

## **GREEN LOGISTICS ADOPTION AND THE MARKETING PERFORMANCE OF BREWERY COMPANIES IN NIGERIA**

**Okonkwo, Raphael Valentine Obodoechi**

Department of Marketing, College of Management Sciences  
Michael Okpara University of Agriculture Umudike –Umuahia, Nigeria.  
rv.okonkwo@mouau.edu.ng

**Iheanacho, Chidiebere Umunna**

Department of Marketing, Faculty of Management Sciences  
University of Calabar, Nigeria.  
iheanachochidiebere@yahoo.com

**Aniuga, Chukwuma**

Department of Marketing, Michael Okpara University of Agriculture  
Umudike –Umuahia, Nigeria.  
aniuga.chukwuma@mouau.edu.ng

**Ogunbangbe, Bashir Muyiwa**

Department of Marketing, College of Management Sciences  
Michael Okpara University of Agriculture Umudike – Umuahia, Nigeria  
rite2bash@gmail.com

**Ogbonna, Chikodi Ferdinand**

Department of Banking & Finance, College of Management Sciences,  
Michael Okpara University of Ariculture Umudike – Umuahia, Nigeria  
chikodi.ogbonna@gmail.com

### **Abstract**

This research investigated the implementation of green logistics and its impact on the marketing performance of beer firms in Nigeria. The study's particular objectives were to investigate the impact of eco-friendly packaging on consumer patronage of Nigeria Breweries Plc products in Nigeria and to ascertain the degree to which sustainable storage and materials handling boost sales. The objectives were to assess the impact of optimizing transportation routes and modes on the market share of Nigeria Breweries Plc products in Nigeria. An exploratory survey design was utilized for the methodology in this study. The study population comprised 22,287,006 individuals, from which a sample size of 400 was statistically calculated. The systematic random sampling method was employed to choose the sample elements and to conduct the questionnaire. The findings reveal that eco-friendly packaging significantly influences consumer patronage of Nigeria Breweries Plc products. In the six states of Southern Nigeria, sustainable warehousing and materials handling have substantial favorable impact on the sales growth of Nigeria Breweries plc products; enhancement of the means and routes of transportation significantly enhanced Nigeria's market share.

**Keywords:** *Sustainable Logistics, Eco-friendly packaging, Consumer patronage, Sustainable Storage, Materials handling, Breweries.*

## **1.1 Introduction**

The green economy and the green movement have gained significant importance in recent decades, influencing every sector of industry. Numerous companies are reconfiguring their business models to integrate environmentally sustainable approaches in the production of goods or services. This mandate applies to the logistics sector, where the incorporation of sustainable practices is essential for attaining ecological integrity and economic viability (Hadi et al., 2023). This entails a reassessment of conventional logistical tasks, including transportation, warehousing, inventory management, and waste disposal, to reduce their environmental impact (Baah et al., 2021).

The term "going green" refers to products and services—encompassing vehicles, food, and electronics—that are designed, manufactured, or constructed to minimize environmental impact while prioritizing energy efficiency, product safety, and resource conservation (Gittel, Magnusson, & Merenda, 2012). United Nations global programs, such as RIO+20 on sustainable development, have impacted global economic operations by emphasizing environmental protection, poverty alleviation, and job creation. The transition to sustainable logistics, which must prioritize compliance with governmental requirements while simultaneously addressing customer expectations and fulfilling environmental responsibilities, is driven by increasing environmental consciousness (Sharma et al., 2023). Green logistics entails the advancement of contemporary logistics, prioritizing the execution of logistics-related activities in an environmentally sustainable manner to facilitate economic growth while conserving and utilizing existing resources to mitigate the detrimental effects of these activities on the environment (Zang et al., 2020). The growing recognition of environmental sustainability's significance has resulted in a shift towards the implementation of green logistics management strategies, particularly within the manufacturing sector (Sharma et al., 2023). The brewing industry, akin to various other production sectors, under mounting pressure to implement sustainable practices owing to environmental issues, regulatory mandates, and evolving consumer preferences. Green logistics has become an essential approach for brewers aiming to reduce their environmental footprint while ensuring operational efficiency. This article analyzes the implementation of green logistics in brewing firms and its impact on their performance across economic, environmental, and social aspects. Green logistics, or Green Economy, pertains to the alignment of significant organizations with their business processes to improve the long-term performance of the firm and its stakeholders (Wu, Dunn, & Forman, 2012). Environmental conservation can be accomplished by practices such as recycling and repackaging in eco-friendly materials (Basu and Wright, 2008). Srivastava (2007) asserts that the adoption of Green Logistics or Green Economy practices results in a reduction of all types of pollutants, hence enhancing environmental performance.

