

Green Marketing Strategies and Sustainable Purchasing Behaviour: Evidence from FMCG Consumers in North-East Nigeria

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Abstract

Sustainable consumption behaviour has attracted increased attention due to rising environmental challenges, including climate change, biodiversity loss, and pollution. Consequently, achieving circular economy principles requires sustainable purchasing behaviour, even as consumer awareness continues to increase. At the same time, businesses are implementing green marketing strategies to promote sustainable consumption and satisfy environmentally conscious consumers. However, many consumers are still engaging in unsustainable behaviours, and there is a paucity of empirical evidence on the effectiveness of green marketing strategies in the North-East region of Nigeria. Hence, this study explored the influence of six green marketing strategies on sustainable purchasing behaviour in North-East Nigeria. Guided by the Cue Utilisation Theory (CUT), using a quantitative method, a cross-sectional survey design, and a multistage sampling technique, 353 valid responses were recorded from FMCG consumers in the six states of the North-East using a structured questionnaire. The hypothesised relationships were assessed using Partial Least Squares Structural Equation Modelling (PLS-SEM). As shown by the results, eco-labelling, eco-branding, and eco-packaging have no significant influence on sustainable purchasing behaviour, indicating that in a post-conflict, resource-constrained context characterised by information asymmetry, consumers prioritise salient extrinsic cues over symbolic or cognitively demanding green signals, consistent with CUT's cue diagnosticity hierarchy. In contrast, green advertising, green placement, and green pricing significantly increase sustainable purchasing behaviour. The findings emphasise that accessibility, affordability, and effective advertising are critical factors shaping sustainable consumption behaviour in the study context. The study contributes context-specific evidence from a post-conflict region and provides useful guidance for policymakers and managers in designing effective green marketing strategies in Nigeria.

Keywords: Green Marketing Strategies; Eco-labelling; Eco-branding; FMCG; Green Advertising; Sustainable Purchasing Behaviour

1. Introduction

Sustainable consumption behaviour has attracted attention from international bodies, governmental institutions, and the scholarly literature due to increased environmental and social challenges. Human well-being and global stability are threatened by climate change, biodiversity loss, pollution, and resource depletion (Chen et al., 2024; Jinliang et al., 2023). Economic expansion and population growth have also increased the exploitation of resources and environmental degradation (Jinliang et al., 2023). Recognising these global economic, social and ecological sustainability concerns, the United Nations introduced the Sustainable Development Goals (SDGs) in 2015 to protect the planet, eradicate poverty, and ensure prosperity by 2030 (United Nations, 2015). Goal 12 of the SDGs focused on responsible consumption and production as a pathway to sustainable development (Gasper et al., 2019; United Nations, 2015), making sustainable consumption behaviour significant to achieving this global agenda.

Sustainable consumption behaviour involves the purchase, use, and disposal of products that minimise environmental impact (Minh & Quynh, 2024). It is considered a proactive measure to mitigate ecological challenges (Mabaso et al., 2025). Sustainable or green purchasing behaviour, as an important aspect of broader sustainable consumption, is significant in advancing the circular economy principles, in which products are made so that they can be reused, repaired, or recycled, addressing climate change, resource depletion, and development goals (Hong et al., 2024; Meis-Harris et al., 2021; Syed et al., 2024). It also helps reduce poverty, encourages the move toward a green economy, and supports sustainable development, which are important steps in containing global warming (Hong et al., 2024). Many businesses are therefore implementing green marketing strategies to encourage sustainable purchasing behaviour and meet the expectations of environmentally conscious consumers

As an important business strategy, organisations are employing green marketing through the modification of their marketing strategies by integrating ecological responsibility to satisfy environmentally conscious consumers (Gbadeyan & Omolekan, 2015; Mustapha et al., 2016; Usman et al., 2024). Strategies such as eco-labelling, eco-branding, eco-friendly packaging, and green advertising help promote products with lower environmental impact, build consumer trust, and improve brand equity (Coelho et al., 2020; Hong et al., 2024). However, sustainable purchasing behaviour varies across regions and is influenced by cultural, economic, and contextual factors.

The North-East as a region is faced with various environmental challenges, including desertification, flooding, and deforestation, which are compounded by years of insurgency. Desertification, for example, is deteriorating, with 50% to 75% of Adamawa, Bauchi, Borno, Gombe, and Yobe states of the region estimated as susceptible to wind erosion and desertification (Azare et al., 2020). These environmental problems can therefore amplify the frailty of natural resources, making sustainable consumption behaviours more urgent than ever. Thus, understanding the drivers of this behaviour is essential.

Despite the increased awareness of the link between consumption and environmental issues, sustainable purchasing behaviour in North-East Nigeria appears to be limited, as many consumers are still engaged in unsustainable consumption habits. Moreover, the North-East is not adequately represented in the academic literature related to this topic. As the region faces multiple socio-economic and environmental challenges (Ibimilua & Ayiti, 2024), the need to understand how green marketing strategies are influencing consumer choices is apparent. Though businesses are implementing green practices, there is scant evidence on their efficacy in driving sustainable purchasing behaviour. Existing studies from the region, such as Bello and Hong (2022), have focused on firm performance rather than consumer behaviour. This study, therefore, attempts to fill this gap. Thus, the objective of the paper is to explore the influences of green marketing strategies on the sustainable purchasing behaviour of FMCG consumers in north-east Nigeria, with the following specific objectives:

- i. To examine the influences of eco-labelling on sustainable purchasing behaviour;
- ii. To assess the influences of eco-branding on sustainable purchasing behaviour;
- iii. To explore the influences of eco-packaging on sustainable purchasing behaviour;
- iv. To evaluate the influence of green pricing on sustainable purchasing behaviour;
- v. To examine the influences of green placement on sustainable purchasing behaviour; and
- vi. To determine the influences of green advertising on sustainable purchasing behaviour.

