African Scientific Journal
ISSN : 2658-9311
Vol : 03, Num 37 Août 2026

The Impact of Sustainable Packaging on Customer Loyalty: The Mediating Roles of Green Perceived Value and Customer Satisfaction.

Auteur 1 : Oussama MHENNA,
Auteur 2 : El Mahdi JUIHER,
Auteur 3 : Hmad OUADDI,

Oussama MHENNA (Doctoral Researcher)
Multidisciplinary Management Research Team (ERPG)
Faculty of Legal, Economic and Social Sciences, Ibn Zohr University, Agadir, Morocco.

El Mahdi JUIHER (ORCID: 0009-0004-0658-8164; Doctor in Management Sciences)
Multidisciplinary Management Research Team (ERPG)
Faculty of Legal, Economic and Social Sciences, Ibn Zohr University, Agadir, Morocco.

Hmad OUADDI (Professor)
Multidisciplinary Management Research Team (ERPG)
Faculty of Legal, Economic and Social Sciences, Ibn Zohr University, Agadir, Morocco.

Déclaration de divulgation : **L'auteur n'a pas connaissance de quelconque financement qui pourrait affecter l'objectivité de cette étude.**

Conflit d'intérêts : **L'auteur ne signale aucun conflit d'intérêts.**

Pour citer cet article : **MHENNA .O, JUIHER .M & OUADDI .H (2026) « The Impact of Sustainable Packaging on Customer Loyalty: The Mediating Roles of Green Perceived Value and Customer Satisfaction », African Scientific Journal « Volume 03, Num 37 » pp: 1425 – 1443.**

DOI : 10.5281/zenodo.21910073

African Scientific Journal
ISSN : 2658-9311
Vol : 03, Num 37 Août 2026

Abstract

This study examines the influence of three dimensions of sustainable packaging—perceived recyclability, perceived biodegradability, and reduction in the amount of material used—on consumer attitudes toward sustainably packaged products and, subsequently, on consumer satisfaction. Methodologically, the study adopts a positivist epistemological stance, a hypothetico-deductive reasoning process, and a quantitative research design. Data were collected through a structured online questionnaire administered via Google Forms to a sample of 100 consumers who had previously purchased or used products with sustainable packaging. The proposed research model was analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM) with SmartPLS. The results indicate that all three sustainable packaging dimensions positively influence consumer attitude. Perceived recyclability has the strongest effect (β = 0.421), followed by perceived biodegradability (β = 0.369) and material reduction (β = 0.303). Together, these dimensions explain 59.0% of the variance in consumer attitude. Consumer attitude, in turn, has a strong positive effect on satisfaction (β = 0.792), explaining 62.7% of its variance. The study concludes that sustainable packaging contributes to favourable consumer evaluations particularly when its environmental characteristics are visible, understandable, and credible. It further highlights consumer attitude as a central mechanism through which sustainable packaging characteristics translate into greater consumer satisfaction. These findings provide managerial implications for firms seeking to combine environmental responsibility with positive consumer experiences.

Keywords: Sustainable packaging; Perceived recyclability; Perceived biodegradability; Consumer attitude; Consumer satisfaction.

African Scientific Journal
ISSN : 2658-9311
Vol : 03, Num 37 Août 2026

Introduction

Growing environmental concern has increased pressure on companies to reconsider the design, production, use, and disposal of product packaging. Although packaging performs essential functions related to product protection, preservation, transportation, communication, and convenience, conventional packaging systems are increasingly criticised for their contribution to resource depletion, plastic pollution, and waste generation. Sustainable packaging has therefore emerged as an important component of corporate environmental responsibility and green marketing strategies. It refers to packaging solutions designed to reduce material consumption, facilitate recycling, promote biodegradation, and minimise environmental impacts throughout the product life cycle (Boz et al., 2020; Nguyen et al., 2020). Nevertheless, the environmental performance of packaging alone does not automatically generate favourable consumer responses, since consumers generally evaluate its sustainability through visible materials, environmental labels, disposal instructions, and other information communicated on the package.

Previous studies have mainly examined consumers' perceptions of environmentally friendly packaging, product evaluation, purchase intention, and willingness to pay (Magnier & Schoormans, 2015; Steenis et al., 2017; Ketelsen et al., 2020). However, sustainable packaging is a multidimensional concept, and consumers may respond differently to each of its specific characteristics. Perceived recyclability may be viewed as a practical contribution to the circular economy, perceived biodegradability may reduce concerns about persistent environmental waste, and material reduction may signal more efficient resource use. Despite the relevance of these dimensions, their respective effects on consumer attitude have not always been clearly differentiated in previous research. Moreover, limited attention has been devoted to the role of consumer attitude in transforming perceptions of sustainable packaging into post-purchase outcomes such as satisfaction.

