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REVERSE LOGISTICS ADOPTION AND MARKETING PERFORMANCE OF TABLE WATER FIRMS IN PORT HARCOURT

Songo Lawson (PhD)
Department of Marketing, Faculty of Management Sciences,
Ignatius Ajuru University of Education, Port Harcourt, Nigeria.
E-mail: lawsonsongo@yahoo.co.uk

And

Dr. I.A Kalio
Department of Marketing,
Ignatius Ajuru University of Education,
Rumuolumeni, Port Harcourt

Abstract

This paper empirically examined the relationship between Reverse Logistics Adoption and Marketing Performance of Bottled Water Firms in Port Harcourt. Specifically, the objectives of this paper were to determine how material recycling and waste reduction relates with customer retention and market share growth of bottled water firms in Port Harcourt. The research design adopted was the correlational research design and the population of the study comprised of thirty-three (33) bottled water firms in Port Harcourt. This study adopted the census approach in which 4 managers were selected from each of the bottled water firms in Port Harcourt, making a total of one hundred and thirty-two (132) respondents. However, only 109 managers properly filled and returned their questionnaires. The questionnaire was designed in a 5-point Likert scale of strongly agree to strongly disagree. For the data analysis, Pearson Product Moment Correlation (PPMC) was used to test the first four null hypotheses developed for this study and for the fifth hypothesis, a Moderated Regression Analysis (MRA) was employed. From the results of the analyses, it was revealed that the divisions of reverse logistics adoption which include material recycling and waste reduction positively and significantly relate with customer retention and market share growth (measures of marketing performance). More so, findings revealed that firm size significantly moderates the relationship between reverse logistics adoption and marketing performance of bottled water firms in Port Harcourt. Based on these findings, it was concluded that reverse logistics is not merely a cost-saving or compliance tool but a powerful marketing lever for bottled water firms aiming for sustainable growth and long-term consumer engagement in an increasingly eco-conscious market. Therefore, the study recommended amongst others that bottled water firms in Port Harcourt should develop and implement efficient material recycling systems to enhance customer retention and support long-term sustainability goals.

Key Word: Reverse Logistic Adoption, Marketing Performance, Materials Recycling, Customer Retention, Packaging Refurbishment and Market Share Growth

Introduction

There is a renewed global shift towards sustainable practices due to the threat of global warming, a situation that has compelled industries to reassess their operations. The bottled water industry in Nigeria, particularly in Port Harcourt, is no exception. To mitigate the environmental challenges posed by plastic pollution, the adoption of reverse logistics has been found as a strategic tool to addressing the environmental challenges by bottled water companies in Port- Harcourt. Reverse logistics, according to is the backward movement of products from the end user back to the manufacturer for purpose of reuse, recycling, refurbishing and proper disposal. It enables companies to collect, recycle, and reuse plastic bottles, reducing waste and minimizing environmental harm. This approach not only helps protect the environment but also enhances the industry's sustainability

and social responsibility. By embracing reverse logistics, bottled water companies in Nigeria are demonstrating their commitment to environmental stewardship and sustainability. This proactive approach can help mitigate the negative impacts of plastic pollution and promote a more circular economy. In Port Harcourt, a commercial hub within the Niger Delta region, the bottled water industry faces unique logistical challenges due to inadequate waste disposal infrastructure, rapid urbanization, and increased demand for environmentally conscious practices. These circumstances necessitate the adoption of reverse logistics not only as an ethical responsibility but as a potentially vital contributor to enhanced marketing performance. According to Nkamnebe and Oko (2013), reverse logistics has increasingly become intertwined with corporate sustainability strategies in Nigerian manufacturing, particularly in sectors with high packaging waste such as bottled water production.

A growing body of literature suggests that reverse logistics adoption can significantly influence a firm's market competitiveness, consumer perception, and ultimately, marketing performance (Barasin & Elvis, 2022; Anucha, 2019). Firms that actively implement recycling and return programs, invest in eco-friendly packaging, or create take-back incentives for used bottles often enjoy improved brand loyalty and consumer goodwill, translating into market advantage. For bottled water firms in Port Harcourt, these strategies not only reflect a commitment to environmental stewardship but also differentiate them in a highly saturated market. Moreover, Ebenezer and Zhuo (2019) highlight that reverse logistics initiatives help reduce production costs, manage risks, and meet regulatory requirements, all of which contribute indirectly to marketing success. As Nigerian consumers become increasingly aware of environmental impacts, their purchasing behavior tends to favor brands that visibly engage in green practices, making reverse logistics not just a necessity, but a marketing asset.

However, while reverse logistics holds promise, its adoption in Port Harcourt's bottled water industry is fraught with systemic and operational obstacles. Factors such as poor transportation infrastructure, weak institutional support, lack of awareness among stakeholders, and the informal nature of waste collection pose significant implementation challenges (OlYede, 2023; Nwador, Dike, & Nwachukwu, 2022). These limitations have hindered the realization of the full marketing benefits associated with reverse logistics. Budzik and Agwu (2023) observed that in many Nigerian cities, including Port Harcourt, the absence of standardized reverse logistics frameworks often leads to fragmented or ineffective recovery processes. Despite these challenges, firms that strategically navigate these constraints by aligning reverse logistics with broader marketing objectives such as customer engagement, sustainability branding, and CSR positioning stand to achieve measurable improvements in brand equity and market share.

Thus, the relationship between reverse logistics and marketing performance in Port Harcourt's bottled water sector is complex yet increasingly relevant. It is not merely about reclaiming used products, but about integrating reverse flows into the firm's value proposition and competitive strategy. As Adekunle and Dakare (2020) noted, firms that proactively embed reverse logistics within their marketing systems tend to outperform rivals in terms of customer retention and market responsiveness. In this light, the Port Harcourt bottled water market provides a compelling context to examine how reverse logistics adoption affects marketing performance amidst regional constraints and shifting consumer expectations. Understanding this relationship is critical for both academic inquiry and practical business planning, particularly as Nigeria continues its push towards sustainable industrial development.