This study advances the literature on green marketing and sustainable consumption by examining how green marketing strategies influence sustainable purchasing behaviour in North-East Nigeria. Using the Cue Utilisation Theory, it

provides a theoretical understanding of how intrinsic and extrinsic cues influence consumer evaluations under uncertainty and scepticism of green claims. The findings offer evidence on the effectiveness of six green marketing strategies, informing policymakers, marketers, and sustainability practitioners in promoting environmentally responsible consumption.

2. Literature Review

2.1 Cue Utilisation Theory

In this study, Cue Utilisation Theory (CUT) is employed as the theoretical foundation. The CUT explains how consumers evaluate products under uncertainty, particularly when attributes such as environmental sustainability are complex, intangible, or difficult to verify before making purchase decisions (Olson & Jacoby, 1972). According to CUT, consumers rely on informational cues as proxies for product quality and credibility, using them to reduce perceived risk and guide decision-making under information asymmetry (Olson & Jacoby, 1972). The theory distinguishes between intrinsic cues, which are inherent to the product, and extrinsic cues, such as price, brand, labels, advertising, and distribution (Richardson et al. 1994). The diagnostic value of cues varies across contexts, with consumers selectively utilising those perceived as most accessible, credible, and relevant to their needs. Recent empirical evidence grounded in CUT demonstrates that this valuation is highly specific, applying directly to credence-based pro-environmental products. For instance, in food consumption, the centrality of a green attribute critically determines its diagnostic power, where core attributes, such as organic production, are utilised as stronger signals of naturalness and environmental friendliness than peripheral attributes such as eco-packaging, leading to higher purchase intentions (Mei et al., 2025). This indicates how credible cues shape perception and reduce uncertainty. Furthermore, the study reveals that this cue hierarchy is context-dependent; deep price discounts can invert the typical valuation, making peripheral green attributes more effective, thereby confirming the contingent nature of green product cues in consumer decision-making (Mei et al., 2025).

Although CUT has mainly been applied in developed markets, evidence from developing economies, including Nigeria, indicates a stronger reliance on extrinsic cues, particularly price, due to economic constraints, limited purchasing power, and heightened price sensitivity (Ogiemwonyi, 2022). In North-East Nigeria, a post-conflict setting with constrained income, weak institutional

monitoring of green claims, and predominantly utilitarian consumption, scepticism toward pro-environmental marketing is likely high. Under such conditions, CUT predicts selective cue utilisation, where consumers prioritise cues that are credible, functional, and verifiable while discounting ambiguous environmental claims (Rao & Monroe, 1988).

This study conceptualises green marketing strategies as informational cues that influence sustainable purchasing behaviour by reducing uncertainty, signalling environmental responsibility, and enhancing perceived value. In the context of sustainable consumption, cues are strategically employed to signal environmental quality. Eco-packaging functions as a tangible extrinsic cue by providing physical, observable evidence of environmental friendliness, and can act as a hybrid signal when its material properties are combined with symbolic claims or certifications. Eco-labelling, eco-branding, green advertising, green pricing, and green placement operate as classic extrinsic cues. They communicate a brand's environmental commitment indirectly and shape consumer judgments primarily through perceived credibility, trust, and value. For credence attributes like sustainability, where direct verification is impossible, these extrinsic cues become critically diagnostic. Their relative influence, the cue hierarchy, is determined by their diagnostic priority, which hinges on credibility, consistency, and their perceived centrality to the product's environmental impact. Therefore, Cue Utilisation Theory provides a coherent theoretical lens to explain how this portfolio of green marketing strategies, acting as a hierarchy of cues, influences sustainable purchasing behaviour. This framework applies to the North-East Nigerian market, where consumer scepticism and information asymmetry may be pronounced, and underpins the present study

2.2 Green Marketing Strategies

Green marketing refers to an environmentally responsible marketing approach that integrates sustainability principles into product design, production, promotion, distribution, and disposal to minimise environmental harm while satisfying consumer and societal needs (Gbadayan & Omolekan, 2015; Imiru, 2023; Mustapha et al., 2016). As a comprehensive process of green management, green marketing involves the identification, anticipation, and satisfying consumer and societal demands profitably and sustainably (Chen et al., 2024). In this study, green marketing is defined as a holistic marketing approach that integrates sustainable production and distribution with consumer environmental consciousness, communicated through eco-oriented marketing strategies.

From the Cue Utilisation Theory (CUT) perspective, consumers rely on extrinsic cues, such as labels, branding, price, packaging, availability, and advertising, when intrinsic product attributes, such as environmental performance, are difficult to verify before purchase (Olson & Jacoby, 1972; Mei et al., 2025). Therefore, green marketing strategies represent the various initiatives employed by companies to incorporate sustainable practices into their marketing mix, influencing consumer behaviour (Mandina et al., 2025; Trung & Van Thanh, 2022). These strategies seek to increase corporate social responsibility, promote environmentally friendly products, and reduce carbon footprints (Mandina et al., 2025). Green marketing strategies can serve as informational cues that reduce information asymmetry and help consumers make sustainability-related purchase decisions. However, the effectiveness of these cues is contingent upon their clarity, credibility, accessibility, and perceived diagnostic value, particularly in developing markets characterised by weak certification systems and limited regulatory enforcement. Consequently, companies are employing green marketing strategies, such as eco-labelling, eco-packaging, eco-branding, green pricing, green placement, and green advertising, as extrinsic signals intended to convey environmental values, mitigate information asymmetry, and increase consumer trust in green products (Nguyen-Viet, 2022; Umema & Japee, 2024).

Eco-labelling is the green marketing strategy that informs consumers about the environmental impact of a product (Huang et al., 2024). Within CUT, eco-labels operate as symbolic informational cues that simplify complex environmental attributes into recognisable signals, enabling consumers to infer product greenness without extensive cognitive effort. Studies suggest that eco-labels are important communication tools that inform consumers about the sustainability of products, which reduces information gaps between consumers and companies (Singh et al., 2023; Tsurayya & Ridanasti, 2025). However, in contexts characterised by low awareness or weak institutional trust, the diagnostic value of eco-labels may be diminished.

