and diminish the efficiency of the purchasing firm, as viewed through the lens of purchasing management (Wang et al., 2018). The good attitude of consumers towards green products does not always translate into actual purchases. The examination of elements which add to the limited impact of environmental views on consumer green purchasing behaviour is of utmost importance. Lastly, the logistics system itself still has some weaknesses, such as vulnerability, personnel dependency, and limited intellectualization (Chen et al., 2017). Hence, it is hypothesized that;

Green Logistics Practices and Their Impact on Product Sustainability in Fast-Moving Customer Goods Firm in Lagos State, Nigeria

Ho: Green logistics practices have no significant effect on product sustainability

2. METHODOLOGY

The methodology employed for the research is survey research design. This design is suited for this study because it gives a detailed description of the impact between variables. This design was used to determine the impact that relates to measurable facts. Survey design is adopted because it allows data to be obtained on a given phenomenon within a restricted time horizon (Trivellas et al., 2020). The study population consisted of 13,782 employees of Unilever Nigeria Plc, Flour Mills Nigeria Plc, Nascon Allied Industries Plc, Dangote Sugar Refinery Plc, Cadbury Nigeria Plc, PZ Cussons Nigeria Plc, Honeywell Flour Mill Plc and Bua Foods Plc. The above FMCG companies producing food and hygiene items, quoted in the Nigerian Stock Exchange, and operating in Lagos State were selected for the study. The selection of organizations for this research was based on their engagement in several elements of green logistics, including procurement, manufacturing, packaging, transportation, reverse logistics, waste management, warehousing, and sustainability (Okunuga et al., 2022; Ogunlela, 2018). The study selected Lagos State because of its industrial qualities, cosmopolitan environment, and status as Nigeria's commercial powerhouse. (Ukah et al., 2019). The management employees were chosen for the study because they are involved in the daily operations of the selected companies and have a good understanding of the variables of the study. The approach of simple random sampling utilised in this study ensures the sample accurately reflects the characteristics of the entire population. As a result, these findings from this study would be able to be representative of a larger population, improving the external validity of the research (Kumar, 2022).

Table 3.1 Proportion of samples

S/N	Organization	Population	Sample Size	Proportion
1	Bua Foods Plc	1,890	519	71
2	Cadbury Nigeria Plc.	489	519	18
3	Dangote Sugar Refinery Plc	2,850	519	107
4	Flour Mills Nig. Plc.	5,083	519	191
5	Honeywell Flour Mill Plc	832	519	31
6	Nascon Allied Industries Plc	581	519	22
7	P Z Cussons Nigeria Plc.	1,302	519	49
8	Unilever Nigeria Plc	755	519	28
	TOTAL	13,782		

A modified questionnaire was employed as the data collection instrument in this investigation. The overall sum of 519 questionnaires were handed out to the participants, of which 502 were accurately completed, returned, and employed for the purpose of conducting the research. The response rate of about 96.7% among the study population is considered to be outstanding. The selection of a questionnaire is motivated by many factors, including the need for an immediate response, feedback, and consideration of the respondents' literacy level (Zikmund et al., 2010). The research used a questionnaire that was structured into three distinct parts. Section A focused on gathering biographical information from the respondents, including variables such as marital status, age, gender, educational qualification, years of experience, and kind of business. Sections B and C of the study include the responses obtained from participants to address the study's inquiries. Section B of this investigation examined the independent variable, Green Logistics Practice, along with its sub-variables, namely green packaging, reverse logistics, green transportation, green procurement, and green manufacturing. The primary emphasis of Section C was on the dependent variable, which is product sustainability. A Likert-type scale with six points, spanning Very High (6) to Very Low (1), was used in this study. The rationale for using a six-point modified Likert-type scale is its simplicity and ability to eliminate ambiguous viewpoints. The quantifiability and subjectivity of responses were readily observable via mathematical analysis (Taherdoost, 2019). The statistical method used to assess construct validity was Confirmatory Factor Analysis (CFA). The construct validity was evaluated by employing the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's Test of Sphericity., while the concept validity was evaluated using Average Variance Extracted (AVE).