To address this gap, the present study examines the effects of perceived packaging recyclability, perceived packaging biodegradability, and reduction in the amount of material used on consumer attitudes toward products with sustainable packaging. It also investigates the subsequent influence of these attitudes on consumer satisfaction. The study adopts a positivist epistemological position, a hypothetico-deductive reasoning process, and a quantitative approach. Data are collected through a structured online questionnaire and analysed using partial least squares structural equation modelling with SmartPLS. By distinguishing among three dimensions of sustainable packaging, this research seeks to provide a more precise

African Scientific Journal
ISSN : 2658-9311
Vol : 03, Num 37 Août 2026

understanding of how environmentally responsible packaging practices shape consumer evaluations and satisfaction.

The remainder of this article is organised as follows. The first section reviews the literature on sustainable packaging, consumer attitude, and satisfaction, and develops the research hypotheses and conceptual model. The second section presents the methodological approach, including the research design, measurement scales, sampling procedure, data collection, and analytical technique. The third section reports the empirical findings obtained from the measurement and structural models. The fourth section discusses the results in relation to previous studies and highlights their theoretical and managerial implications. Finally, the article concludes by summarising the main findings, outlining the study's limitations, and proposing directions for future research.

Literature Review

This literature review presents the main concepts used in this research, as well as the theoretical relationships established between the various variables in the proposed model. It helps situate the study within its conceptual framework and justify the formulation of the hypotheses.

Sustainable Packaging

Sustainable packaging refers to an approach that takes into account the entire life cycle of packaging, from design and production through use, recovery, and end-of-life, while seeking to reduce environmental impacts without compromising the essential functions of protecting, preserving, transporting, and providing information about the product. This concept is therefore not limited to the use of biodegradable or recyclable materials, but also encompasses reducing the amount of materials used, incorporating renewable or recycled resources, energy efficiency in manufacturing processes, reusability, recyclability, and responsible waste management. Sustainable packaging is thus a multidimensional concept that combines environmental, economic, social, and functional considerations throughout the value chain (Boz et al., 2020). From the consumers' perspective, eco-friendly packaging is primarily associated with material reduction, recyclability, reusability, biodegradability, the absence of toxic substances, and the minimization of environmental pollution (Nguyen et al., 2020). However, characteristics perceived as eco-friendly do not always correspond to actual environmental performance, as consumers often assess sustainability based on visible indicators, such as paper, glass, or the natural appearance of the material, while a life-cycle analysis may yield different results depending on production, transportation, and recycling conditions (Otto et al., 2021). This discrepancy is particularly significant in the food sector, where excessive reduction of

African Scientific Journal
ISSN : 2658-9311
Vol : 03, Num 37 Août 2026

packaging can increase product losses and waste, the environmental impact of which may exceed that of the packaging itself (Boz et al., 2020). Similarly, the bio-based origin of a material does not automatically guarantee a positive assessment, particularly due to the persistent confusion between the concepts of bio-based, biodegradable, and compostable packaging (Herbes et al., 2018). Sustainable packaging must therefore be viewed as a systemic solution based on environmental performance, functional efficiency, and consumers' ability to correctly understand its ecological attributes. In the context of consumer behavior, sustainable packaging acts as an extrinsic cue that can influence perceptions of a company's environmental responsibility, the perceived quality of the product, brand image, and behavioral responses. The visual elements of the packaging and environmental claims reinforce perceptions of sustainability when they are consistent with one another and aligned with the consumer's level of environmental concern (Magnier & Schoormans, 2015). The materials used, colors, shapes, and graphic information also influence the ecological evaluation of the packaging and, indirectly, the overall assessment of the product, even though consumers do not always correctly distinguish between solutions with different environmental impacts (Steenis et al., 2017). Packaging perceived as sustainable can also enhance the perceived quality and natural character of the product, particularly when the packaging's environmental attributes align with the product's or brand's ecological positioning (Magnier et al., 2016). Pro-environmental attitudes, personal norms, environmental concern, and willingness to pay a premium thus contribute to strengthening the intention to purchase products with eco-friendly packaging (Prakash & Pathak, 2017). Nevertheless, a gap remains between stated environmental attitudes and actual purchasing behavior, due to constraints related to price, convenience, quality, product protection, and the credibility of environmental information (Ketelsen et al., 2020). Perceived value and willingness to pay therefore emerge as key determinants of the intention to purchase products using sustainable packaging (Duarte et al., 2024). Consumer reactions also vary depending on the type of packaging offered, such as recyclable, reusable, or biodegradable, as well as on the brand's environmental image associated with the product (Plotkina et al., 2025). They are further influenced by individual characteristics such as age, education level, gender, and environmental awareness (Chirilli et al., 2022). Thus, although sustainable packaging generally generates favorable perceptions and intentions, its effect on consumer behavior remains contingent on perceived environmental value, satisfaction, the credibility of environmental signals, and characteristics specific to each consumer.