Eco-branding is the strategy that incorporates environmental values into a company's communication and brand identity, which increases customer loyalty and brand reputation and balances consumer preferences with sustainability (Kulikova & Kondratenko, 2024; Verma & Tyagi, 2023). From a cue utilisation perspective, eco-branding can serve as a reputation-based cue that will allow consumers to rely on brand familiarity and perceived integrity when evaluating green claims. Such cues are particularly influential in repeat purchase situations,

where brand credibility substitutes for direct product verification. Nonetheless, the effectiveness of eco-branding may be inhibited in price-sensitive markets where functional and economic considerations outweigh symbolic brand associations.

Eco-packaging involves the use of renewable, biodegradable, or recyclable materials to reduce waste and environmental impact (Shaikh & Hyder, 2023). Packaging functions as a visual that is immediately observable at the point of purchase. Studies show that consumers primarily associate eco-friendly packaging with biodegradability, recyclability, and visual appeal (Nguyen et al., 2020). However, the strength of eco-packaging may depend on consumers' ability to correctly interpret these signals, which may vary across socio-cultural contexts.

Green pricing reflects the premium often attached to eco-friendly products due to higher costs in sustainable production and certification (Agrawal & Ansari, 2022; Pushpanathan & Dhananjani Silva, 2020). Under CUT, price functions as both a quality signal and a sacrifice cue. While some consumers are willing to pay more when ecological benefits are evident, high prices may discourage widespread adoption, especially in low-income contexts where affordability influences purchase decisions (Karunarathna et al., 2020). Nonetheless, fair and transparent pricing remains a crucial determinant of green purchase intention (Hossain & Khan, 2018; Su & Li, 2024). Consequently, the diagnostic value of green pricing is context-dependent and may weaken green cue effectiveness where economic constraints dominate.

Green placement focuses on the sustainable distribution of green products, including reducing transportation emissions and ensuring accessibility (Agrawal & Ansari, 2022; Pushpanathan & Dhananjani Silva, 2020). Availability acts as a critical situational cue, as consumers may purchase green products when conveniently located (Kaur et al., 2022). CUT suggests that even strong informational cues lose influence when products are inconveniently located or inconsistently supplied. In regions affected by infrastructural limitations or insecurity, accessibility becomes more important in the use of green cues.

Green advertising communicates the environmental benefits of sustainable products to boost buyers' knowledge and change their attitudes towards sustainable purchasing (Borah et al., 2024; Carrión-Bósquez et al., 2024). It positions businesses as socially responsible and shapes consumer environmental knowledge and concern (Kaur et al., 2022; Nguyen-Viet, 2022). Green advertising

strategy can function as a persuasive informational cue, framing green product attributes and guiding consumer interpretation of other green features. However, exaggerated or ambiguous claims may reduce cue credibility and lead to scepticism, particularly in environments where greenwashing concerns are prevalent (Nguyen-Viet, 2022).

These six green marketing strategies together can act as extrinsic green marketing cues that guide consumer decision-making about the environmental quality of products and influence sustainable purchasing behaviour. However, their effectiveness depends on message presence, as well as on cue credibility, consistency, and relevance within the socio-economic and institutional context.

2.3 Sustainable Purchasing Behaviour

Sustainable purchasing behaviour (SPB) is an important component of sustainable consumer behaviour and involves consumers making decisions about what to buy based on societal and environmental factors (Madinga et al., 2024). SPB is viewed as an outcome of green marketing influence. From a Cue Utilisation Theory perspective, sustainable purchasing behaviour can be influenced by consumers' reliance on observable green marketing cues when intrinsic environmental attributes are not directly verifiable. Studies indicated that when exposed to green marketing, consumers tend to infer the environmental performance of products and reduce uncertainty surrounding green claims, leading to sustainable consumption behaviour (Hao et al., 2024; Perez-Castillo & Vera-Martinez, 2021). For instance, through eco-labelling, consumers can get information about green products and their usage that can guide them towards sustainable behaviour (Meis-Harris et al., 2021). These studies indicate that consumers are more likely to engage in sustainable purchasing when green cues are easily recognisable, trustworthy, and aligned with their values.

However, the effectiveness of green marketing strategies is not uniform across contexts. In developing regions, factors such as affordability constraints, limited environmental awareness, weak regulatory enforcement, scepticism, and low trust in green claims, mostly due to concerns about greenwashing, may reduce consumers' reliance on certain cues and, consequently, influence sustainable purchasing behaviour. Although existing studies, largely conducted in European and Asian contexts, indicate that strategies such as eco-labelling, green advertising, sustainable packaging, and eco-branding can influence consumer perceptions and sustainable purchasing decisions, evidence from developing

contexts is limited and local studies such as Abiodun et al. (2024) and Oloveze et al. (2023) are from other regions, leaving North-East Nigeria unrepresented. In such settings, affordability concerns and socio-cultural norms may affect how consumers interpret and utilise green marketing cues. This gap needs to be explored to understand how green marketing strategies influence sustainable purchasing behaviour in North-East Nigeria.