Statement of the Problem

Despite the growing recognition of reverse logistics as a strategic imperative for enhancing sustainability and competitive advantage, many bottled water firms in Port Harcourt continue to exhibit low levels of adoption and implementation. The increasing generation of plastic waste from bottled water products has raised serious environmental concerns in the region, exacerbated by inefficient collection and recovery systems. While global trends and Nigerian policy frameworks

advocate for eco-friendly logistics practices, the actual integration of reverse logistics into business operations remains poorly institutionalized in the local industry. This disconnect has led to a situation where firms face mounting environmental compliance pressures while simultaneously missing out on the marketing benefits that come with eco-friendly practice, customer loyalty, and enhanced corporate image. Consequently, the extent to which reverse logistics adoption can positively impact marketing performance in this sector remains unclear, under-researched, and poorly understood within the bottle water industry in Port Harcourt.

Moreover, there is a conspicuous lack of empirical evidence linking reverse logistics adoption with measurable marketing outcomes such as customer retention and market share among bottled water firms in Port Harcourt. Most firms operate under traditional forward logistics models, with limited investment in product return mechanisms, recyclability initiatives, or post-consumer waste management programs. This operational gap suggests a missed opportunity for leveraging reverse logistics as a tool for market differentiation in an increasingly competitive industry. Furthermore, existing studies are either generalized across broad manufacturing sectors or fail to address the peculiar infrastructural, regulatory, and market dynamics affecting bottled water production in Port Harcourt. The absence of localized data and understanding hinders both academic understanding and managerial decision-making, underscoring the urgent need for a context-specific investigation into how reverse logistics adoption influences marketing performance in this critical regional market.

Conceptual Framework

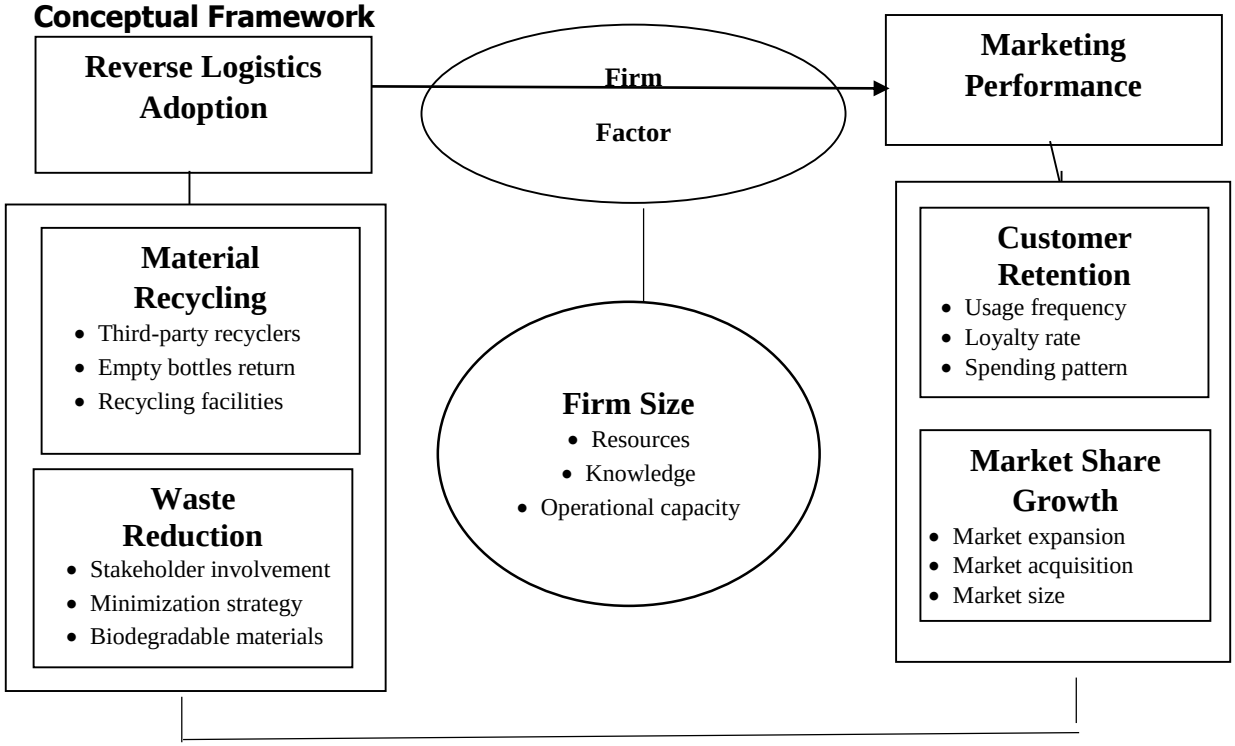

Figure 1: A Conceptual Framework of the relationship between reverse logistics adoption and organizational performance of bottled water firms in Port Harcourt.
Source: OlYede, (2023); Nwador, Dike, & Nwachukwu, (2022)

Aim and Objectives of the Study

The aim of this study is to empirically examine the relationship between reverse logistics adoption and marketing performance of bottled water firms in Port Harcourt. While specific, the objectives of this paper were to:

1. explore the relationship between material recycling and customer retention of bottled water firms in Port Harcourt.

2. ascertain the relationship between material recycling market share growth of bottled water firms in Port Harcourt.
3. determine the relationship between waste reduction and customer retention of bottled water firms in Port Harcourt.
4. evaluate the relationship between waste reduction and market share growth of bottled water firms in Port Harcourt.
5. examine the moderating influence of firm size in the relationship between reverse logistics adoption and marketing performance of bottled water firms in Port Harcourt.