Green logistics denotes the integration of sustainable methods within supply chain and logistics activities, encompassing transportation, warehousing, packaging, and distribution (Rodrigue et al., 2017). Breweries can optimize delivery routes to decrease fuel consumption, employ sustainable packaging materials, apply energy-efficient warehousing techniques, and adopt reverse logistics to improve recycling and minimize waste (Sbihi & Eglese, 2010). The implementation of green logistics transcends mere compliance; it constitutes a strategic choice that might enhance competitiveness. Brewery companies that adopt sustainability frequently experience cost reductions, improved brand reputation, and heightened consumer loyalty (Zailani et al., 2015). Nonetheless, the shift to green logistics entails problems, including substantial initial investments, technological obstacles, and organizational reluctance to change (Luthra et al., 2015). Green logistics, also known as eco-logistics or

sustainable logistics, involves the incorporation of environmentally friendly supply chain management and logistics practices to mitigate their adverse environmental impacts. It includes techniques designed to diminish carbon emissions, optimize resource use, and improve energy efficiency throughout transportation, warehousing, packaging, and distribution operations (Sbihi & Eglese, 2007). The notion has gained significance due to heightened regulatory demands, customer demand for sustainable products, and pledges to corporate social responsibility (CSR). However, there exists untapped potential to pursue a developmental path that cultivates green jobs, improves poverty alleviation, encourages sustainable growth, and restores environmental health and quality. By implementing effective policy interventions and financing, the nation may continue to generate fresh opportunities from this.

### **1.2 Statement of the Problem**

The brewing sector substantially impacts global economic activity; nevertheless, it possesses a huge environmental imprint owing to its resource-intensive processes. This include elevated water usage, energy consumption, packaging waste, and transportation emissions. As environmental issues escalate, brewery firms encounter mounting demand from governments, consumers, and stakeholders to implement sustainable logistical techniques, known as green logistics, to reduce their ecological footprint (McKinnon et al., 2015; Olajire, 2020). Despite the recognized advantages of green logistics, such as cost reduction, regulatory adherence, and improved brand image, numerous beer companies have difficulties in its comprehensive implementation (Luthra et al., 2017). Transitioning to sustainable logistics entails considerable hurdles, notably elevated implementation costs. The initial capital necessary for eco-friendly transportation, energy-efficient warehousing, and sustainable packaging can be substantial, particularly for small and medium-sized breweries (Zhu et al., 2008). Moreover, numerous breweries exhibit considerable technology and knowledge deficiencies, lacking the requisite experience and infrastructure to proficiently incorporate green logistics into their supply chains (Wu, Dunn, & Forman, 2012). Moreover, regulatory and commercial pressures exacerbate the dilemma, as environmental regulatory authorities advocate for breweries to implement sustainable practices, while disparate legislation across various countries pose compliance challenges (European Commission, 2020). Furthermore, operational resistance stemming from organizational inertia and an aversion to change obstructs the implementation of novel logistics models (Seuring & Müller, 2008).

### **1.3 Objectives of the Research**

The primary aim of this study is the adoption of green logistics and its impact on the marketing performance of brewery firms in Nigeria. The specific objectives include:

- i. Assess the impact of environmentally sustainable packaging on consumer patronage of Nigeria Breweries Plc products in Nigeria.
- ii. Determine the degree to which sustainable storage and materials handling contribute to the sales growth of Nigeria Breweries Plc in Nigeria.
- iii. Assess the impact of transportation route and mode optimization on the market share of Nigeria Breweries Plc products in Nigeria.