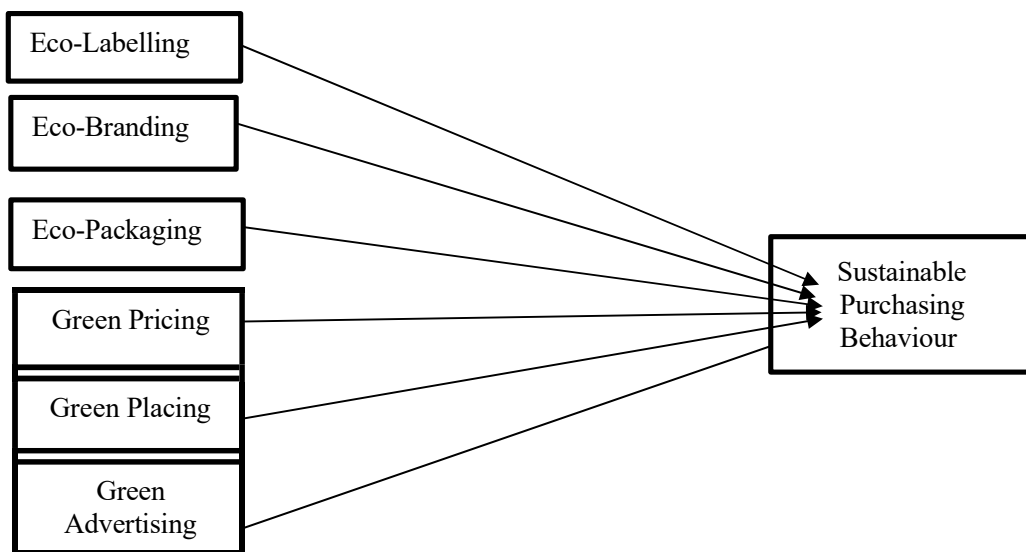


Figure 1. *Conceptual Model of the Study*
Sources: Authors' Design (2025).

2.4 Hypotheses Development

2.4.1 Eco-labelling and Sustainable Purchasing Behaviour

For consumers to be engaged in sustainable purchasing, they need sufficient information about the environmental effects of products (Nguyen-Viet, 2022). Eco-labelling provides environmental details of products to make information available to consumers (Masocha, 2021). It educates customers about the sustainable aspects of products, which can increase confidence in green claims and encourage eco-friendly purchasing decisions (Li, 2025; Masocha, 2021; Tsurayya & Ridanasti, 2025). Research indicated that eco-labelling had a positive and substantial impact on green purchase intention, directly and indirectly through

the mediation of adaptive green brand equity (Nguyen-Viet, 2022). It was further observed by Oloveze et al. (2023) that eco-labelling has a significant influence on sustainable consumption behaviour. An understanding of eco-labels also had a substantial positive impact on sustainable consumption, trust, and the environmental attitude of consumers (Xin & Long, 2023). Based on the above discussions, the following hypothesis is proposed:

H₁: Eco-labelling positively influences sustainable consumption behaviour.

2.4.2 Eco-branding and Sustainable Purchasing Behaviour

The use of environmental principles has become an important practice in influencing consumer purchasing behaviour. Eco-branding improves brand credibility, trust, and influence sustainable purchasing through signalling ecological values and aligning with consumers' green identities (Majeed et al., 2022; Verma & Tyagi, 2023). It builds a company's environmental identity (Li, 2025). Eco-branding increases brand positioning by associating products with sustainability, which allows consumers to express their ecological values through their purchasing choices. This symbolic and emotional connection leads to stronger, sustainable purchasing intentions and behaviour. Empirical findings indicate that green branding promotes the development of sustainable products and positively influences green loyalty (Jinliang et al., 2023). Based on the above, it is proposed that:

H₂: Eco-branding positively influences sustainable purchasing behaviour.

2.4.3 Eco-packaging and Sustainable Purchasing Behaviour

Eco-packaging is considered an important factor in minimising ecological impacts (Coelho et al., 2020). Through the use of recyclable materials and reducing non-biodegradable substitutes, eco-packaging can help reduce negative environmental effects (Diansyah & Pratminingsih, 2025). Research indicated that eco-packaging appeals to environmentally conscious consumers and strengthens their purchase intentions (Basnet et al., 2024; Mahmoud et al., 2022). Furthermore, it was found that consumers are more disposed to purchase and are willing to pay more for products with biodegradable packaging (Plotkina et al., 2025). By addressing lifecycle concerns, eco-packaging can motivate consumers to choose green products. Drawing from the above, the hypothesis below is proposed:

H₃: Eco-packaging positively influences sustainable purchasing behaviour.

2.4.4 Green Pricing and Sustainable Purchasing Behaviour

Pricing can be an important factor in consumers' green product adoption decisions. If green products are perceived to have been competitively but fairly priced by consumers, they may tend to accept green products; nevertheless, significant price differences may discourage green purchasing (Narimanfar & Nezhad, 2022; Nguyen-Viet, 2023). Green products tend to be more expensive than non-green equivalents, owing to the extra expenses connected with green processes (Pushpanathan & Silva, 2020). Green pricing strategies that ensure affordability and are value reflective of environmental benefits might encourage green purchase behaviour (Narimanfar & Nezhad, 2022; Nguyen-Viet, 2023). Empirical findings suggest that green pricing influences sustainable behaviour. For instance, green pricing was found to have significantly influenced green purchasing intention (Kamalanon et al., 2022; Pushpanathan & Dhananjani Silva, 2020). It also significantly influenced the purchase decision of FMCG consumers (Abiodun et al., 2024). It was further observed that consumers' understanding of the costs of green products has a positive impact on green consumption behaviour (Lopes et al., 2024). Diverging from the above, Agrawal and Ansari (2022) found that green prices undermine consumers' purchase intention of green FMCG products. Thus, it is proposed as follows:

H4: Green pricing positively influences sustainable purchasing behaviour.

2.4.5 Green Placement and Sustainable Purchasing Behaviour

Making green products visible and accessible can influence consumer decision-making. Therefore, green placement deals with efforts to deliver green products at the proper location, time and quantity in sustainable ways (Usman et al., 2024), therefore, could influence sustainable purchasing behaviour. Studies have shown that when sustainable products are conspicuously displayed and conveniently available, consumers may incorporate them into their purchasing practices (Mahmoud et al., 2024; Narimanfar & Nezhad, 2022). Green placement was found to have significantly influenced the purchase decision of FMCG consumers (Abiodun et al., 2024). Moreover, Nguyen-Viet (2023) reported that dimensions of green customer-based brand equity, including green brand image, green trust, green satisfaction, and green loyalty, were significantly improved by green placement. Contrarily, Agrawal and Ansari (2022) found that green placement had no discernible effect on consumers' intentions to purchase green FMCG. Based on the foregoing, the hypothesis below is formulated:

H5: Green placement positively influences sustainable consumption behaviour.