African Scientific Journal
ISSN : 2658-9311
Vol : 03, Num 37 Août 2026

Customer Loyalty

Customer loyalty refers to a consumer's long-term commitment to a brand, company, or supplier, which is manifested by a persistent preference and a willingness to maintain the relationship despite the presence of competing offers. It cannot, therefore, be reduced to repeat purchases alone, as these may result from habit, a lack of alternatives, high switching costs, or situational constraints rather than genuine attachment. Authentic loyalty is based on a combination of a favorable attitude and repeated purchasing behavior, whereas repetition without commitment is more akin to artificial or circumstantial loyalty (Dick & Basu, 1994). This distinction leads to the consideration of two complementary dimensions: behavioral loyalty, observable through purchase frequency, retention, and the share of spending devoted to a brand; and attitudinal loyalty, reflected by preference, attachment, recommendation, and resistance to competing offers (Chaudhuri & Holbrook, 2001). The development of loyalty can also follow a gradual process comprising cognitive, affective, conative, and behavioral phases, during which awareness of the brand's benefits evolves into emotional appreciation, an intention to repurchase, and ultimately actual behavior (Oliver, 1999). From this perspective, recommendation intentions, willingness to pay a higher price, reduced complaint behavior, and resistance to change are important manifestations of loyalty (Zeithaml et al., 1996). However, the measures used in the literature do not always yield equivalent results, as attitudinal, intentional, and behavioral indicators represent different levels of the customer–brand relationship (Watson et al., 2015). A rigorous conceptualization of loyalty must therefore simultaneously incorporate the consumer's psychological attachment and the actual continuity of their purchasing behaviors.

Customer loyalty develops primarily when the experiences offered by the company generate satisfaction, value, trust, and relational commitment that are strong enough to reduce the appeal of competing alternatives. Satisfaction generally promotes retention, since a positive and cumulative assessment of past experiences increases the likelihood of continuing the relationship with the company (Anderson & Sullivan, 1993). However, this relationship is neither automatic nor strictly linear, as a satisfied customer may switch brands due to price, desired variety, competitive promotions, or a change in their needs. Reported levels of satisfaction do not influence repurchase intention and actual observed behavior in the same way; these effects vary notably depending on consumers' individual characteristics (Mittal & Kamakura, 2001). Satisfaction is therefore an important but insufficient condition for loyalty, the development of which also depends on the nature of the market, the intensity of competition, and the costs associated with switching providers (Kumar et al., 2013). Trust further strengthens

African Scientific Journal
ISSN : 2658-9311
Vol : 03, Num 37 Août 2026

this relationship when it enables the consumer to perceive the provider as competent, reliable, and focused on their interests, while perceived value transforms this trust into an intention to continue the relationship (Sirdeshmukh et al., 2002). Emotional commitment also helps stabilize the relationship, whereas calculative commitment, based primarily on switching costs, may temporarily retain the customer without fostering genuine preference (Gustafsson et al., 2005). The effects of loyalty thus extend beyond mere repeat purchases, as they can result in positive word-of-mouth, reduced price sensitivity, improved retention, and enhanced business performance, although their intensity varies by industry and the measurement methods used (Watson et al., 2015). These findings therefore prompt an examination of how specific signals of environmental responsibility, such as sustainable packaging, can enhance perceived value, satisfaction, and, ultimately, customer loyalty.