### **1.4 Research Questions**

The research questions that will direct the investigation include:

- i. What is the impact of environmentally sustainable packaging on consumer patronage of Nigeria Breweries Plc products in Nigeria?

- ii. Have sustainable storage and materials handling significant contribution to the sales growth of Nigeria Breweries Plc in Nigeria?
- iii. What is the impact of transportation route and mode optimization on the market share of Nigeria Breweries Plc products in Nigeria?

### **1.5 Research Hypotheses**

The following null hypotheses were established to direct the researchers in this investigation:

- i. Eco-friendly packaging exerts no substantial influence on consumer patronage of Nigeria Breweries Plc products.
- ii. Sustainable warehousing and materials handling do not contribute to the sales growth of Nigeria Breweries Plc products.
- iii. The optimization of transportation routes and modes does not significantly impact the market share of Nigeria Breweries Plc.

### **1.6 Literature Review**

This review examines contemporary studies on green logistics, focusing on its conceptual foundations, drivers, constraints, and its relationship with organizational performance in industrial contexts. Existing literature emphasizes how factors such as environmental regulations, government support, and corporate reputation influence the adoption of green logistics practices (Chatzoudes et al., 2024). Furthermore, environmental, social, and market performance have been identified as mediating variables linking green logistics practices to financial outcomes (Agyabeng-Mensah et al., 2020). Overall, prior research highlights that green logistics enhances operational efficiency, financial performance, and corporate image, thereby strengthening competitiveness and aligning firms with sustainability goals.

Logistics involves the coordinated management of procurement, transportation, storage, and distribution of goods and related information to achieve cost-efficient service delivery. Green logistics extends this concept by integrating environmentally sustainable practices across logistics activities such as transportation, warehousing, packaging, and distribution (Rodrigue et al., 2017). Beyond regulatory compliance, adopting green logistics offers strategic advantages including cost savings, improved brand reputation, and increased customer loyalty (Zailani et al., 2015).

Despite its benefits, transitioning to green logistics presents challenges such as high initial investment, technological limitations, and resistance to organizational change (Luthra et al., 2017). In the brewing industry, increasing environmental concerns and regulatory pressures have intensified the need for sustainable logistics practices. Green logistics enables breweries to reduce environmental impact while maintaining operational efficiency. Core practices include sustainable transportation, waste management, energy efficiency, and eco-friendly warehousing (Sharma et al., 2023).

Technological innovations such as the Internet of Things (IoT) and Big Data analytics play a crucial role in enhancing green logistics. IoT facilitates real-time tracking and monitoring of goods, improving efficiency and reducing environmental impact (Ben-Daya et al., 2017), while Big Data supports informed decision-making and process optimization (Wang et al., 2016). Additionally, reverse logistics promotes recycling and reuse, contributing to waste reduction and the circular economy (Ravi & Shankar, 2015). However, issues such as regulatory compliance costs and technological constraints continue to hinder widespread adoption (Govindan & Soleimani, 2017).

### **1.6.2 Principles of Sustainable Logistics**

Sustainable logistics involves implementing environmentally responsible practices throughout supply chain operations to minimize emissions, waste, and resource consumption (McKinnon et al., 2015). It integrates economic efficiency with environmental sustainability by reducing pollution and conserving resources (Sbihi & Eglese, 2009). Given that transportation significantly contributes to global CO<sub>2</sub> emissions, green logistics emphasizes cleaner technologies, optimized logistics networks, and circular economy practices. These efforts align with global sustainability frameworks such as the United Nations Sustainable Development Goals (SDGs), particularly those related to industry, responsible consumption, and climate action.

### **1.6.3 Key Components of Sustainable Logistics**

Green logistics comprises several core elements which includes:

#### **Sustainable Packaging**

This involves the use of biodegradable, recyclable, or reusable materials to minimize environmental impact. With global packaging waste exceeding 400 million metric tons annually, sustainable packaging is critical for reducing pollution and conserving resources (World Bank, 2023).