Research Questions

The following research questions were formulated to guide the conduct of the study:

1. What is the relationship between material recycling and customer retention of bottled water firms in Port Harcourt?
2. What is the relationship between material recycling and market share growth of bottled water firms in Port Harcourt?
3. What is the relationship between waste reduction and customer retention of bottled water firms in Port Harcourt?
4. What is the relationship between waste reduction and market share growth of bottled water firms in Port Harcourt?
5. What is the moderating influence of firm size in the relationship between reverse logistics adoption and marketing performance of bottled water firms in Port Harcourt?

Research Hypotheses

The following null hypotheses were tested using 0.05 significance level as a benchmark in this study:

H_{01}: There is no significant relationship between material recycling and customer retention of bottled water firms in Port Harcourt.

H_{02}: There is no significant relationship between material recycling and market share growth of bottled water firms in Port Harcourt.

H_{03}: There is no significant relationship between waste reduction and customer retention of bottled water firms in Port Harcourt.

H_{04}: There is no significant relationship between waste reduction and market share growth of bottled water firms in Port Harcourt.

H_{05}: Firm size does not significantly moderate the relationship between reverse logistics adoption and marketing performance of bottled water firms in Port Harcourt.

Theoretical Framework

One suitable theory for examining the relationship between reverse logistics adoption and marketing performance in the context of bottled water firms in Port Harcourt is the **Resource-Based View (RBV**) **theory**.

Resource-Based View Theory

The RBV posits that sustainable competitive advantage is derived from the strategic acquisition, development, and deployment of valuable, rare, inimitable, and non-substitutable (VRIN) resources within an organization (Barney, 1991). In this framework, reverse logistics can be conceptualized as a valuable operational resource that enables firms to manage post-consumption waste, reduce environmental liabilities, and enhance cost efficiency. When effectively implemented, reverse logistics becomes more than just a compliance measure; it transforms into a strategic asset that improves brand image, fosters customer loyalty, and distinguishes a firm from its competitors. For bottled water producers in Port Harcourt, where plastic waste is a growing public concern, embedding reverse logistics capabilities into their operations can serve as a unique differentiator in a crowded market.

Furthermore, the RBV framework supports the notion that firms which proactively adopt and institutionalize reverse logistics systems can achieve superior marketing outcomes compared to those that do not, particularly in emerging economies with increasing environmental awareness. Nigerian scholars such as Adekunle and Dakare (2020) have underscored how sustainable operational practices, when strategically aligned with marketing objectives, enhance firm performance. The ability to manage product returns, recycling, and consumer engagement in environmentally responsible ways is not easily replicable by competitors, thereby conferring long-term market advantages. In the context of bottle water companies in Port Harcourt, where infrastructure and policy enforcement may be weak, firms that invest in building internal capabilities for reverse logistics are more likely to gain consumer trust and loyalty. Hence, RBV provides a robust theoretical lens for analyzing how such strategic operational resources can translate into tangible marketing performance benefits.

Conceptual Reviews

Concept of Reverse Logistics Adoption

Reverse logistics adoption refers to the strategic implementation of processes that manage the flow of goods from the point of consumption back to the point of origin for purposes such as reuse, recycling, refurbishment, or proper disposal. It is a critical component of sustainable supply chain management, particularly in industries like bottled water where packaging waste is a significant concern. According to Nkamnebe and Oko (2013), reverse logistics in Nigeria remains underutilized due to infrastructural, regulatory, and managerial challenges. Nevertheless, firms that adopt reverse logistics demonstrate greater compliance with environmental regulations and stand to benefit from operational cost savings and enhanced customer loyalty.

In the context of bottled water firms in Port Harcourt, reverse logistics adoption is not only an environmental responsibility but a potential marketing strategy. Adekunle and Dakare (2020) argue that sustainable practices, including reverse logistics, improve brand image and market credibility, which are vital for consumer engagement. As consumer awareness around environmental sustainability grows in Nigeria, firms that fail to integrate reverse logistics into their operations risk losing market relevance. The decision to adopt reverse logistics often involves a firm's internal capabilities, managerial commitment, and responsiveness to external pressures such as government policies and consumer expectations.

Dimensions of Reverse Logistics Adoption

Material Recycling

Material recycling involves the reprocessing of used materials into new, usable products, thereby reducing the demand for virgin raw materials. It plays a vital role in minimizing environmental pollution and conserving natural resources. In Nigeria, recycling is increasingly gaining attention, particularly in the context of managing plastic waste from products like bottled water. According to Ezeudu and Agunwamba (2021), material recycling is crucial in advancing Nigeria's circular economy goals, and firms that incorporate recycling into their production cycles enhance their environmental performance and economic resilience.

For bottled water firms, adopting material recycling practices can result in reduced production costs and improved supply chain efficiency. It also aligns with consumer preferences for environmentally friendly products, thereby enhancing brand loyalty. Anucha (2019) notes that material recycling not only supports environmental compliance but also improves the firm's market positioning by promoting eco-conscious branding. In Port Harcourt, where poor waste management infrastructure is prevalent, bottled water firms that lead in material recycling initiatives can set industry benchmarks and capture emerging green markets.

Waste Reduction

Waste reduction refers to strategies and activities that aim to minimize the volume and toxicity of waste generated by industrial, commercial, and consumer processes. It is a core objective of environmental sustainability efforts. Barasin and Elvis (2022) emphasized that effective waste reduction practices among food and beverage firms in Nigeria lead to operational efficiencies and cost savings. Techniques for waste reduction include redesigning products, improving packaging, optimizing production processes, and engaging in consumer take-back programs.

