Investigating the Adoption of Green Logistics Practices on Operational Sustainability in Fast-Moving Customer Goods in Lagos State, Nigeria

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ABSTRACT: Statement of Problem: There is a growing debate on sustainability challenges among fast-moving consumer goods firms (FMCG). FMCG firms value efficiency and sustainability. Research shows that FMCG firms are unsustainable owing to inadequate green logistics practices. Many studies focused on non-FMCG companies and industrialised countries, not emerging ones.

Methodology: The green logistics and operational sustainability of chosen FMCG firms in Lagos State, Nigeria, were examined. The study was survey-based. The study included 13,782 managers from eight publicly listed FMCG businesses in Lagos State, Nigeria. The Taro Yamane formula determined the 519 sample size. Basic random sampling was utilised. The questionnaire was standardised and validated. Constructs' Cronbach's alpha reliability coefficients ranged from 0.78 to 0.94. The response rate was 96.7%. The data were examined using descriptive and inferential statistics, including multiple and hierarchical regression.

Findings: The findings revealed that green logistics practices had significant effect on the operational sustainability of selected FMCG firms in Lagos State, Nigeria ($Adj.R^2 = 0.02$, $F(5, 496) = 3.31$, $p < 0.05$). The study concluded that green logistics practices promote operational sustainability of selected FMCG firms in Lagos State, Nigeria.

Recommendations and Contribution to Knowledge: FMCG enterprises in Lagos State, Nigeria can integrate green logistics techniques into their sustainability plan to improve long-term sustainability. The research suggests that green logistics techniques may considerably enhance operational sustainability, making them essential to a firm's sustainability strategies.

KEYWORDS: Operational sustainability, Green logistics practices, Green production, Green transportation, Green packaging.

1. INTRODUCTION

The need for businesses to be environmentally sustainable has gained attention from researchers worldwide (Yingfei et al., 2022; Liu & Ma., 2022). To improve company sustainability, fast-moving consumer goods (FMCG) companies in the US are always adapting to shifting consumer needs and market trends (Zuiderveen et al., 2020). Digitalization has made it easy for consumers to make comparisons and examine products on the spot. The fast-moving consumer goods firms, therefore, must optimize their marketing potentials, logistics practices and brand awareness to be financially sustainable in the competitive market.

Nigeria's largest fast-moving consumer goods firms have seen their profit surge to a five-year high and above pre-pandemic levels in the first half of 2022. For instance, the duo of Nigerian Flour Mill and Honeywell Flour Mills Plc reported N591 billion in 2022 half-year revenue despite operational challenges, while Dangote Sugar PLC, Nascon PLC Unilever PLC, Nestle Plc and Cadbury Nigeria PLC, earned N504.7196 billion as revenue in the half year of 2022, outperforming their earnings in the corresponding period of 2021, a sign that economic recovery is on for Africa's biggest economy.(Nairametrics, 2022). Ayorinde (2021) explained that the reason most fast-moving consumer goods firms recorded above pre-pandemic level profit is largely because of the implementation of price increases. The firms implemented at least two to three price increments across most of their products, which is part of the reason why the nation experienced a rise in inflation significantly. Nevertheless, according to the Manufacturers Association of Nigeria (MAN, 2021), only 10% of the fast-moving consumer goods manufacturing firms in Nigeria were sustainable, while 60% were on the verge of shutting down due to financial instability, poor technology adoption, policy challenges, and other crises that have affected the country (Salau et al., 2018).

The objective of this study was to assess the effect of green logistics practices on operational sustainability.

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Khan et al., (2017) stated that using renewable energy and green practices in logistics operations is the only remedy for mitigating air pollution, addressing climate change, and combating global warming. Incorporating green logistics into the circular economy is necessary to attain an ideal equilibrium of economic, social, operational, and environmental effectiveness for a firm. Companies need to prioritise operations strategy in response to growing environmental concerns, including consumer demand for eco-friendly products, rising energy costs, and stricter legislation. Several organisations in industrialised nations have used operational excellence strategies to attain sustainability since these initiatives have an influence on the three fundamental aspects of sustainability: economic, environmental, and social sustainability (Chakraborty et al., 2020). The attainment of these operational advantages enhances the firm reputation, market expansion, and brand reinforcement to gain competitive edge (Gandhi et al., 2018). The research conducted by Aldakhil et al., (2018) demonstrated a favourable correlation between green practices in logistics operations and sustainable economic and environmental development. However, Aldakhil et al., (2018) observed that global logistics activities have a significant role in generating carbon emissions and greenhouse gases in the atmosphere. In the absence of appropriate rules for logistics operations, the main consequence will be a negative impact on environmental sustainability (Zaman & Shamsuddin, 2017). Due to the mixed findings, this study hypothesizes that:

H_0: Green logistics practices have no significant effect on operational sustainability.