#### **Eco-friendly Warehousing and Materials Handling**

Sustainable warehousing focuses on energy efficiency, waste reduction, and automation to minimize environmental impact while maintaining operational effectiveness (EPA, 2023). Advanced technologies in materials handling can significantly reduce energy consumption and improve efficiency.

#### **Sustainable Transportation**

Traditional transportation systems contribute heavily to greenhouse gas emissions. Green transportation promotes fuel-efficient routing, use of electric and hybrid vehicles, and integration of smart mobility systems to reduce environmental impact (Demir et al., 2014). Future developments include smart city integration, shared mobility systems, and autonomous vehicles.

### **1.6.4 Theoretical Framework**

This study is grounded in the Institutional Theory and the Triple Bottom Line (TBL) Theory. Institutional theory explains how organizations respond to external pressures such as regulations, norms, and stakeholder expectations, often leading to similar practices across industries (DiMaggio & Powell, 1983). It highlights three key pillars: regulatory, normative, and cultural-cognitive forces (Scott, 2014).

On the other hand, the Triple Bottom Line theory expands performance evaluation beyond financial outcomes to include social and environmental dimensions (Elkington, 1994). It emphasizes that sustainable business success depends on balancing economic viability, social responsibility, and environmental protection. Together, these theories provide a strong framework for understanding the adoption and impact of green logistics practices.

### **1.6.5 Marketing Performance**

Marketing performance measures how effectively an organization achieves its marketing objectives, including sales growth, customer satisfaction, brand equity, and market share. It combines both financial and non-financial indicators (Rust et al., 2004). Modern marketing

performance is increasingly data-driven, enabling firms to optimize strategies in real time and enhance competitiveness (Ambler, 2003).

### **1.6.6 Empirical Review**

Empirical studies consistently demonstrate the positive impact of green logistics on organizational performance. For instance, Nwaulune et al. (2023) found that green logistics significantly improves social sustainability among FMCG firms in Nigeria. Similarly, Uwamahoro et al. (2023) reported strong positive correlations between green logistics practices and operational performance in construction projects.

Studies in Zimbabwe and Kenya further confirm that green logistics enhances operational and environmental performance (Kanyepe et al., 2023; Odock et al., 2024). Mutie et al. (2020) also identified a significant positive relationship between green logistics and firm performance. Additionally, Anh et al. (2025) demonstrated that green warehousing and transportation significantly influence economic, environmental, and social outcomes among logistics firms in Vietnam.

### **1.7 Methodology**

This study adopts an exploratory survey design, focusing on selected states in Nigeria. The population comprises over 22 million individuals across six states. Using the Taro Yamane formula, a sample size of 400 respondents was selected. Data were collected through structured questionnaires, with validity ensured through content validation and reliability confirmed using the test-retest method.

#### **1.7.2 Data Presentation and Analysis**

Four hundred copies of the questionnaire were delivered to chosen brewing enterprises in Akwa Ibom, Abia, Enugu, Anambra, and Imo states. A total of three hundred twenty (320) completed copies were utilized to test the hypotheses.

#### **1.7.3 Hypotheses Testing**

##### **Hypothesis 1**

**Ho<sub>1</sub>:** Eco-friendly packaging does not significantly influence consumers' patronage of Nigeria Breweries Plc Products.

**Hi<sub>1</sub>:** Eco-friendly packaging significantly influence consumers' patronage of Nigeria Breweries Plc Products.

Test Statistics = Pearson's Product-Moment Correlation Coefficient (r)

Distribution of Respondents' Aggregate Responses to Questions 1, 2, 3, 4, and 5: Sustainable Packaging and Augmenting Consumer Loyalty.

Summary of Correlation Analysis Findings for Hypothesis Ho<sub>1</sub>

Tests on the organization's practices of Corporate Citizenship, Sustainable packaging on their Marketing Performance.