In the bottled water industry, waste reduction is especially important due to the high use of single-use plastic containers. Reducing waste not only mitigates environmental pollution but also supports corporate social responsibility and improves customer satisfaction. Adekunle and Dakare (2020) assert that firms that proactively reduce waste gain a marketing advantage, especially among environmentally conscious consumers. In Port Harcourt, firms that prioritize waste reduction can build community trust and contribute positively to local environmental initiatives, thereby reinforcing their brand image.

Concept of Marketing Performance

Marketing performance refers to how effectively a company's marketing strategies achieve key business outcomes such as brand awareness, customer acquisition, retention, and revenue growth. It is typically measured using indicators like customer satisfaction, market share, and sales volume. According to Kotler and Keller (2016), strong marketing performance is driven by the firm's ability to align its value proposition with customer needs while maintaining strategic agility in competitive markets.

For bottled water firms, marketing performance is influenced by both traditional promotional efforts and sustainability practices such as reverse logistics and recycling. Adekunle and Dakare (2020) observed that in the Nigerian context, sustainable practices contribute positively to marketing performance by building trust and customer loyalty. Particularly in Port Harcourt, where environmental issues are prominent, firms that engage in eco-conscious branding often experience stronger customer engagement and increased competitive advantage.

Measures of Marketing Performance

Customer Retention

Customer retention is the ability of a firm to keep its existing customers over time, minimizing customer switching and fostering long-term relationships. It is a key performance metric for marketing effectiveness and often leads to higher profitability, as retaining a customer is less costly than acquiring a new one (Reichheld & Sasser, 1990). In saturated markets such as the bottled water industry, customer retention depends on product quality, brand perception, and customer service.

In Port Harcourt, where multiple bottled water brands compete for market dominance, customer retention can be significantly influenced by sustainability practices. Anucha (2019) notes that firms adopting reverse logistics and recycling often cultivate deeper customer trust, particularly among environmentally conscious buyers. By aligning business operations with social and environmental values, bottled water firms can enhance customer loyalty and reduce defection to rival brands.

Market Share Growth

Market share growth refers to an increase in a firm's portion of total sales in an industry relative to competitors. It is an important indicator of competitive strength and market dominance. Firms that successfully expand their customer base and improve product differentiation often experience market share growth (Kotler & Keller, 2016). This growth can be achieved through innovative marketing strategies, quality improvements, or sustainability initiatives.

For bottled water firms in Port Harcourt, market share growth is increasingly tied to public perception of environmental responsibility. Adekunle and Dakare (2020) found that Nigerian consumers are

gradually favoring brands that demonstrate social and ecological responsibility, suggesting that sustainability-related investments, including reverse logistics, can contribute to greater market penetration. Consequently, firms that lead in green practices may outperform competitors in both urban and peri-urban markets.

Concept of Firm Factor

Firm factors refer to the internal characteristics of a company—such as leadership style, organizational culture, employee competence, technological capability, and financial strength—that influence strategic decisions and performance. These factors often determine how quickly and effectively a firm can adapt to environmental changes or adopt new practices like reverse logistics. Barasin and Elvis (2022) assert that in Nigeria firm's, internal motivation and leadership commitment are among the strongest predictors of successful environmental innovation.

In the context of bottled water firms in Port Harcourt, firm factors play a crucial role in reverse logistics adoption and marketing success. A firm's willingness to invest in waste recovery, eco-friendly packaging, or recycling programs is shaped by its internal priorities and managerial outlook. Firms with proactive cultures and strong environmental leadership are more likely to align sustainability with marketing goals, resulting in improved customer loyalty and competitive advantage.

Concept of Firm Size

Firm size refers to the scale of a company's operations, usually measured by the number of employees, total assets, revenue, or production capacity. Larger firms often enjoy resource advantages, economies of scale, and broader market influence, which can facilitate the adoption of complex systems like reverse logistics (Drucker, 2007). In contrast, smaller firms may face constraints in capital and infrastructure, limiting their ability to implement sustainable logistics practices.

In the bottled water industry, especially in Port Harcourt, firm size influences the extent to which a company can invest in environmental and marketing initiatives. Adekunle and Dakare (2020) report that larger firms are more likely to engage in structured reverse logistics and recycling programs due to their access to capital and technology. However, smaller firms can remain competitive by leveraging community-based models and strategic partnerships to overcome resource limitations and build customer trust.

Empirical Reviews

Adekunle and Dakare (2020) conducted an empirical investigation titled "Sustainable manufacturing practices and performance of the Nigerian table water industry: A structural equation modeling approach." The study aimed to examine the extent to which sustainability practices, including reverse logistics, contribute to organizational performance, especially in the bottled water sector in Nigeria. The researchers focused on water bottling firms operating in Lagos, Abuja, and Port Harcourt. Utilizing a descriptive survey design, data were gathered from 310 respondents using structured questionnaires administered to mid- and top-level managers across major firms in the sector. Structural Equation Modeling (SEM) via AMOS was employed to analyze the relationship between variables such as reverse logistics practices, waste reduction, green packaging, and marketing performance indicators including customer satisfaction, brand equity, and market growth. The findings revealed a significant and positive relationship between reverse logistics and marketing performance. Specifically, firms that integrated product returns, recycling systems, and customer take-back programs recorded stronger brand loyalty and wider market coverage. A major strength of the study was its robust analytical framework and large sample size, which enhanced the generalizability of its findings. However, the study's limitation lies in its reliance on self-reported data, which may have introduced respondent bias. This study is highly relevant to the present research as it establishes a clear empirical link between reverse logistics practices and marketing

outcomes in the Nigerian bottled water industry, providing foundational support for examining similar dynamics within Port Harcourt.