Operational sustainability aligns with the achievement of operational excellence. The word operational refers to the assembly and distribution of products and the accomplishment of specific tasks, while "excellence" refers to the goals that must be met and sustained to remain outstanding (Mitchell, 2015). It refers to the ability of the business to meet its manufacturing processes such as production, distribution, waste minimization, and other interactions between employees and the company's customers without compromising the environment and its future potential (Chakraborty et al., 2020). Operational sustainability consists of the continuous improvement that companies employ to attain a competitive edge, best practices and efforts within their industries for continuous improvement. (Moktadir et al., 2020).

2. METHODOLOGY

The positivist research philosophy was applied in this study. The positivist paradigm is based on the idea that one of the ways to truly uncover new knowledge is through scientific observation and measurement (Mohajan, 2018). This paradigm is also based on the idea that scientific laws are universal and can be used to predict and explain natural phenomena. The advantages of the positivist paradigm include its ability to provide clear and concise explanations for observed phenomena and its ability to make predictions about future events (Žukauskas et al., 2018). The survey design was employed in this research. This design was used to analyse the thoughts, views, and feelings of various groups of individuals. The justification for using survey research design is that it enabled the researcher to obtain information from the sample of study using a research instrument that aligned with the research objective.

The study's population consisted of 13,782 employees from Bua Foods Plc, Cadbury Nigeria Plc, Flour Mills Nigeria Plc, Honeywell Flour Mill Plc, Dangote Sugar Refinery Plc, Nascon Allied Industries Plc, PZ Cussons Nigeria Plc, and Unilever Nigeria Plc. The research focused on the fast-moving consumer goods companies operating in Lagos State, which specialise in providing food and hygiene products and are listed on the Nigerian Stock Exchange. The companies were taken into consideration for the study due to their participation in reverse logistics, manufacturing, packaging, procurement, waste management, warehousing, and sustainability, as well as their involvement in green logistics operations (Okunuga et al., 2022; Ogunlela, 2018). Due to its industrial character, cosmopolitan city, and status as Nigeria's commercial hub, Lagos State was taken into consideration for the study. The justification for using these companies was that they engage in green practices which aligns with the study objectives, also, they have maintained a good business track record for years and are all quoted in the Nigerian stock exchange (Okunuga et al., 2022; Ogunlela, 2018). The study adopted the simple random sampling technique, where every individual in the population has an equal opportunity of being chosen. This technique is commonly used in research studies to obtain a representative sample of the population, where the sample is selected entirely by chance, and no bias is introduced (Liu & Li, 2021).

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		

The data-gathering instrument was a customised questionnaire. A total of 519 questionnaires were issued to the respondents, out of which 502 were completed and returned for analysis. The response rate of around 96.7% of the study's employed population is regarded as outstanding. The reason for using a questionnaire is due to its ability to elicit direct responses, gather feedback, and accommodate the literacy level of the respondents (Zikmund et al., 2009). In the study, the questionnaire was divided into three sections, section A, covered information about respondents' biodata while section B contained responses on the independent variable (Green Logistics Practice) and section C responses on the dependent variable (Operational sustainability). A six-point modified Likert-type scale ranging from Very High (6) to Very Low (1) was used. The justification for choosing a six-point modified Likert-type scale is that it is easy to understand and gives room for the elimination of undecided opinions.

Construct validity was measured statistically using Confirmatory Factor Analysis (CFA). Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity were used to determine sample adequacy while Average Variance Extracted (AVE) was used to determine the construct validity.