2.4.6 Green Advertising and Sustainable Purchasing Behaviour

Green advertising promotes the environmental benefits of products and is an effective strategy that can influence consumer intentions and encourage sustainable purchasing behaviour, which demonstrates a company's environmental consciousness (Borah et al., 2024). Green advertising can raise awareness of ecological benefits and communicate firms' environmental commitments, motivating consumers to choose sustainable alternatives (Li, 2025). Research suggests that green advertising improves consumer attitudes, brand equity, and product appeal; however, its impact may vary with credibility and message framing (Jaiswal et al., 2022; Oloveze et al., 2023). By appealing to consumers' environmental consciousness, green advertising increases trust, shapes favourable perceptions, and ultimately drives sustainable purchasing behaviour (Borah et al., 2024; Huo et al., 2025). Moreover, Huo et al. (2025) found that green advertising improves various aspects of consumer wisdom, thereby increasing green brand equity. Thus, the hypothesis below is proposed:

H6: Green advertising positively influences sustainable purchasing behaviour.

3. Methodology

This study adopted the positivist philosophy, quantitative method, and cross-sectional survey design in examining the influence of six green marketing strategies on sustainable purchasing behaviour in North-East Nigeria. The population comprised educated adult FMCG consumers with a minimum of secondary education and at least 18 years of age across Adamawa, Bauchi, Borno, Gombe, Taraba, and Yobe states. A multistage sampling technique was employed that includes cluster sampling defined by state, proportionate quota sampling, and purposive selection of individual respondents to ensure the selection of only educated adults familiar with FMCG products. This yielded 388 responses, of which 353 were valid. A power analysis was conducted to ascertain the necessary sample size for the model comprising six predictors using G*Power 3.1 (Faul et al., 2009). Given the parameters ($\alpha = 0.05$, $f^2 = 0.15$, power = 0.80), a minimum of 98 responses was required. Therefore, the retained 353 responses substantially exceed the minimum requirement, thereby affirming the sample's sufficiency and can ensure robust analysis (Memon et al., 2021). Moreover, it is larger than the typical 200 cases in SEM studies (Kline, 2023) and also meets the PLS-SEM guideline of having at least 200 responses for moderately complex models (Hair et al., 2019).

A structured questionnaire that measured variables on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree) was used to collect data. The dependent variable, Sustainable Purchasing Behaviour, was measured using items adapted from Corboş et al. (2024). The independent construct, Green Marketing Strategies, was operationalised through six dimensions: eco-labelling (Carrión-Bósquez et al., 2024), eco-branding (Basnet et al., 2024), eco-packaging (Nguyen-Viet, 2023), green pricing (Duarte et al., 2024), green placement (Nguyen-Viet, 2023), and green advertising (Duarte et al., 2024). The items were adapted from pre-validated scales with established reliability, originally developed to measure green marketing and sustainable consumption behaviour in other sectors. Expert review confirmed that the adapted items were appropriate, relevant, and understandable for FMCG consumers in North-East Nigeria. Instrument quality was confirmed through expert review and validated for construct validity ($AVE \geq 0.50$, $HTMT \leq 0.90$), and reliability (factor loadings ≥ 0.708 , Cronbach's alpha and composite reliability ≥ 0.70). Data were analysed using SPSS for descriptive statistics and PLS-SEM via SmartPLS for hypothesis testing. PLS-SEM was chosen due to its suitability for complex models with multiple constructs, its ability to handle smaller sample sizes, and its robustness for predictive and exploratory analysis.

The study adhered to strict ethical standards to ensure transparency, respect, and integrity. Informed consent was obtained from all participants, who were briefed on the study's purpose, procedures, voluntary participation, and right to withdraw without penalty. Confidentiality and anonymity were maintained, and data were used solely for academic purposes. The research respected local cultural norms in North-East Nigeria to ensure the survey was culturally appropriate and non-harmful. Findings were reported honestly, with limitations disclosed. Ethical approval was obtained from the Ethical Review Committee of the University of Ilorin, confirming compliance with established institutional standards for research involving human participants.

4. Results and Discussions

4.1 Descriptive Statistics of Respondents

The study recorded 353 usable responses from the target population. Most of the respondents (36.3%) were aged 25 - 34 years, followed by 31.2% aged 35 - 44 years, 24.4% aged 18 - 24 years, 7.9% aged 45 - 54 years, and 0.3% aged 55 - 64 years, indicating that the population is predominantly young and middle-aged. The gender distribution indicates that 73.7% of respondents were male and 26.3%

were female. Marital status shows that 49.6% single and 50.4% married. The educational qualifications of participants show that 51.6% had a Degree/HND, 24.9% a Master's degree, 14.2% an O' Level certificate, 4.8% a PhD, and 4.5% a Diploma/NCE. With respect to occupation, 44.2% were civil servants, 26.6% were business owners, 20.7% were students, 6.2% were farmers, and 2.3% worked in other fields, such as banking and engineering. Monthly income levels revealed that 32.0% earned ₦50,000–₦150,000, 28.3% ₦150,001–₦300,000, 17.6% less than ₦50,000, 7.6% above ₦300,000, while 14.4% did not disclose their income. The purchase frequency of fast-moving consumer goods indicated that 32.6% reported buying daily or almost daily, 25.2% several times a week, 20.1% once a week, and 22.1% a few times a month. This demographic profile describes a relatively educated, economically active sample with regular FMCG purchasing patterns.