Green Logistics Practices and Their Impact on Product Sustainability in Fast-Moving Customer Goods Firm in Lagos State, Nigeria

Table 3.2: Validity Results

Variables	No of Items	KMO	Bartlett's Test	Sig	Average Extracted	Variance	Remark
Green Procurement	5	0.870	185.195	0.000	0.627		Valid
Green Production	5	0.823	120.721	0.000	0.688		Valid
Green Transportation	5	0.768	67.582	0.000	0.647		Valid
Green Packaging	5	0.793	171.539	0.000	0.746		Valid
Reverse Logistics	5	0.800	104.496	0.000	0.635		Valid
Product Sustainability	5	0.786	153.941	0.000	0.618		Valid

Validity testing was conducted on the research instrument to ascertain its accuracy. The statistical measurement of construct validity was conducted utilizing the average variance extract (AVE), while the measurement of Sampling Adequacy was performed using the Kaiser-Meyer-Olkin (KMO) measure and the Bartlett sphericity test. The Kaiser-Meyer-Olkin (KMO) values exceeded 0.5, suggesting that the questions effectively assessed the variables in the sample. The Bartlett test of Sphericity produced a value of 0.000, indicating statistical significance at a level below 5%. This shows a strong and statistically significant correlation between the variables being measured in the study. The KMO test yielded a result beyond 5% in this research, whereas the Bartlett test of Sphericity had a result below 5%. These findings indicate that the statements comprising the testing instruments for each variable accurately measured the predicted outcomes. The study's construct validity for every variable instrument was supported by using Average Variance Extracted (AVE) values higher than 0.5. Indicators of convergent validity are provided by the AVE values.

Table 3.3: Reliability Result

Variables	No of Items	Cronbach's Alpha	Composite Reliability	Remark
Green Procurement	5	0.933	0.894	Reliable
Green Production	5	0.886	0.917	Reliable
Green Transportation	5	0.787	0.856	Reliable
Green Packaging	5	0.911	0.936	Reliable
Reverse Logistics	5	0.850	0.895	Reliable
Product Sustainability	5	0.885	0.839	Reliable

The internal consistency method of reliability was used due to its ability to evaluate the degree to which each test question measures a shared concept. This approach is considered the most reliable and consistent measure of dependability (Leary, 2004). The internal consistency of the questions in the questionnaire was assessed using Cronbach's Alpha in this study. A linearity test was conducted to ascertain the independent and dependent variables of the research. A structured questionnaire was employed to collect data, which was subsequently analyzed using the Statistical Package for Social Science (SPSS). The replies from the employee were analyzed using descriptive statistics, including frequency distribution, standard deviation and mean.

3. RESULTS & DISCUSSION

Table 4.1: Descriptive Statistics on Product Sustainability

	VH	H	MH	ML	L	VL	missing	Total	
	%	%	%	%	%	%	%	Mean	Standard Deviation
Growth in market in the last 5 years	12.15	28.69	35.06	22.11	1.99	.00	0.0	4.27	1.00
Growth in sales in the last 5 years	10.16	23.11	40.04	23.31	3.39	.00	0.0	4.13	1.00
Customer loyalty	30.88	33.27	27.49	7.57	.60	.20	0.0	4.86	.98
Company's reputation and image in the market	10.16	28.29	43.23	16.53	1.79	.00	0.0	4.28	.92
Alignment between company offering and consumers' expectations	12.75	24.90	38.45	18.73	5.18	.00	0.0	4.21	1.05
Grand Average								4.35	0.99

Green Logistics Practices and Their Impact on Product Sustainability in Fast-Moving Customer Goods Firm in Lagos State, Nigeria

The findings of descriptive statistics on product sustainability are shown in Table 4.1. According to the study's inferences, it was seen that 12.15%, a portion of the participants conveyed a significant level of growth in the market over the last five years. Additionally, 28.69% of the respondents expressed a high growth level, 35.06% showed a moderate growth level, and 22.11% expressed a moderate level of growth. The respondents, on average, expressed a high level of reaction to market growth during the last five years. The standard deviation of the responses suggested a tendency to converge around the mean, with the mean of 4.27 and 1.00 as the standard deviation. Moreover, the data shown in the table above indicates that in terms of sales growth over the last 5 years, 10.16% of the participants ranked it as very high, 23.11% as high, and 40.04% as moderately high. On the other hand, 23.31% rated it as moderately low, and 3.39% rated it as low. The participants, on average, reported a high response rate regarding the rise in sales during the last five years (mean = 4.13, standard deviation = 1.00). Regarding customer loyalty, 30.88% of the participants expressed a very high level, 33.27% expressed a high level, and 27.49% expressed a moderately high level. On the other hand, 7.57% expressed a moderately low level, 0.60% expressed a low level, and 0.20% expressed a very low level. The participants, on average, reported a modest client loyalty level, with a standard deviation that indicates a tendency to cluster around the mean. 4.86 was the value of the mean, with 0.98 as the standard deviation.