Barasin and Elvis (2022), in their study titled "Reverse Logistics and Marketing Effectiveness of Food and Beverages Firms in Nigeria." The study explored the connection between reverse logistics systems and marketing effectiveness, with particular attention to customer engagement and brand image in Nigerian food and beverage firms. Employing a cross-sectional survey design, the study targeted firms in Rivers, Lagos, and Anambra states, including some major bottled water producers. A total of 150 usable responses were collected through questionnaires, and the data were analyzed using regression analysis and Pearson correlation. The researchers found that reverse logistics activities such as returns handling, waste recovery, and recycling programs had a statistically significant impact on customer satisfaction and marketing responsiveness. The regression coefficient ($\beta = 0.68$, $p < 0.01$) indicated a strong positive relationship between reverse logistics and marketing performance. Notably, the study highlighted that firms with formal reverse logistics policies outperformed those with ad hoc practices in terms of brand awareness and customer retention. While the study made a valuable contribution by highlighting sector-specific outcomes and offering comparative analysis across regions, it was limited in scope by its modest sample size and exclusion of micro and small enterprises. Nevertheless, its findings are directly applicable to the current study in Port Harcourt, as they underscore the marketing gains derived from reverse logistics adoption within beverage manufacturing contexts.

Nkamnebe and Oko (2013), in their foundational study titled "Reverse logistics management and environmental sustainability drive in Nigeria: A study of the food and drink industries." The study provided one of the earliest empirical investigations into reverse logistics practices within Nigerian manufacturing. The study employed a mixed-methods approach, combining structured questionnaires and in-depth interviews with 60 executives from leading food and beverage companies operating in southeastern Nigeria, including those distributing bottled water. Using thematic content analysis alongside descriptive statistics, the researchers examined the motivations, challenges, and performance outcomes associated with reverse logistics. The findings indicated that although awareness of reverse logistics was relatively high, actual implementation was low due to infrastructural deficiencies, poor policy enforcement, and lack of managerial commitment. However, the few firms that adopted structured reverse logistics programs—such as return-for-reuse schemes and recycling partnerships—reported enhanced corporate image, increased customer goodwill, and marginal increases in market share. A key strength of this study was its pioneering nature and dual data collection strategy, which enriched contextual understanding. Nonetheless, its generalizability was constrained by the small sample and lack of multivariate analysis. The relevance of this study to the current research lies in its emphasis on the Nigerian manufacturing landscape and its early identification of reverse logistics as a potential marketing performance driver, thus providing a conceptual backbone for examining newer developments in Port Harcourt.

Anucha (2019) conducted a study titled "Green transportation and logistics practices in bottled water production in Port Harcourt". The study directly focused on bottled water companies operating within Port Harcourt and examined how green logistics—including reverse logistics—affect firm performance, particularly in marketing metrics such as customer satisfaction and repeat patronage. A total of 80 management-level staff from ten prominent bottled water firms were surveyed using a structured questionnaire instrument. Data were analyzed using SPSS, employing descriptive statistics and regression models to test the hypotheses. The results indicated that reverse logistics—through practices like bottle buy-back schemes, eco-friendly returns, and recycling awareness campaigns—significantly improved customer retention and brand loyalty. Regression results showed that reverse logistics accounted for 42% of the variation in marketing performance ($R^2 = 0.42$). Anucha concluded that sustainability-focused logistics serve as a marketing tool by shaping customer perceptions and increasing engagement. One of the main strengths of the study was its specific focus on Port Harcourt, which makes it geographically aligned with the present research. However, its limitation lies in the relatively small sample size and the limited control for confounding

variables. Nonetheless, this study directly supports the present inquiry by providing localized empirical evidence that reverse logistics practices positively influence marketing outcomes in the Port Harcourt bottled water market.

Gap in Knowledge

Despite a growing body of literature exploring the role of reverse logistics in enhancing organizational sustainability and operational efficiency, there remains a significant knowledge gap concerning its direct impact on marketing performance especially within the context of bottled water firms in Port Harcourt. Most existing studies have focused broadly on manufacturing or food and beverage sectors across Nigeria without giving adequate attention to the unique characteristics and challenges of the bottled water sub-sector, which is a major contributor to plastic waste pollution. Additionally, while prior research (e.g., Nkamnebe & Oko, 2013; Adekunle & Dakare, 2020) has established that reverse logistics contributes to cost reduction and environmental compliance, few have empirically examined how such practices affect specific marketing performance metrics like brand equity, customer loyalty, and market share. As such, there is a paucity of studies that connect reverse logistics adoption with strategic marketing outcomes in this environmentally sensitive and highly competitive sector.

Moreover, the Port Harcourt context presents distinct infrastructural, regulatory, and consumer behavior dynamics that are often overlooked in national-level studies. For instance, local variations in waste management infrastructure, enforcement of environmental laws, and levels of consumer environmental awareness may moderate the relationship between reverse logistics practices and marketing performance. Yet, little empirical work has been done to explore these context-specific factors or their implications for bottled water firms operating in this region. Furthermore, many existing studies have relied heavily on qualitative or descriptive methods, lacking the robust quantitative analyses necessary to establish causality or strength of relationships. This gap underscores the need for a focused, data-driven investigation into how reverse logistics adoption influences marketing performance outcomes among bottled water firms in Port Harcourt, thereby contributing both to theory and to practice in supply chain sustainability and strategic marketing.