Table 3.2: Validity Results

Variables	No of Items	KMO	Bartlett's Test	Sig	Average Variance Extracted	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
Operational Sustainability	5	0.676	88.053	0.000	0.670	Valid

The research instrument was subjected to validity testing to ensure that it was accurate. Construct validity was measured statistically using average variance extract (AVE), while the Sampling Adequacy was measured using KMO and Barlett sphericity test. The KMO results were greater than 0.5, which implied that the questions measured the variables in the sample. The Bartlett test of Sphericity result of 0.000, which is less than 5%, suggests that there is a highly significant relationship between variables in measuring the variables under analysis. The KMO test result in this analysis was greater than 5%, and the Bartlett test of Sphericity result was less than 5%, suggesting that the statements that constituted the testing instruments of each variable calculated what was expected. Average Variance Extracted (AVE) values greater than 0.5 were used to support the construct validity of all variables in the research instrument. The AVE values serve as evidence of convergent validity.

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
Operational Sustainability	5	0.804	0.869	Reliable

This research used Cronbach's Alpha to assess the internal consistency of the questionnaire queries. Internal consistency, as defined by Saunders et al. (2009), refers to the degree of uniformity in replies across all the items in a study questionnaire. The linearity test was performed to identify the study's independent and dependent variables. Data collected through a structured

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questionnaire was analysed through Statistical Package for Social Science (SPSS). Descriptive statistics such as frequency distribution, mean and standard deviation were used to analyse the responses from the employee.

3. RESULTS

Table 4.1: Descriptive Statistics on Operational Sustainability

	VH	H	MH	ML	L	VL	Missing	Total	
	%	%	%	%	%	%	%	Mean	Standard Deviation
Accurate delivery time as outcome	10.96	34.06	38.65	14.74	1.59	.00	0.0	4.38	.92
Improvement in capacity utilization	18.36	26.15	35.13	16.97	2.99	.40	0.0	4.39	1.08
Promotion of quality and brand image	30.08	30.48	26.69	11.55	1.20	.00	0.0	4.77	1.04
Enhancement of public relations	9.76	20.92	36.85	26.69	5.38	.40	0.0	4.02	1.06
Brand loyalty by consumers	8.37	8.96	17.73	42.23	19.52	3.19	0.0	3.35	1.22
Grand Average								4.18	1.06

The findings of descriptive statistics on operational sustainability are shown in Table 4.1. The investigation revealed that 10.96% of the respondents expressed a very high level of satisfaction with the accuracy of delivery time. Additionally, 34.06% indicated a high level of satisfaction, 38.65% indicated a moderately high level, 14.74% indicated a moderately low level, and 1.59% indicated a low level. The respondents, on average, reported a high level of satisfaction with the exact delivery time, as demonstrated by a mean score of 4.38 and a standard deviation of 0.92, suggesting that there is little variation around the mean. The data from the table above indicates that in terms of improvement in capacity utilisation, 18.36% of the respondents rated it as very high, 26.15% rated it as high, and 35.13% rated it as moderately high. On the other hand, 16.97% rated it as moderately low, 2.99% rated it as low, and 0.40% rated it as very low. The respondents reported a high response rate for improvement in capacity utilisation, with an average of 4.39 and a standard deviation of 1.08. In terms of promoting quality and brand image, 30.08% of the participants expressed a very high level of importance, 30.48% expressed a high level, and 26.69% expressed a moderately high level. On the other hand, 11.55% indicated a moderately low level of importance, and just 1.20% indicated a low level. The respondents, on average, expressed a high level of emphasis on promoting quality and brand image. The standard deviation indicates that there is a convergence of opinions around the mean. The mean is 4.77 and the standard deviation is 1.04.

The descriptive analysis reveals that 9.76% of the respondents expressed a significant increase in public relations, 20.92% expressed a high increase, 36.85% expressed a moderately high increase, 26.69% expressed a moderately low increase, 5.38% expressed a low increase, and 0.40% expressed a very low increase. The respondents, on average, assessed the strengthening of public relations at a relatively high level. The standard deviation indicates that the ratings were clustered closely around the mean (mean = 4.02, STD = 1.06). Regarding customer brand loyalty, 8.37% expressed a very high level, 8.96% expressed a high level, 17.73% expressed a moderately high level, 42.23% expressed a moderately low level, 19.52% expressed a low level, and 3.19% of respondents expressed a very low level. The respondents said that customer brand loyalty is generally moderate, with a standard deviation indicating a tendency to cluster around the mean (mean = 3.35, STD = 1.22).

The operational sustainability of selected fast-moving consumer goods firms in Lagos State, Nigeria has a grand mean of 4.18 and a standard deviation of 1.06. This indicates that, on average, the respondents' responses regarding operational sustainability tend to be "high".