The findings from the descriptive analysis revealed that 10.16% of the participants expressed a very high perception of the company's reputation and image in the market. Additionally, 28.29% indicated a high perception, 43.23% indicated a moderately high perception, 16.53% expressed a moderately low perception, and 1.79% indicated a poor perception. The respondents, on average, expressed a relatively high rating for the company's reputation and image in the market. The standard deviation showed that the ratings are converging around the mean, with a mean of 4.28 and a standard deviation of 0.92. Finally, in terms of the congruence between the company's product or service and the expectations of customers, 12.75% reported a very high level, 24.90% reported a high level, 38.45% reported a moderately high level, and 18.73% reported a moderately low level. The participants, on average, expressed that there is a reasonable level of alignment between the company's offerings and customer expectations. This alignment is demonstrated by a standard deviation that demonstrates convergence towards the mean (mean = 4.21, STD = 0.99). The average product sustainability score for selected FMCG goods enterprises in Lagos State, Nigeria is 4.35, with a standard deviation of 0.99. This showed that the replies of the respondents generally align with a "high" level of product sustainability.

According to the findings shown in Table 4.2, there is a consistent pattern of answers, indicating that both green logistical practices and product sustainability exhibit a moderate level of importance. Therefore, it can be inferred that the elements of green logistics practices have a significant impact on the sustainability of consumer goods products in certain FMCG corporations located in Lagos State, Nigeria.

Table 4.2 Multiple Regression Summary of Green Logistics Practices and Product Sustainability of Selected Fast-Moving Consumer Goods Firms in Lagos State, Nigeria

N	Model	B	Sig.	T	ANOVA (Sig.)	R	Adjusted R ²	F (5,496)
502	(Constant)	2.894	.000	8.076	0.000 ^b	0.219 ^a	0.038	4.977
	Green production	0.017	.704	.380				
	Green procurement	0.050	.277	1.089				
	Green transportation	0.98	.131	1.511				
	Green packaging	0.122	.007	2.723				
	Reverse logistics	0.060	.007	2.727				
Predictors: (Constant), Green Production, Green Procurement, Green Transportation, Green Packaging, Reverse Logistics.								
Dependent Variable: Product Sustainability								

The findings of the multiple regression analysis for the components of green logistics practices on product sustainability of chosen FMCG enterprises in Lagos State, Nigeria are shown in Table 4.2. The findings revealed that green packaging ($\beta = 0.122$, $t = 2.723$,

Green Logistics Practices and Their Impact on Product Sustainability in Fast-Moving Customer Goods Firm in Lagos State, Nigeria

p0.05) and reverse logistics ($\beta = 0.060$, $t = 2.727$, $p < 0.05$) have a positive and significant impact on the sustainability of products in selected FMCG firms in Lagos State, Nigeria. On the other hand, green production ($\beta = 0.017$, $t = 0.380$, $p > 0.05$), green procurement ($\beta = 0.050$, $t = 1.089$, $p > 0.05$), and green transportation ($\beta = 0.98$, $t = 1.511$, $p > 0.05$) have a positive but insignificant effect on the products. This implies that the use of green packaging and reverse logistics plays a crucial role in promoting product sustainability within fast-moving consumer goods companies.

The obtained R-value of 0.1219 provides empirical evidence in favour of the findings, suggesting a slight positive correlation between the components of green logistics practices and the product sustainability of chosen FMCG enterprises in Lagos State, Nigeria. The coefficient of multiple determination, denoted as Adj R², has a value of 0.038. This value suggests that approximately 3.8% of the variability observed in product sustainability among the chosen FMCG can be explained by the implementation of green logistics practices. The remaining 96.2% of variability is attributed to other variables that were excluded from the model. The multiple regression models, both predictive and prescriptive, are represented as follows:

$$PS = 2.894 + 0.017GP + 0.050GProc + 0.98GT + 0.122GPkg + 0.060RL + U_i \quad \text{--- Eqn(i) (Predictive Model)}$$

$$PS = 2.894 + 0.122GPkg + 0.060RL + U_i \quad \text{--- Eqn(ii) (Prescriptive Model)}$$

Where:

- PS= Product Sustainability
- GP = Green Production
- GProc = Green Procurement
- GT = Green Transportation
- GPkg=Green Packaging
- RL = Reverse Logistics

The regression model indicates that when green logistics methods are held constant at zero, there is a positive correlation between product sustainability and a coefficient of 2.894. The predictive model reveals that of all the factors examined, only green production, green procurement, and green transportation exhibit insignificance. Consequently, the company's management may choose to minimise these variables, resulting in their exclusion from the prescriptive model. The findings from the multiple regression analysis, as observed in the prescriptive model, demonstrate that a one-unit improvement in all other variables related to green logistic practices (specifically, green packaging and reverse logistics) leads to a corresponding increase of 0.122 and 0.060 in product sustainability, respectively. Conversely, a one-unit improvement to these variables does not increase product sustainability. Consequently, a rise in green transportation and packaging would result in an improvement in the sustainability of certain FMCG companies in Lagos State, Nigeria.