##### **Test Statics - Pearson Correlation Coefficient**

The outcome of the correlation coefficient study conducted to evaluate Ho<sub>1</sub> indicates a substantial correlation between eco-friendly packaging and the consumption of Nigeria Breweries Plc products ( $r = 0.531$ ,  $t\text{-cal.} > t\text{-crit}$ ;  $0.000 < 0.01$ ). Consequently, Ho<sub>1</sub> is rejected,

and the alternative hypothesis is affirmed, asserting that "Eco-friendly packaging significantly influenced consumer patronage of Nigeria Breweries Plc products in Nigeria."

### **Test of Hypothesis 2**

**H0<sub>2</sub>:** Sustainable warehousing and materials handling do not significantly contribute to the sales growth of Nigeria Breweries Plc products.

**H1<sub>2</sub>:** Sustainable warehousing and materials handling significantly contribute to the sales growth of Nigeria Breweries Plc products.

Test Statistic: Multiple Linear Regression Analysis

#### Model Summary

R = 0.920

R<sup>2</sup> = 0.847

Adjusted R<sup>2</sup> = 0.844

Standard Error = 2.68505

Predictors: Sustainable warehousing, materials management, operational performance

#### ANOVA Results

Regression: SS = 5997.488, df = 3, MS = 1999.163

Residual: SS = 1081.421, df = 150, MS = 7.209

Total: SS = 7078.909, df = 153

F = 277.297, p = 0.000

Dependent Variable: Operational Performance

#### Regression Coefficients

Constant: B = -1.184, SE = 0.837, t = -1.414, p = 0.160

Eco-friendly storage solutions: B = 1.804, SE = 0.115, Beta = 0.818, t = 15.718, p = 0.000

Materials Management: B = 0.073, SE = 0.098, Beta = 0.037, t = 0.738, p = 0.461

Execution: B = 0.244, SE = 0.077, Beta = 0.123, t = 3.170, p = 0.002

### **Interpretation**

The regression results reveal a strong relationship between sustainable warehousing, materials handling, and sales performance. The model explains 84.7% of the variation in performance (R<sup>2</sup> = 0.847), indicating high predictive power. The ANOVA result (F = 277.297, p < 0.05) confirms the model is statistically significant.

Eco-friendly storage solutions have the strongest and most significant effect on performance (p < 0.05), while execution also shows a significant effect. However, materials management is not statistically significant (p > 0.05).

Based on these findings, the null hypothesis (H0<sub>2</sub>) is rejected and the alternative hypothesis (H1<sub>2</sub>) is accepted. This implies that sustainable warehousing and materials handling significantly enhance the sales growth of Nigeria Breweries Plc products.

### **Test of Hypothesis 3**

**H0<sub>3</sub>:** Optimization of transportation routes and modes does not significantly affect the market share of Nigeria Breweries Plc.

H1<sub>3</sub>: Optimization of transportation routes and modes significantly affects the market share of Nigeria Breweries Plc.

### **Test Statistic: Regression Analysis**

Model Summary

R = 0.053

R<sup>2</sup> = 0.001

Adjusted R<sup>2</sup> = -0.007

Standard Error = 0.153

Predictor: Optimization of transportation routes and modes

ANOVA Results

Regression: SS = 0.002, df = 3, MS = 0.002

Residual: SS = 1.859, df = 79, MS = 0.025

Total: SS = 1.956, df = 95

F = 0.191, p = 0.677

Dependent Variable: Market Share

Regression Coefficients

Constant: B = 1.066, SE = 0.061, t = 19.119, p = 0.000

Optimization of transportation routes: B = -0.011, SE = 0.055, Beta = -0.047, t = -0.464, p = 0.677

### **Interpretation**

The regression analysis shows a very weak relationship between transportation optimization and market share (R = 0.053). The model explains only 0.1% of the variation in market share (R<sup>2</sup> = 0.001), indicating negligible explanatory power.

The ANOVA result (F = 0.191, p > 0.05) shows that the model is not statistically significant. Additionally, the predictor variable is not significant (p = 0.677).