Therefore, it can be inferred that the elements of green logistics practices have an impact on the operational sustainability of chosen fast-moving consumer goods companies in Lagos State, Nigeria.

Table 4.2 Multiple Regression Summary of Green Logistics Practises and Operational 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)
	(Constant)	2.997	.000	7.549				
	Green production	-0.006	.909	.114				
	Green procurement	0.012	.823	.224				
	Green transportation	0.174	.018	2.364	0.006[b]	0.180[a]	0.023	3.310
	Green packaging	0.116	.022	2.292				

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	Reverse logistics	-0.018	.0467	-728				
502	Predictors: (Constant), Green Production, Green Procurement, Green Transportation, Green Packaging, Reverse Logistics.							
	Dependent Variable: Operational Sustainability							

Table 4.2 displays the results of the multiple regression analysis conducted on the components of green logistics practices and their impact on the operational sustainability of chosen fast-moving consumer goods companies in Lagos State, Nigeria. The findings indicate that green transportation (β= 0.174, t = 2.364, p<0.05) and green packaging (β= 0.116, t = 2.292, p<0.05) have a positive and statistically significant impact on the operational sustainability of selected fast-moving consumer goods firms in Lagos State, Nigeria. However, green procurement (β = 0.012, t = 0.224, p>0.05) has a positive but statistically insignificant effect on operational sustainability. The study found that green production (β = -0.006, t = 0.114, p>0.05) and reverse logistics (β = -0.018, t = -0.728, p>0.05) do not have a significant impact on the operational sustainability of selected fast moving consumer goods enterprises in Lagos State, Nigeria. This means that green transportation and green packaging are crucial elements for fast-moving consumer goods industries to achieve operational sustainability.

The R-value of 0.180 confirms this finding and suggests that the components of green logistics practices have a modest positive correlation with the operational sustainability of selected fast-moving consumer goods enterprises in Lagos State, Nigeria. The coefficient of multiple determination, Adj R^2 = 0.023, suggests that approximately 2.3% of the variability in operational sustainability among selected fast-moving consumer firms can be attributed to green logistics practices. The remaining 97.7% of the changes are influenced by other variables that were not included in the model. The predictive and prescriptive multiple regression models are stated in the following manner:

OS = 2.997 + -0.006GP + 0.012GProc+0.174GT + 0.116GPkg + -0.018RL + U_i---Eqn(i) (Predictive Model)

OS = 2.997 + 0.174GT + 0.116GPkg + U_i ----Eqn(ii) (Prescriptive Model)

Where:

OS= Operational Sustainability

GP = Green Production

GProc = Green Procurement

GT = Green Transportation

GPkg = Green Packaging

RL = Reverse Logistics

The regression model demonstrated that when green logistics practices are held constant at zero, the value of operational sustainability is 2.997, indicating a positive relationship. The predictive model reveals that only the variables of green production, green procurement, and reverse logistics are found to be statistically unimportant. Consequently, the management of the firm may de-emphasize these factors, which is why they are not included in the prescriptive model. The results of the multiple regression analysis, as observed in the prescriptive model, indicate that when all other variables of green logistic practices (green transportation, green packaging) are enhanced by one unit, operational sustainability would also increase by 0.174 and 0.116 respectively, and vice versa. Therefore, implementing green transportation and green packaging practices will result in improved operational sustainability for chosen fast-moving consumer products companies in Lagos State, Nigeria.

The F-statistics (df = 5, 496) = 290.640, with a p-value of 0.000 (p<0.05), suggests that the overall model is statistically significant in predicting the impact of green logistics practices on operational sustainability. This indicates that green logistics practices, excluding green production, green procurement, and reverse logistics, are important factors in determining the operational sustainability rate of selected fast-moving consumer goods firms in Lagos State, Nigeria. The findings indicate that fast-moving consumer goods companies should prioritise the development of green transportation and green packaging as key components of their green logistics strategies to enhance operational sustainability. Consequently, the null hypothesis (H_0) asserting that green logistics methods had no substantial impact on the operational sustainability of chosen fast-moving consumer goods companies in Lagos State, Nigeria was rejected.