The Effect of Sustainable Packaging on Customer Loyalty

Sustainable packaging can strengthen customer loyalty when it is perceived as concrete evidence of the brand's environmental commitment and as a consistent response to the consumer's ecological values. Recyclable, biodegradable, or reusable materials, reduced packaging volume, and the inclusion of credible environmental information are signals that can improve the overall evaluation of the product and differentiate the brand from its competitors. The effectiveness of these signals, however, depends on their visual and informational consistency, as well as on the consumer's level of environmental concern (Magnier & Schoormans, 2015). A favorable perception of packaging sustainability can also enhance the perceived quality and naturalness of the product, particularly when the packaging aligns with the brand's ecological positioning (Magnier et al., 2016). Materials, colors, and graphic elements thus influence perceptions of sustainability, which in turn affect product evaluation and behavioral intentions (Steenis et al., 2017). Following this logic, sustainable packaging increases the environmental benefits that consumers associate with their purchase and can thus foster a higher perceived green value. This value promotes satisfaction when the product's environmental and functional performance meets initial expectations, and subsequently encourages continued engagement with the brand. Perceived green value thus exerts a direct effect on eco-loyalty, as well as an indirect effect through green satisfaction and trust (Chen, 2013). The effect of sustainable packaging on loyalty therefore depends less on its material characteristics taken in isolation than on the cognitive and affective evaluations it generates in consumers.

African Scientific Journal
ISSN : 2658-9311
Vol : 03, Num 37 Août 2026

Empirical results generally support a positive relationship between sustainable packaging and loyalty, while revealing that this influence remains conditional and often indirect. In the context of environmentally friendly plastic products, perceived green quality and perceived green value are key determinants of loyalty, while trust and reduced perceived risk reinforce the continuity of the relationship with the brand (Pahlevi & Suhartanto, 2020). The practice of selling unpackaged food products also has a direct positive effect on supermarket customer loyalty, in addition to indirect effects mediated by brand image and satisfaction; however, the mediating effect of trust is not always significant (Barbosa et al., 2023). This difference shows that loyalty can develop through multiple mechanisms and that trust is not systematically the primary means of transforming an environmental initiative into sustainable relational behavior. More broadly, retailers' eco-friendly practices simultaneously improve satisfaction, loyalty, word-of-mouth, and willingness to pay more, with satisfaction playing a key role in converting environmental perceptions into favorable responses (González-Viralta et al., 2023). However, a positive attitude toward sustainable packaging does not automatically guarantee repeat purchases, as price, convenience, product protection, the availability of eco-friendly solutions, and the credibility of information can limit its actual influence (Ketelsen et al., 2020).

Although sustainable packaging is attracting growing interest in research on consumer behavior, the existing literature remains fragmented regarding its long-term relational implications. Most previous studies have focused primarily on perceptions of sustainability, product evaluation, purchase intention, and willingness to pay for environmentally friendly packaging (Magnier & Schoormans, 2015; Steenis et al., 2017; Ketelsen et al., 2020; Duarte et al., 2024), while relatively little attention has been paid to customer loyalty as a sustainable behavioral and attitudinal outcome. Furthermore, research on green loyalty has primarily examined general environmental practices, eco-friendly products, green trust, or green brand image, rather than sustainable packaging considered as a specific strategic signal (Chen, 2013; Pahlevi & Suhartanto, 2020; González-Viralta et al., 2023). Although sustainable packaging can improve product evaluation and strengthen favorable brand reactions, the mechanisms through which these perceptions translate into loyalty remain insufficiently explained. More specifically, perceived green value and customer satisfaction have often been studied separately, revealing a lack of empirical evidence regarding their simultaneous and sequential mediating roles in the relationship between sustainable packaging and customer loyalty. Addressing this gap is important because consumers may remain loyal not only because the packaging is environmentally friendly, but also because it generates greater ecological value and, consequently, increased satisfaction with the product and the brand. Therefore, this study

seeks to answer the following research question: ***To what extent does sustainable packaging influence customer loyalty, and how do perceived green value and customer satisfaction mediate this relationship?***

To address this research question, four hypotheses were formulated as follows:

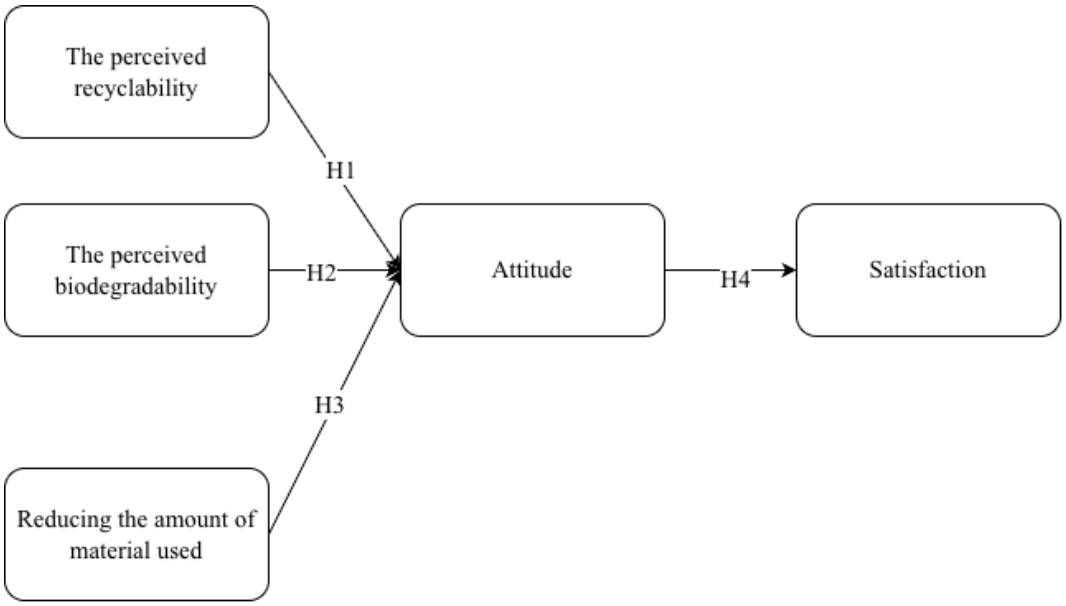
H1: The perceived recyclability of packaging has a positive and significant effect on consumer attitude toward the product.

H2: The perceived biodegradability of packaging has a positive and significant effect on consumer attitude toward the product.

H3: Reducing the amount of material used in packaging has a positive and significant effect on consumer attitudes toward the product.

H4: Consumers' favorable attitudes toward products with sustainable packaging have a positive and significant effect on their satisfaction.

Figure 1. Conceptual framework of the effect of sustainable packaging dimensions on consumer attitudes and satisfaction



Source: The authors.

Following this theoretical analysis, the research hypotheses were selected for empirical testing. The following section presents the methodology adopted to test the research model.

Method

This study adopts a positivist epistemological stance, in that it aims to objectively explain and test the causal relationships between the perceived dimensions of sustainable packaging, consumer attitudes, and consumer satisfaction. It thus follows a hypothetical-deductive

African Scientific Journal
ISSN : 2658-9311
Vol : 03, Num 37 Août 2026

approach based on a quantitative methodology, with hypotheses formulated from the literature before being tested against empirical data. Data will be collected using a structured questionnaire administered online via Google Forms to consumers who have previously purchased or used products packaged in what they perceive to be sustainable packaging. The constructs related to perceived recyclability, perceived biodegradability, reduction in material quantity, attitude, and satisfaction will be measured using items adapted from previous scales and rated on a five-point Likert scale, ranging from “strongly disagree” to “strongly agree.” A non-probability convenience sample will be used to facilitate access to respondents who meet the study criteria. The minimum sample size will be determined using G*Power software, based on a multiple regression model with up to three predictor variables, an average effect size of 0.15, a significance level of 5%, and a statistical power of 90%. This analysis indicates a minimum of approximately 100 usable responses. The data will then be analyzed using SmartPLS via the partial least squares structural equation modeling (PLS-SEM) method, which is particularly well-suited for estimating predictive models involving multiple latent variables. The analysis will first focus on the quality of the measurement model through indicator reliability, Cronbach’s alpha, composite reliability, average extracted variance, and discriminant validity. The structural model will then be evaluated based on path coefficients, R^2 values, f^2 effect sizes, predictive quality Q^2, and multicollinearity. Finally, the significance of the four hypotheses will be tested using a bootstrapping procedure based on 5,000 resamplings.

Before the final analysis, the items must be pretested with a small group of consumers to verify their clarity, comprehensibility, and relevance to the context under study. The results from SmartPLS will then be used to examine the external loadings, Cronbach’s alpha, composite reliability, AVE, and discriminant validity.

The items below constitute a proposed operationalization tailored to consumers who have already purchased or used a product with sustainable packaging. Responses can be collected on a five-point Likert scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree. The dimensions selected correspond to characteristics frequently associated with sustainable packaging in the literature, including recyclability, biodegradability, and material reduction.