4.2 Assessment of Common Method Variance

Due to the use of self-reported, cross-sectional survey data in the study, there are concerns about the possibility of common method variance (CMV). Therefore, both procedural and statistical controls were implemented to limit CMV, as its presence can influence the relationships between variables. Procedurally, the questionnaire was designed with clarity, anonymity of respondents was ensured, and items were randomised, with predictor and criterion variables separated across sections to reduce evaluation anxiety and answer consistency (Podsakoff et al., 2003). The statistical methods involved Harman's single-factor test, where all measurement items were entered into an unrotated principal component factor analysis. The results revealed that the first factor accounted for 28.90% of the total variance, which is well below the 50% threshold recommended by Podsakoff et al. (2003). This indicates that common method bias is unlikely to affect the study's results. Moreover, the full collinearity approach recommended by Kock (2015) was also used. Adopting this method, the variance inflation factor (VIF) values for all latent variables in the model were obtained and examined. All the VIF values are below the threshold of 3.3; therefore, CMV is considered not a serious concern in the study.

4.1 Assessment of Measurement Model

The reliability of constructs, convergent validity, and discriminant validity were evaluated. As in Figure 2, the factor loadings of retained items ranged between 0.710 (GPR2) and 0.873 (GPR3), indicating adequate individual item reliability as they are above 0.70 (Hair et al., 2019).

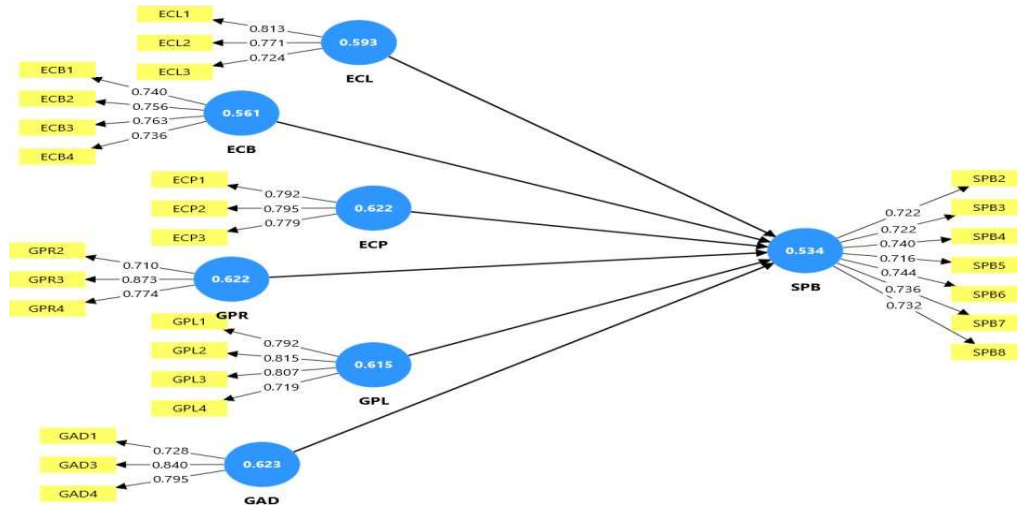


Figure 2: Measurement Model

As presented in Table 1, Cronbach’s alpha and composite reliability of all constructs are above the 0.70 threshold; therefore, internal consistency is achieved (Hair et al., 2019). The values of the AVE were also above the 0.50 benchmark, which demonstrates that the constructs explain more than half of the variance in their indicators; therefore, convergent validity has been achieved (Hair et al., 2019).

Table 1
Construct Reliability and Validity

Construct	Cronbach’s Alpha	rho_A	Composite Reliability	AVE
ECB	0.739	0.739	0.836	0.561
ECL	0.702	0.709	0.814	0.593
ECP	0.701	0.703	0.832	0.622
GAD	0.702	0.707	0.832	0.623
GPL	0.795	0.816	0.864	0.615
GPR	0.705	0.731	0.830	0.622
SPB	0.854	0.855	0.889	0.534

Both the Fornell-Larcker criterion and the Heterotrait-Monotrait ratio (HTMT) were evaluated for discriminant validity. As shown in Table 2, the square roots of AVE are higher than the corresponding inter-construct correlations, which satisfies the Fornell-Larcker criterion for achieving discriminant validity. Similarly, HTMT values were below both the conservative threshold of 0.85 and the liberal threshold of 0.90, thus further supporting discriminant validity (Henseler, 2017).

Table 2*Fornell-Larcker Criterion and Heterotrait-Monotrait Ratio (HTMT)*

Construct	ECB	ECL	ECP	GAD	GPL	GPR	SPB
<i>Fornell-Larcker</i>							
ECB	0.749						
ECL	0.534	0.770					
ECP	0.485	0.389	0.789				
GAD	0.402	0.432	0.455	0.789			
GPL	0.343	0.400	0.405	0.471	0.784		
GPR	0.379	0.375	0.375	0.458	0.414	0.788	
SPB	0.385	0.383	0.384	0.522	0.441	0.473	0.730
<i>HTMT Ratio</i>							
ECB							
ECL	0.771						
ECP	0.671	0.575					
GAD	0.558	0.638	0.651				
GPL	0.432	0.540	0.516	0.624			
GPR	0.528	0.558	0.533	0.653	0.555		
SPB	0.482	0.504	0.493	0.674	0.514	0.602	

4.2 Assessment of Structural Model and Hypothesis Testing

The study confirms that collinearity is not an issue, as all VIFs are below the thresholds of 3.3 (Kock, 2015). The endogenous variable, sustainable purchasing behaviour (SPB), has an R^2 of 0.384, indicating that the six predictor variables come together to explain 38.4% of the variance in SPB, which is a moderate explanatory power (Hair et al., 2019). Effect size (f^2) was further examined to determine the contributions of individual exogenous constructs. Green advertising ($f^2 = 0.072$) demonstrated the largest effect, followed by green pricing ($f^2 = 0.050$) and green placement ($f^2 = 0.025$), all within the small effect range. Eco-branding, eco-labelling, and eco-packaging had negligible effects ($f^2 < 0.02$). These findings suggest the significant influences of green advertising, green pricing, and green

placement on sustainable consumption behaviour. However, the small effect sizes indicate that no single green marketing strategy is a dominant driver of sustainable purchasing in this context. Marketers must therefore adopt an integrated 'cue bundling' strategy, combining persuasive advertising, accessible placement, and fair pricing to create a cumulative, credible signal that can effectively guide consumer choice. The assessment of the predictive relevance through PLSpredict showed a Q² value of 0.345 for SPB, which suggests that the model has predictive relevance, as the value is greater than zero (Hair et al., 2019). Furthermore, the Root Mean Square Error (RMSE = 0.814) and Mean Absolute Error (MAE = 0.575) demonstrated satisfactory out-of-sample predictive accuracy.