4. DISCUSSION

The results of the multiple regression analysis indicate that the implementation of green logistics practices, including green production, green procurement, green transportation, green packaging, and reverse logistics, has a positive and significant impact on the operational sustainability of fast-moving consumer goods firms in Lagos State, Nigeria. The adjusted R-squared value is 0.023, indicating a weak relationship between the variables. The F-statistic is 290.640 with 3 and 310 degrees of freedom, and the

p-value is less than 0.05, suggesting statistical significance. Therefore, the merging of the autonomous sub-variables had significant effects on forecasting the operational sustainability of chosen fast-moving consumer goods companies in Lagos State, Nigeria. Based on empirical evidence, the findings of this study align with, Song et al., in their 2017 study where they examined how various aspects of Green Supply Chain Management (GSCM) affect the operational performance of manufacturing companies in Shanxi, Shandong, Beijing, Guangdong, and Jiangsu. They discovered a significant correlation between GSCM practices and organisational performance. Laari (2016) found that several aspects of a business might influence its operational performance. However, the implementation of Green Supply Chain Management (GSCM) practices has a significant effect on the operational performance of an organisation. In their 2017 study, Xiong and Suyin examined 187 manufacturing enterprises in Wuhan. They categorised green supply chain management into two components: internal environmental management and upstream and downstream cooperation. The study revealed that effective internal link management had a positive influence on enterprise link performance, financial performance, and operational performance. Additionally, upstream and downstream cooperation had a positive impact on enterprise environmental performance but had a negative effect on enterprise financial performance and operational performance. Green logistics has a significant impact on economic performance by reducing costs, enhancing product quality, raising product prices, increasing sales and profit margins, expanding market share and efficiency, creating new market prospects, boosting employee motivation and satisfaction, improving corporate image, and providing access to financial opportunities. In their study, Saada et al., (2020) investigated the correlation between operational performance and ten supply chain management practices. These practices encompassed supplier relationships, inventory management, product development, agility, quality implementation, logistics integration, transportation, and purchasing activities in the manufacturing process.

Shen et al., (2017) conducted a study to examine the variables that impact green procurement. The research revealed that the primary variables influencing the implementation of green practices by developers include marketing benefits, market pressure, internal pressure within the organisation, policy pressure, and business advantages. Among these elements, policy pressure, marketing benefits, and business benefits were shown to be the most prevalent causes for developers to adopt green practices. In the study conducted by Afum et al., (2020), it was shown that green manufacturing practices (GMPs) had a notable and beneficial impact on sustainable performance. Once again, the implementation of environmentally friendly manufacturing techniques has a substantial and beneficial impact on the green supply chain initiative. Furthermore, the green supply chain effort acts as a mediator between green manufacturing practices and sustainable performance. The study conducted by Agyabeng-Mensah et al., (2020) found that green warehousing and logistics optimisation have a negative impact on economic performance, but they enhance economic performance by promoting supply chain sustainability. Research has shown that social values and ethics have a beneficial role in promoting supply chain sustainability and enhancing economic performance.

In their study, Jinru et al., (2022) discovered that the implementation of green finance and green logistics has a notable and favourable impact on sustainable production and the circular economy. Furthermore, sustainable manufacturing has a substantial and beneficial impact on the circular economy. Evidently, sustainable production was shown to have a significant mediation function among these factors. Similarly, Kamarulzaman et al., (2018) found that Malaysian food-based businesses have a relatively low degree of adoption of green initiatives in warehousing, which indicates that these manufacturers have implemented environmental measures in their warehousing operations. The findings also show that implementing environmentally friendly practices in warehousing has a substantial influence on manufacturers' commercial success. These findings corroborate the results of Khor et al., (2016), indicating that when faced with institutional pressure, using disposal choices might lead to enhanced performance levels in some scenarios.

5. CONCLUSION

The findings of this research demonstrate that the use of green logistics methods, including green manufacturing, green procurement, green transportation, green packaging, and reverse logistics, has a substantial impact on the operational sustainability of FMCG Firms in Lagos State, Nigeria. The management of these firms should explore opportunities to optimize their supply chain processes to minimise the amount of waste produced and enhance the effectiveness of energy use. This can include initiatives such as implementing a closed-loop supply chain system, optimizing routing and scheduling, and investing in green technologies such as electric vehicles and renewable energy sources. This research has limitations due to its reliance on self-reported data provided by respondents, which might be influenced by prejudice and mistakes. For example, respondents may have over or under-reported their firm's adoption of green logistics practices or sustainability performance. Also, this study was a survey and captured data at a single point in time. Future studies could adopt a longitudinal design to track the relationship between green logistics practices and operational sustainability performance over time.

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