The F-statistics ($df = 4, 496$) = 232.344 at $p = 0.000$ ($p < 0.05$) suggest that the model as a whole is statistically significant in forecasting the impact of green logistics practices on product sustainability. This implies that, with the exception of green production, green procurement, and green transportation, green logistics practices play a significant role in determining the product sustainability rate of selected FMCG firms in Lagos State, Nigeria. The findings indicate that it would be beneficial for FMCG companies to prioritize the advancement of green logistics methods, namely green packaging and reverse logistics, to enhance product sustainability. Consequently, the null hypothesis (H_0), positing that there exists no statistically significant impact of green logistics practices on the product sustainability of selected fast-moving consumer goods companies in Lagos State, Nigeria, was rejected. The result from the multiple regression analysis conducted for the hypothesis indicates that the implementation of green logistics practices has a statistically significant and positive effect on product sustainability within a specific group of FMCG located in Lagos State, Nigeria. (Adj. R-squared = 0.023; $F(3,310) = 290.640$, $p < 0.05$). Hence, the combining of the independent sub-variables exhibited statistical significance in determining the sustainability of products within a specific group of FMCG companies located in Lagos State, Nigeria.

Based on empirical evidence, the result of this study is in agreement with other studies. In a research by Mendoza-Fong et al. (2019) the result showed that green attributes in production processes have significant effect on operational, commercial, and economic benefits of organizations. In Li's (2016) study, a systematic analysis was conducted on the progress of sustainable mobility in major cities throughout the world. The study identified the transportation challenges faced by Beijing and proposed strategies to encourage the use of green protocols. Additionally, the study provided Recommendations for enhancing Beijing's eco-friendly transport infrastructure and promoting the adoption of sustainable transport methods. The results of this research align with the discoveries of Ahamat et al., (2019), who demonstrated that price sensitivity, green advertising, environmental knowledge, and the trust put in green goods all had a favourable impact on consumers' green buying behaviour. In a study conducted by Hamurcu and Eren (2020), it was determined that electric cars have the advantage of emitting zero tailpipe emissions. This characteristic contributes to the improvement of air quality in urban areas, particularly in densely populated

Green Logistics Practices and Their Impact on Product Sustainability in Fast-Moving Customer Goods Firm in Lagos State, Nigeria

regions, resulting in enhanced air quality and the creation of more habitable cities. In their research, Bukhari et al. (2017) determined that factors such as environmental support, commitment to environmental responsibility, perception of green products, social attractiveness, and environmental friendliness all have a substantial influence on the perception of a green brand image. The study conducted by Joshi & Rahman (2015) showed a rise in consumers' inclination to buy environmentally friendly items.

4. CONCLUSION

The employment of green logistics methods possesses the capacity to provide cost reductions for organizations via the optimization of transportation networks, reduction of fuel consumption, and minimization of waste. This may provide a competitive edge and enhance their financial performance. This research demonstrates the execution of environmentally friendly logistics methods, including green transportation, reverse logistics, green packaging, green production, and green procurement has a significant impact on product sustainability within a specific group of FMCG firms located in Lagos State, Nigeria. It is essential for the management of these organizations to carefully evaluate the prospective long-term financial advantages associated with the application of green logistics techniques. For instance, the adoption of sustainable transportation methods may result in financial benefits by mitigating fuel use, enhancing vehicle upkeep, and reducing carbon emissions. Furthermore, the allocation of resources towards sustainable product design and packaging has the potential to bolster the brand image and cultivate customer loyalty, so leading to enhanced financial prosperity over an extended period of time. The current research used a sample including eight FMCG companies located in Lagos State. Although the sample size is deemed enough for a quantitative investigation, it may not be substantial enough to establish generalizable findings pertaining to the whole FMCG industry in Lagos State, Nigeria. Consequently, this gives rise to a limitation. Hence, other investigations might examine the applicability of the results in different settings or sectors by reproducing this study in alternative industries.

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Green Logistics Practices and Their Impact on Product Sustainability in Fast-Moving Customer Goods Firm in Lagos State, Nigeria

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