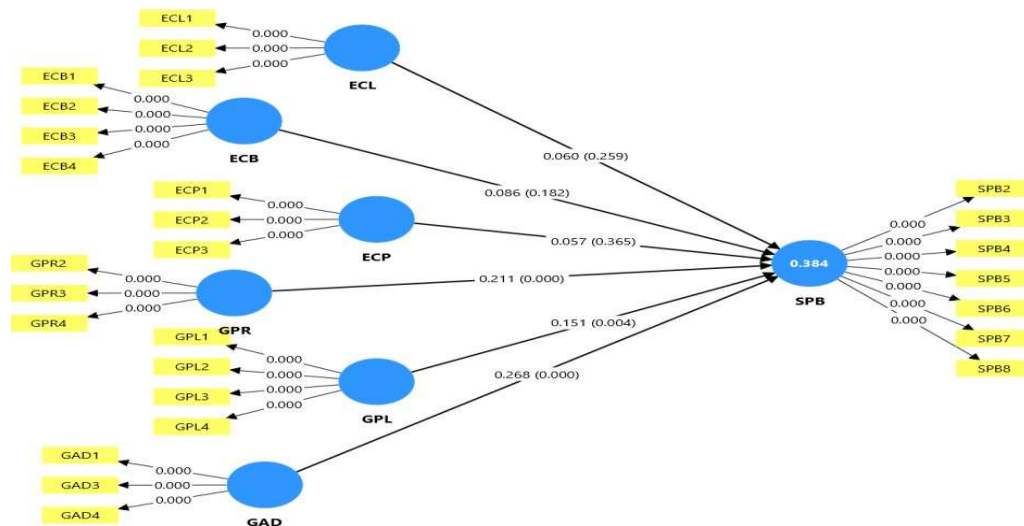


Figure 3. Structural Model

Table 3
Coefficient of Determination and Predictive Relevance for SPB

Construct	R ²	Adjusted R ²	Q ² predict	RMSE	MAE
SPB	0.384	0.373	0.345	0.814	0.575

Note. SPB = Sustainable Purchasing Behaviour.

4.4 Analysis of Hypothesised Relationships

This examined the influences of six green marketing strategies on sustainable purchasing behaviour. Six hypotheses were proposed to guide the study. Path coefficients were used to evaluate the significance of the hypothesised relationships using bootstrapped coefficients, t-statistics and p-values. The results are presented in Table 4.

Table 4
Path Coefficients

Path	β	T-value	p - value	Decision	VIF	f ²
ECL → SPB	0.060	1.128	0.259	Not-Supported	1.591	0.004
ECB → SPB	0.086	1.336	0.182	Not-Supported	1.649	0.007
ECP → SPB	0.057	0.907	0.365	Not-Supported	1.535	0.003
GPR → SPB	0.211	3.530	0.000	Supported	1.435	0.050
GPL → SPB	0.151	2.844	0.004	Supported	1.473	0.025
GAD → SPB	0.268	4.519	0.000	Supported	1.619	0.072

Note. N = 353. ECB = Eco-branding; ECL = Eco-labelling; ECP = Eco-packaging; GAD = Green advertising; GPL = Green placing; GPR = Green pricing; SPB = Sustainable purchasing behaviour.

The results in Table 4 above show that eco-labelling has no significant influence on sustainable purchasing behaviour ($\beta = 0.060$, $p > 0.05$); therefore, H₁ was not supported. Eco-branding has no considerable effect on SPB ($\beta = 0.086$, $p > 0.05$), H₂ was not supported, and the influence of eco-packaging was insignificant on SPB ($\beta = 0.057$, $p > 0.05$); thus, H₃ cannot be accepted. In contrast, green pricing has a significant positive effect on SPB ($\beta = 0.211$, $p < 0.001$), strongly supporting H₄. Green placement exerted a significant positive effect on SPB ($\beta = 0.151$, $p < 0.05$); therefore, H₅ is supported, and green advertising has the strongest significant positive effects on SPB ($\beta = 0.268$, $p < 0.001$).

4.5 Discussion

This study explored the influence of six green marketing strategies on sustainable purchasing behaviour. The CUT was employed as the underpinning theory. The results from the PLS-SEM analyses provided mixed support for the stated

hypotheses, agreeing with some existing studies and diverging from others. Eco-labelling, for instance, did not significantly predict SPB ($\beta = 0.060$, $p = 0.259$). This is contrary to findings that suggested that eco-labelling increased consumers' trust and reduced information asymmetry, and influenced purchase intention and sustainable consumption behaviour (Nguyen-Viet, 2022; Masocha, 2021; Xin & Long, 2023). From the CUT perspective, the insignificant influence can be attributed to the low level of awareness among consumers and the limited recognition of eco-labels in North-East Nigeria, which might reduce their influence on purchasing decisions. Eco-branding did not significantly predict sustainable purchasing behaviour ($\beta = 0.086$, $p = 0.182$). This contrasts with past studies that identified eco-branding as an important factor that improves green credibility, green trust, and loyalty toward green products (Majeed et al., 2022; Verma & Tyagi, 2023). A probable reason for the non-significant influence, when viewed from the CUT, may be consumer scepticism toward firms' environmental claims, particularly in contexts where independent verification is limited. This suggests that branding efforts alone may not effectively influence purchasing behaviour unless they are supported by authentic sustainability practices and credible third-party certifications.