African Scientific Journal
ISSN : 2658-9311
Vol : 03, Num 37 Août 2026

Table 1. Measurement Items and Sources

Construct	Code	Proposed measurement item
Perceived packaging recyclability	REC1	I believe that the packaging of this product can be easily recycled.
	REC2	The materials used in this packaging appear to be compatible with existing recycling systems.
	REC3	This packaging can be processed or reused to produce new materials.
Perceived packaging biodegradability	BIO1	I believe that this packaging can decompose naturally after use.
	BIO2	This packaging appears to be less harmful to the environment when it becomes waste.
	BIO3	The materials used in this packaging appear capable of degrading without leaving persistent polluting waste.
Reduction in the amount of material used	RED1	This packaging uses only the amount of material necessary to protect the product.
	RED2	I believe that this packaging avoids the excessive use of materials.
	RED3	The design of this packaging helps reduce the amount of waste generated.
Attitude toward products with sustainable packaging	ATT1	I have a favorable opinion of this product because of its sustainable packaging.
	ATT2	I evaluate products presented in this type of packaging positively.
	ATT3	Choosing a product with sustainable packaging seems to be a good decision.
Consumer satisfaction	SAT1	I am satisfied with my experience of using this product with sustainable packaging.
	SAT2	The sustainable characteristics of the packaging meet my expectations.
	SAT3	Overall, I am satisfied with my decision to purchase or use this product.

Source: The authors.

African Scientific Journal
ISSN : 2658-9311
Vol : 03, Num 37 Août 2026

Having outlined the research design, sampling procedure, measurement instrument, and PLS-SEM analysis process, the study now turns to the empirical findings. The following section presents the respondents' characteristics, evaluates the measurement model, and examines the structural relationships and research hypotheses.

Result

This section presents the empirical results obtained from the analysis of the questionnaire data using SmartPLS. The analysis begins an assessment of the measurement model through indicator reliability, internal consistency, convergent validity, and discriminant validity. The structural model is then evaluated using the path coefficients, coefficients of determination, effect sizes, predictive relevance, and bootstrapping results. Finally, the four research hypotheses are examined to determine the effects of perceived recyclability, perceived biodegradability, and material reduction on consumer attitudes, as well as the influence of these attitudes on consumer satisfaction.

Table 2. Construct Reliability and Validity

Construct	**Cronbach's Alpha**	**Composite Reliability (rho_A)**	**Composite Reliability (rho_C)**	**Average Variance Extracted (AVE)**
Attitude toward products with sustainable packaging	0.877	0.878	0.924	0.803
Consumer satisfaction	0.869	0.876	0.919	0.792
Perceived packaging biodegradability	0.853	0.872	0.911	0.773
Perceived packaging recyclability	0.838	0.839	0.902	0.755
Reduction in the amount of material used	0.858	0.860	0.914	0.779

Source: SmartPLS

The results confirm the satisfactory reliability and convergent validity of all constructs included in the measurement model. Cronbach's alpha values range from 0.838 to 0.877, while composite reliability values measured by rho_A range from 0.839 to 0.878 and those measured by rho_C range from 0.902 to 0.924. All these coefficients exceed the recommended threshold of 0.70, indicating a high level of internal consistency among the measurement items. Furthermore, the average variance extracted values range from 0.755 to 0.803, substantially

African Scientific Journal
ISSN : 2658-9311
Vol : 03, Num 37 Août 2026

exceeding the minimum threshold of 0.50. Therefore, each construct explains more than 75% of the variance in its indicators, confirming adequate convergent validity. Since the composite reliability values remain below 0.95, the items also appear sufficiently distinct and do not indicate excessive redundancy. Overall, the measurement model demonstrates satisfactory construct reliability and convergent validity, allowing the analysis to proceed to the assessment of discriminant validity and the structural model.

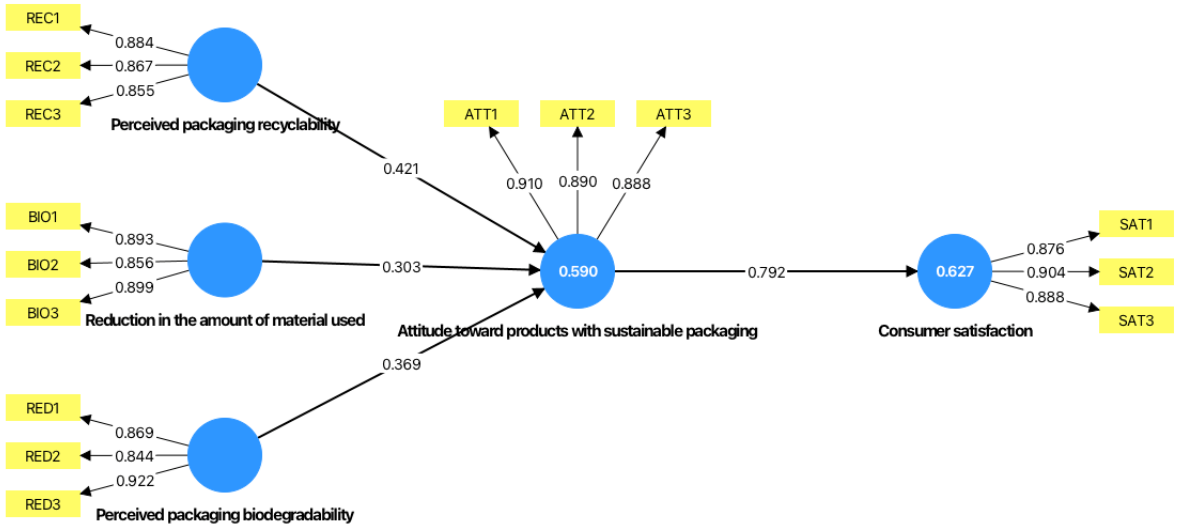
Table 3. Variance Inflation Factor (VIF) Values