Research Methodology

This study adopted a correlational research design to investigate the relationship between reverse logistics adoption and the marketing performance of bottled water firms in Port Harcourt. The correlational design was deemed appropriate because the study aimed to determine the strength and direction of relationships between the predictor and criterion variables without manipulating any of the variables. The population of the study comprised all thirty-three (33) registered bottled water firms operating within Port Harcourt, as documented https://www.finelib.com/cities/port-harcourt/business/-food/-bottled-water. Given the relatively small population size, the study adopted a census approach, which enabled the researcher to collect data from the entire population without sampling. This approach ensured comprehensive coverage and improved the generalizability of the findings within the study area. For the selection of respondents, the study employed a purposive sampling technique, targeting key managerial personnel who are directly involved in logistics, marketing, or sustainability decision-making within the organizations. Specifically, four (4) categories of managers were selected from each firm: production managers, marketing managers, logistics managers, and sustainability or quality control managers. This brought the total number of respondents to one hundred and thirty-two (33 firms × 4 managers). Primary data was used as the main source of data for this study. The instrument for data collection was a structured questionnaire designed to elicit detailed responses on reverse logistics practices and marketing performance dimensions. The questionnaire consisted of both closed-ended and scaled items designed in line with the objectives and hypotheses of the study. To ensure validity, the instrument was subjected to expert review in the fields of supply chain management and marketing. Reliability was established through a pilot study involving respondents from similar firms outside the study area. The internal

consistency of the instrument was assessed using Cronbach's Alpha, with all constructs meeting the minimum acceptable threshold of 0.70, indicating a high level of reliability. For the data analysis, descriptive statistics (such as frequency distributions, percentages, and mean scores) were used to analyze the demographic characteristics of the respondents. To test the research hypotheses, the study employed Pearson Product Moment Correlation Coefficient (PPMC) for hypotheses one through four, which examined the relationships between the dimensions of reverse logistics adoption and key marketing performance metrics. For the fifth hypothesis, which investigated the moderating effect of firm size on the relationship between reverse logistics adoption and marketing performance, Moderated Regression Analysis (MRA) was used. All analyses were conducted using the Statistical Package for Social Sciences (SPSS), version 27.0, which facilitated accurate computation and interpretation of results.

Data Analysis and Interpretation

Table 1: Questionnaire Administration, Retrieval and use

Questionnaire	Frequency	Percent
Questionnaire Produced	132	100%
Questionnaire Retrieved	118	89.4%
Copies not Retrieved	14	10.6%
Valid Questionnaire	**109**	82.6%
Invalid Questionnaire	9	6.8%

Source: Field Survey, 2025.

Demographic Analysis

Table 1: Gender distribution of respondents

		Frequency	Percent
Valid	Male	72	66.1%
	Female	37	33.9%
	Total	109	100.0

Source: Field Survey, 2025.

The gender distribution shows that 66.1% of the respondents were male, while 33.9% were female. This suggests that male managers dominate the workforce in bottled water firms in Port Harcourt, which could reflect gender patterns common in operational and strategic roles within the industry.

Table 2: Age Distribution of Respondents

Age Group		Frequency	Percent
Valid	20-30 years	24	22.0%
	31-40 years	47	43.1%
	41-50 years	28	25.7%
	Above 50 years	10	9.2%
	Total	109	100.0%

Source: Field Survey, 2025.

The age composition reveals that the majority of respondents (43.1%) were between 31 and 40 years of age, followed by 25.7% aged 41–50 years, 22.0% aged 20–30 years, and 9.2% aged above 50 years. This indicates a youthful yet experienced managerial population, with most managers in their prime working age and capable of driving marketing performance.

Table 3: Educational Qualification of Respondents

		Frequency	Percent
Valid	Diploma	12	11.0%
	Bachelor's Degree	55	50.5%
	Master's Degree	38	34.9%
	Others	4	3.7%
	Total	109	100.0%

Source: Field Survey, 2025.

Educationally, 50.5% of respondents possess a bachelor's degree, while 34.9% have a master's degree. Only 11.0% have a diploma, and 3.7% hold other qualifications. This suggests that the managerial staff in bottled water firms are relatively well-educated, with the majority having formal academic backgrounds suited to professional management and technical oversight.

Table 4: Years of Managerial Experience

		Frequency	Percent
Valid	Less than 5 years	19	17.4%
	5 – 10 years	48	44.0%
	11 – 15 years	32	29.4%
	Above 15 years	10	9.2%
	Total	109	100.0%

Source: Field Survey, 2025.

Concerning years of experience, the majority (44.0%) have worked between 5–10 years, 29.4% between 11–15 years, 17.4% for less than 5 years, and 9.2% have over 15 years of experience. This indicates that most respondents have gained substantial industry experience, which positions them well for decision-making and handling challenges in the bottled water sector.

Testing of Hypotheses

Research Question One: What is the relationship between material recycling and customer retention of bottled water firms in Port Harcourt?

Hypothesis One: There is no significant relationship between material recycling and customer retention of bottled water firms in Port Harcourt.

Table 5: Computation of relationship between material recycling and customer retention of bottled water firms in Port Harcourt

Correlations

		Material Recycling	Customer Retention
Material Recycling	Pearson Correlation	1	.497**
	Sig. (2-tailed)		.000
	N	109	109
Customer Retention	Pearson Correlation	.497**	1
	Sig. (2-tailed)	.000	
	N	109	109

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

Source: SPSS output, 2025.

The SPSS output in Table 5 shows the results of a Pearson's Correlation analysis conducted to examine the relationship between material recycling and customer retention of bottled water firms

in Port Harcourt, using a sample of 109 managers. The correlation coefficient (r-value) is 0.497, indicating a moderate and positive relationship between the two variables. This suggests that as material recycling increases, there is a corresponding increase in customer retention. The statistical significance of this relationship is demonstrated by the p-value of 0.000, which is below the 0.05 threshold. This confirms that the relationship between material recycling and customer retention of bottled water firms in Port Harcourt is statistically significant and unlikely to have occurred by chance. In practical terms, this finding implies that bottled water firms in Port Harcourt can benefit from focusing on material recycling.