In contrast with earlier studies that linked it to higher purchase intentions and willingness to pay a premium (Basnet et al., 2024; Plotkina et al., 2025), eco-packaging also showed no significant effect on sustainable purchasing behaviour ($\beta = 0.057$, $p = 0.365$). The weak relationship might not be unconnected with constraints related to affordability and limited concern for packaging sustainability among consumers. In low-income areas, cost and product functionality may outweigh eco-packaging features, thereby reducing the influence of eco-packaging on purchasing decisions. In sum, the non-significance of eco-labelling, eco-packaging, and eco-branding in North-East Nigeria may be due to consumers' concerns about credibility, symbolism, and practical considerations.

Green pricing had a significant positive effect on sustainable purchasing behaviour ($\beta = 0.211$, $p < 0.001$). This supports prior findings that highlight price as a key determinant of sustainable consumption (Narimanfar & Nezhad, 2022; Kamalanon et al., 2022). The result implies that consumers in North-East Nigeria appreciate fair and reasonable pricing for environmentally friendly products. Although high prices can deter adoption (Agrawal & Ansari, 2022), when costs

are viewed as justified by environmental value, pricing becomes a motivating factor for sustainable purchasing.

Green placement significantly predicted sustainable purchasing behaviour ($\beta = 0.151$, $p = .004$), supporting earlier research that links product accessibility and visibility to higher consumer adoption (Mahmoud et al., 2024; Nguyen-Viet, 2023). In the study context, the availability of green products at convenient and visible points of sale appears to be an effective means of encouraging sustainable purchases, highlighting the practical role of distribution in shaping consumer behaviour. As hypothesised, green advertising strongly and positively influenced SPB ($\beta = 0.268$, $p < .001$). This is consistent with prior research showing that advertising enhances consumer awareness, attitudes, and trust (Borah et al., 2024; Jaiswal et al., 2022; Huo et al., 2025). The pattern of significant and non-significant results supports the notion by the CUT that the hierarchy of cue diagnostic prediction is contextually determined. In the post-conflict context of the North-East, consumers prioritise green marketing cues that are credible, salient, and address immediate utilitarian needs, such as green advertising, green pricing, and green placement. Green marketing cues that are difficult to verify, symbolic rather than functional, or involve practical trade-offs are discounted. This establishes that the effectiveness of green marketing strategies is contingent on their perceived diagnostic value within a specific socio-economic context.

4.6 Implications

The study provided contributions that are valuable to the green marketing theory and practice, mainly on the influences of green marketing strategies on sustainable purchasing behaviour. The study contextualised the Cue Utilisation Theory in a post-conflict setting of a developing economy that faces environmental challenges. It demonstrates that the impact of green marketing cues is not universal but is reshaped by economic pressure, institutional weakness, and information asymmetry. It contributes to the literature on the contingency of green marketing effectiveness. Moreover, the findings suggested that green advertising, green pricing, and green placement are the strategies with the greatest impacts, extending the sustainability literature by recognising external marketing efforts as direct drivers of sustainable actions. Practically, it suggests the significance of persuasive and transparent green advertising, fair and value-based pricing, and greater product visibility to encourage sustainable purchasing, whereas sophisticated cues such as eco-labels or brand narratives may have a limited impact where consumer trust and awareness are low. Effectiveness can be further

supported through credible certification systems, regulatory oversight, and consumer education, while incentives or subsidies may help address price barriers. Additionally, combining awareness campaigns with interventions targeting economic and infrastructural constraints may more effectively promote sustainable purchasing behaviour in fragile contexts.

5. Conclusion and Recommendations

This study examined the effects of six green marketing strategies, including eco-labelling, eco-branding, eco-packaging, green pricing, green placement, and green advertising on SPB in North-East Nigeria. The results from the analyses of data from FMCG consumers show that green advertising, green placement, and green pricing have significant positive effects on SPB; however, the influences of eco-labelling, eco-branding, and eco-packaging are not significant on SPB. The findings suggest that consumers in the region are more responsive to green marketing strategies that improve awareness, accessibility, and affordability of green products. Green advertising emerged as the strongest driver, showing the importance of persuasive and credible messages in influencing sustainable purchasing behaviour. Green product availability and visibility in stores through green placement and green pricing that reflects environmental value are important in encouraging sustainable consumption behaviour. The insignificant effects of eco-labelling, eco-branding, and eco-packaging might be due to low awareness, limited trust, or affordability concerns. For these strategies to be effective, stronger policy support, better regulation, and more consumer education might be necessary. The results suggested that marketers need to focus on improving communication, accessibility, and pricing effectiveness when promoting sustainable products. Policymakers and NGOs should also help raise public awareness and standardise eco-labelling practices to build consumer trust. Collaborative efforts between businesses and regulators are also important, as they can create a more supportive environment for sustainable purchasing in North-East Nigeria.

Limitations and Future Research

The study, though, made substantial contributions to theory and practice; some limitations should be acknowledged. Its focus on educated adult FMCG consumers in North-East Nigeria may hinder the generalisation of the findings to other demographics or regions with different socio-economic or cultural factors. The use of self-reported survey data might have introduced social desirability bias, as some respondents could have overstated their sustainable purchasing

behaviour. Moreover, only six green marketing strategies were explored, leaving other variables that could potentially influence SPB, such as green trust, environmental knowledge, and cultural values. Future research could build on these findings by adopting longitudinal designs to track changes in consumer behaviour over time or by comparing results across regions and countries. Including psychological and contextual moderators, such as environmental concern, income levels, environmental knowledge, and regulatory support, could also provide deeper insight and improve the model. Moreover, potential mediators such as green trust, perceived value, and consumer self-efficacy can uncover mechanisms that translate green marketing strategies into sustainable consumer behaviour.

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