Therefore, the null hypothesis (H0<sub>3</sub>) is accepted, and the alternative hypothesis (H1<sub>3</sub>) is rejected. This implies that optimization of transportation routes and modes does not significantly affect the market share of Nigeria Breweries Plc.

## **1.8 Discussion of Findings**

The research investigated the implementation of green logistics and the performance of brewery firms in Abia, Akwa Ibom, Anambra, Enugu, Delta, and Imo states, all located in Southern Nigeria. The study of the results yielded the following conclusions. Hypothesis one demonstrated that eco-friendly packaging significantly influences consumer patronage of Nigeria Breweries Plc products across six states in Southern Nigeria. This outcome aligns with research conducted by Nwaulune, Ajike, and Bamidele (2023), which found that green logistics strategies have a substantial influence on the social sustainability of specific FMCG firms in Lagos State, Nigeria. Kanyepe et al. (2023) also assert that the implementation of green logistics methods significantly enhances the operational performance of multinational road freight companies.

Hypothesis two reveals that the multiple linear regression analysis demonstrates a strong beneficial impact of sustainable storage and materials handling on the sales growth of Nigeria Breweries Plc products. This finding corroborates the research by Uwamahoro, Nadeem, Shale, and Wachiuri (2023), which demonstrated that green logistics practices, including

green packaging, green warehousing, and green transportation modes and routes, significantly enhance the operational performance of multinational construction firms, evidenced by correlation coefficients of  $r=0.728$ ,  $r=0.796$ , and  $r=0.841$ , indicating that green logistics improves efficiency in these firms.

The findings of hypothesis three demonstrate a significant positive effect, with  $R=0.53$  and  $R^2=0.001$ ,  $P<0.005$ . Consequently, the null hypothesis ( $H_0$ ) was rejected, while the alternative hypothesis posits that the optimization of transportation modes and routes significantly enhances the market share of Nigeria Breweries Plc products across the six Southern states in Nigeria. This finding corroborates the assertions of Anh, Khoa, Giang, and Toan (2025), who postulated that green transportation significantly impacts economic, environmental, and social performance in their study conducted in Hanoi. Therefore, replicating these green logistics approaches in Nigeria will optimize profit for beer companies and improve the ecosystem, facilitating the adoption of green logistics to promote an environmentally sustainable business environment and organizational performance.

## **1.9 Conclusion**

The research investigated the implementation of green logistics and its impact on the marketing performance of beer firms in Nigeria. Three characteristics of green logistics—eco-friendly packaging, sustainable warehousing and materials handling, and optimization of transportation routes and modes—were employed as sub-variables to assess the dependent variable of consumer patronage. Sales expansion and market share of brewery firms in Nigeria.

A total of four hundred (400) respondents were randomly selected as the sample size for this study, and four hundred copies of the questionnaire were delivered to the selected brewing enterprises in Akwa Ibom, Abia, Enugu, Anambra, and Imo states. A total of three hundred twenty (320) completed copies were utilized to test and analyze the hypotheses using SPSS version 23.

The findings indicated that eco-friendly packaging significantly influences consumer patronage of Nigeria Breweries Plc products across six states in Southern Nigeria; furthermore, sustainable warehousing and materials handling positively impact the sales growth of Nigeria Breweries Plc products in these Southern states.

## **1.10 Recommendations**

Based on the findings and conclusions of the research, the researchers present the following recommendations:

- i. Managers of brewery firms should prioritize increased investments in boosting the innovativeness of eco-friendly packaging by selecting recycled polymers instead of virgin plastics.
- ii. Brewery managers should prioritize enhancing energy efficiency, modernizing material handling equipment, adopting smart technology, and minimizing waste in their operations to decrease costs and environmental impact.
- iii. Managers of beer firms should implement AI-driven route planning software, consolidate shipments, and transition to lower-emission transportation methods such as electric vehicles. The utilization of data analytics and IoT devices improves route efficiency and facilitates real-time monitoring, while embracing sustainability.

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