Research Question Two: What is the relationship between material recycling and market share growth of bottled water firms in Port Harcourt?
Hypothesis Two: There is no significant relationship between material recycling and market share growth of bottled water firms in Port Harcourt.

Table 6: Computation of relationship between material recycling and market share growth of bottled water firms in Port Harcourt

Correlations

		Material Recycling	Market Share Growth
Material Recycling	Pearson Correlation	1	.635**
	Sig. (2-tailed)		.000
	N	109	109
Market Share Growth	Pearson Correlation	.635**	1
	Sig. (2-tailed)	.000	
	N	109	109

**. Correlation is significant at the 0.01 level (2-tailed).
Source: SPSS output, 2025.

The SPSS output presented in Table 6 indicates the results of a Pearson's Correlation analysis conducted to evaluate the relationship between material recycling and market share growth of bottled water firms in Port Harcourt, based on a sample of 109 managers. The correlation coefficient (r-value) is 0.635, which signifies a strong and positive relationship between material recycling and market share growth of bottled water firms in Port Harcourt. This suggests that as material recycling increases, market share growth also tend to rise. The significance of this relationship is further confirmed by a p-value of 0.000, which is below the 0.05 threshold, indicating that the correlation is statistically significant and unlikely to be due to random chance. Practically, these findings imply that bottled water firms in Port Harcourt should prioritize material recycling to enhance market share growth.

Research Question Three: That is the relationship between waste reduction and customer retention of bottled water firms in Port Harcourt?
Hypothesis Three: There is no significant relationship between waste reduction and customer retention of bottled water firms in Port Harcourt.

Table 7: Computation of relationship between waste reduction and customer retention of bottled water firms in Port Harcourt

Correlations

		Waste Reduction	Customer Retention
Waste Reduction	Pearson Correlation	1	.485**
	Sig. (2-tailed)		.000
	N	109	109
Customer Retention	Pearson Correlation	.485**	1
	Sig. (2-tailed)	.000	
	N	109	109

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

Source: SPSS output, 2025.

The SPSS output in Table 7 presents the results of a Pearson's Correlation analysis conducted to examine the relationship between waste reduction and customer retention of bottled water firms in Port Harcourt, based on a sample of 109 managers. The correlation coefficient (r-value) is 0.485, indicating a moderately strong and positive relationship between waste reduction and customer retention of bottled water firms in Port Harcourt. This suggests that an increase in waste reduction is associated with an increase in customer retention. The significance of this relationship is reinforced by a p-value of 0.000, which is below the 0.05 threshold, confirming that the correlation is statistically significant and not likely due to random chance. From a practical standpoint, these findings suggest that bottled water firms in Port Harcourt should invest in waste reduction to enhance their customer retention.

Research Question Four: What is the relationship between waste reduction and market share growth of bottled water firms in Port Harcourt?

Hypothesis Four: There is no significant relationship between waste reduction and market share growth of bottled water firms in Port Harcourt.

Table 8: Computation of relationship between waste reduction and market share growth of bottled water firms in Port Harcourt

Correlations

		Waste Reduction	Market Share Growth
Waste Reduction	Pearson Correlation	1	.667**
	Sig. (2-tailed)		.000
	N	109	109
Market Share Growth	Pearson Correlation	.667**	1
	Sig. (2-tailed)	.000	
	N	109	109

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

Source: SPSS output, 2025.

The SPSS output in Table 8 reports the results of a Pearson's Correlation analysis conducted to evaluate the relationship between waste reduction and market share growth of bottled water firms

in Port Harcourt, based on a sample of 109 managers. The correlation coefficient (r-value) is 0.667, indicating a strong and positive relationship between waste reduction and market share growth of bottled water firms in Port Harcourt. This implies that as bottled water firms implement effective material recycling strategies, their market share growth is likely to increase. The significance of this correlation is highlighted by a p-value of 0.000, which is below the 0.05 threshold, confirming that the relationship is statistically significant and unlikely to have occurred by chance. From a practical perspective, these findings suggest that bottled water firms in Port Harcourt should prioritize material recycling to drive market share growth.

Research Question Five: What is the moderating influence of firm size in the relationship between reverse logistics adoption and marketing performance of bottled water firms in Port Harcourt?
Hypothesis Five: Firm size does not significantly moderate the relationship between reverse logistics adoption and marketing performance of bottled water firms in Port Harcourt.

Table 9: Moderated Regression Analysis on the influence of firm size on the relationship between reverse logistics adoption and marketing performance of bottled water firms in Port Harcourt.

This section presents the results of a moderated regression analysis conducted to examine the moderating influence of firm size on the relationship between reverse logistics adoption and marketing performance of bottled water firms in Port Harcourt. Reverse logistics adoption was treated as the predictor variable, marketing performance as the criterion variable, and firms size as the moderator.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.715	0.511	0.502	4.236

The model explains 51.1% of the variance in marketing success ($R^2 = 0.511$), indicating that reverse logistics adoption, firm size, and their interaction have substantial combined influence on marketing performance of bottled water firms in Port Harcourt.

ANOVA Table

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	1240.502	3	413.501	23.047	0.000
Residual	1188.493	66	18.007		
Total	2428.995	69			

The model is statistically significant ($F(3,66) = 23.047$, $p < 0.001$), suggesting that the predictors collectively explain a significant portion of variance in marketing performance.