Construct	**Indicator**	**VIF**
Attitude toward products with sustainable packaging	ATT1	2.597
	ATT2	2.332
	ATT3	2.312
Perceived packaging biodegradability	BIO1	2.342
	BIO2	1.905
	BIO3	2.410
Perceived packaging recyclability	REC1	2.084
	REC2	1.967
	REC3	1.874
Reduction in the amount of material used	RED1	2.290
	RED2	1.820
	RED3	2.637
Consumer satisfaction	SAT1	2.131
	SAT2	2.355
	SAT3	2.400

Source: SmartPLS

The variance inflation factor values range from 1.820 to 2.637. All values remain below the conservative threshold of 3.3and the more general threshold of 5.0, indicating the absence of problematic multicollinearity among the indicators. The highest VIF value is observed for RED3 (2.637), followed by ATT1 (2.597), while the lowest value concerns RED2 (1.820). Consequently, the indicators provide sufficiently distinct information, and none requires elimination on the basis of collinearity. These results support the adequacy of the measurement model and allow the analysis to proceed to the assessment of discriminant validity and the structural relationships.

Figure 2. PLS-SEM Model



Source: SmartPLS

The results indicate that all measurement items exhibit satisfactory outer loadings, ranging from 0.844 to 0.922, and therefore exceed the recommended threshold of 0.708. This confirms that the indicators adequately represent their respective constructs. Perceived packaging recyclability has the strongest effect on consumer attitude toward products with sustainable packaging (β = 0.421), followed by perceived packaging biodegradability (β = 0.369) and the reduction in the amount of material used (β = 0.303). Together, these three dimensions explain 59.0% of the variance in consumer attitude ($R^2 = 0.590$), indicating moderate explanatory power. Consumer attitude subsequently exerts a strong positive effect on consumer satisfaction (β = 0.792) and explains 62.7% of its variance ($R^2 = 0.627$). These findings suggest that positive perceptions of sustainable packaging characteristics contribute to the formation of favorable consumer attitudes, which, in turn, substantially enhance satisfaction. Nevertheless, the statistical significance of these relationships must be confirmed using the bootstrapping results, particularly the *t*-values, *p*-values, and confidence intervals.

Discussion

The findings indicate that the three dimensions of sustainable packaging positively influence consumers' attitudes toward products, although their relative effects differ. Perceived packaging recyclability produces the strongest effect on attitude (β = 0.421), suggesting that consumers respond particularly favorably when they believe that packaging can be collected, processed, and reintegrated into the production cycle. Recyclability may be easier for

African Scientific Journal
ISSN : 2658-9311
Vol : 03, Num 37 Août 2026

consumers to recognize and evaluate than other environmental attributes because it is frequently communicated through familiar symbols, labels, and disposal instructions. This result is consistent with previous research showing that packaging materials and graphical information operate as environmental signals that shape sustainability perceptions and product evaluations (Steenis et al., 2017). It also supports the argument that the effectiveness of sustainable packaging depends on the clarity and consistency of its visual appearance and environmental claims (Magnier & Schoormans, 2015).

Perceived biodegradability has the second-strongest effect on consumer attitude (β = 0.369). This finding suggests that consumers develop a more favorable evaluation of a product when they believe its packaging can decompose naturally and create less persistent environmental waste. Nevertheless, the effect remains lower than that of recyclability, potentially because biodegradability is a less directly observable attribute and consumers may not clearly distinguish between biodegradable, compostable, and biobased packaging. Such uncertainty can reduce the strength of the environmental signal generated by the packaging. The result nevertheless confirms that consumers rely on packaging characteristics to infer both the environmental responsibility of the product and its broader quality. Sustainable packaging can therefore influence evaluations that extend beyond the package itself and affect the perceived value and quality of the product it contains (Magnier et al., 2016).