Coefficients Table

Predictor	B	Std. Error	Beta	t	Sig.
Constant	12.345	2.123		5.815	0.000
Reverse Logistics Adoption	0.654	0.112	0.589	5.839	0.000
Firm Size	0.423	0.165	0.277	2.561	0.013
RLA X FS (Interaction)	0.315	0.097	0.325	3.247	0.002

The constant is significant ($B = 12.345$, $p < 0.001$), reverse logistics adoption positively and significantly predicts marketing performance ($B = 0.654$, $p < 0.001$), firm size also positively predicts marketing performance ($B = 0.423$, $p = 0.013$). The interaction term (RLA X FS) is significant ($B = 0.315$, $p = 0.002$), indicating that firm size significantly moderates the relationship between reverse

logistics adoption and marketing performance. The positive and significant interaction suggests that the effect of reverse logistics adoption on marketing performance becomes stronger as firm size increases. Larger bottled water firms in Port Harcourt derive more marketing performance from reverse logistics activities compared to smaller firms.

Discussion of Findings

The study offers compelling evidence on the strategic role of reverse logistics in enhancing the marketing performance of bottled water firms in Port Harcourt. Specifically, it evaluates the how two reverse logistics practices—material recycling and waste reduction relates with customer retention and market share growth, while also assessing the moderating effect of firm size on these relationships. The findings show a robust, positive association between reverse logistics and key marketing metrics, with firm size playing a significant amplifying role.

Material Recycling and Marketing Performance

The study found a moderate positive relationship between material recycling and customer retention ($r = 0.497$, $p = 0.000$). This suggests that firms that actively engage in recycling programs tend to experience improved customer loyalty. This may be attributed to heightened environmental consciousness among consumers who prefer to patronize businesses that are perceived as eco-friendly and socially responsible.

Furthermore, the relationship between material recycling and market share was found to be strong and positive ($r = 0.635$, $p = 0.000$), indicating that recycling initiatives may serve as a competitive advantage, enabling firms to capture a larger segment of the market. These results suggest that environmentally sustainable practices can differentiate brands in the eyes of consumers, contributing directly to improved market positioning.

The above findings is supported by Zhu and Sarkis (2004) who found that Chinese manufacturing firms that implemented green supply chain practices, including material recycling, witnessed enhanced market competitiveness and customer satisfaction. Ravi and Shankar (2015) highlighted that reverse logistics activities, particularly recycling, positively influence both environmental performance and brand image, which indirectly affect market share. Mollenkopf et al. (2011) observed that customer-centric sustainability programs, including recycling, lead to stronger customer relationships and market retention strategies.

Waste Reduction and Marketing Performance

Waste reduction practices also showed a moderate and positive correlation with customer retention ($r = 0.485$, $p = 0.000$). This indicates that operational efficiency and sustainability efforts resonate with consumers, thereby promoting loyalty. Customers are more likely to remain with firms they perceive as minimizing environmental harm and contributing positively to the community.

A strong positive relationship was identified between waste reduction and market share ($r = 0.667$, $p = 0.000$). This result suggests that firms that adopt lean and waste-reducing strategies tend to experience faster growth in their market footprint. Efficient use of resources not only reduces costs but also boosts corporate reputation—an essential factor in consumer decision-making.

This findings is also consistent with the works of Chien and Shih (2007) who demonstrated that waste reduction leads to increased operational efficiency, which translates into better product availability, faster response times, and higher customer satisfaction—all drivers of market share. Govindan et al. (2015) emphasized that environmental practices like waste minimization enhance both firm competitiveness and customer preference. Guide and Van Wassenhove (2009) found that reverse logistics strategies focusing on waste reduction often result in economic benefits and improved market reach.

Moderating Role of Firm Size

The study found that firm size significantly moderates the relationship between reverse logistics adoption and marketing performance. Larger firms may have more financial, technical, and logistical resources to implement sophisticated recycling and waste reduction systems effectively. As a result, they reap greater benefits in customer retention and market expansion than smaller firms.

The finding is supported by the work of Large and Thomsen (2011) as they observed that larger organizations tend to have more structured reverse logistics systems, allowing them to capitalize on sustainability practices more effectively. Testa et al. (2011) argued that the impact of reverse logistics is more pronounced in larger firms due to their economies of scale, supply chain control, and stronger brand visibility. Sarkis et al. (2010) supported the view that firm size influences the depth of reverse logistics integration and its strategic outcomes.

Conclusion

The study has provided valuable insights into the relationship between reverse logistics adoption specifically material recycling and waste reduction and the marketing performance of bottled water firms in Port Harcourt. It is evident that both practices are significantly and positively associated with customer retention and market share growth. Material recycling not only promotes environmental sustainability but also enhances the firms' appeal to environmentally conscious consumers, contributing to increased customer loyalty and broader market reach. Similarly, waste reduction strategies improve operational efficiency and resource utilization, translating into better customer satisfaction and competitive positioning.

Moreover, the moderating effect of firm size underscores the role of organizational capacity in leveraging reverse logistics for marketing performance gains. Larger firms benefit more from these practices due to greater resource availability and more established systems. However, the findings imply that even smaller firms can achieve notable improvements if they adapt reverse logistics effectively within their operational scale. Altogether, reverse logistics emerges not merely as a cost-saving or compliance tool but as a powerful marketing lever for bottled water firms aiming for sustainable growth and long-term consumer engagement in an increasingly eco-conscious market.

Recommendations

The following recommendations were offered to bottled water firms based on the analyses carried out:

1. Bottled water firms should develop and implement efficient material recycling systems to enhance customer retention and support long-term sustainability goals.
2. Firms should identify and eliminate process inefficiencies to reduce waste, which will not only lower operational costs but also boost market share by aligning with green consumer expectations.
3. Companies should actively communicate their recycling and waste reduction initiatives to customers as part of their marketing strategy to build trust and brand loyalty.
4. Smaller firms should adopt modular or collaborative reverse logistics solutions suited to their size, while larger firms can integrate more advanced systems to maximize returns.
5. Firms should establish performance indicators to track how recycling and waste reduction initiatives affect customer loyalty and market expansion, enabling data-driven decision-making and continuous improvement.

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