The reduction in the amount of material used also positively influences consumer attitude (β = 0.303), although it has the weakest effect among the three dimensions. Consumers may appreciate minimalist packaging because it signals lower resource consumption and reduced waste generation. However, material reduction may be less salient than recyclability or biodegradability, particularly when consumers cannot easily determine whether the packaging actually uses fewer resources. Excessive reduction may also generate concerns regarding product protection, durability, hygiene, or convenience. This result consequently suggests that reducing packaging materials is more likely to generate favorable attitudes when the environmental benefit is clearly communicated without compromising the packaging's functional performance. Previous research similarly shows that sustainable redesign strategies can strengthen consumer preferences, but their effectiveness depends on how consumers understand the environmental and functional consequences of the proposed packaging solution.

Collectively, recyclability, biodegradability, and material reduction explain 59.0% of the variance in consumer attitude (R2=0.590), demonstrating that these packaging dimensions possess satisfactory explanatory power. The remaining variance may be associated with other factors, including price, packaging aesthetics, convenience, environmental concern, product

African Scientific Journal
ISSN : 2658-9311
Vol : 03, Num 37 Août 2026

category, brand credibility, and consumers' environmental knowledge. More importantly, consumer attitude exerts a strong positive effect on satisfaction ($\beta = 0.792$) and explains 62.7% of its variance ($R2=0.627$). This result indicates that consumers who evaluate sustainably packaged products favorably are considerably more likely to feel satisfied with their purchasing or consumption experience. It is consistent with the broader green-consumption literature, in which positive environmental evaluations and perceived green value contribute to satisfaction and subsequently reinforce durable favorable responses toward products and brands (Chen, 2013).

Overall, the results support the proposed theoretical sequence in which identifiable sustainable-packaging attributes shape consumer attitudes, which subsequently determine satisfaction. The findings also imply that attitude acts as an important psychological mechanism connecting objective or perceived packaging characteristics with post-purchase evaluations. From a managerial perspective, firms should not merely adopt sustainable materials but should ensure that recyclability, biodegradability, and material reduction are understandable, credible, and compatible with the functional expectations associated with the product. However, the definitive acceptance of H1, H2, H3, and H4 must be based on the bootstrapping results, particularly the corresponding t-values, p-values, and confidence intervals.

African Scientific Journal
ISSN : 2658-9311
Vol : 03, Num 37 Août 2026

Conclusion

This study examined the influence of three dimensions of sustainable packaging, perceived recyclability, perceived biodegradability, and reduction in the amount of material used, on consumer attitude, as well as the subsequent effect of attitude on satisfaction. The findings show that all three dimensions positively contribute to the formation of favourable attitudes toward sustainably packaged products. Perceived recyclability produces the strongest effect, followed by perceived biodegradability and material reduction. Together, these dimensions explain a substantial proportion of the variance in consumer attitude, demonstrating that packaging characteristics constitute important environmental signals in consumers' product evaluations.

Consumer attitude also exerts a strong positive effect on satisfaction, indicating that consumers who evaluate sustainably packaged products favourably are more likely to feel satisfied with their purchase or consumption experience. The results therefore support the proposed theoretical sequence in which specific packaging attributes influence cognitive and affective evaluations, which subsequently determine post-purchase satisfaction. From a theoretical perspective, the study extends sustainable packaging research by separating its principal dimensions rather than treating it as a single general construct. It also highlights attitude as an important explanatory mechanism connecting environmental packaging attributes with consumer satisfaction.

From a managerial perspective, companies should adopt sustainable packaging strategies that are both environmentally credible and easily understood by consumers. Clear recycling instructions, trustworthy biodegradability claims, recognised environmental labels, and visible reductions in unnecessary materials can strengthen favourable product evaluations. Nevertheless, sustainability initiatives should not compromise product protection, convenience, hygiene, or quality, since weak functional performance may reduce consumer satisfaction. The study remains subject to limitations related to the use of self-reported data, online convenience sampling, and the analysis of behavioural intentions and perceptions rather than actual purchasing behaviour. Future research could test the model with larger and more diversified samples, compare product categories or cultural contexts, and incorporate variables such as environmental concern, green perceived value, trust, price sensitivity, purchase intention, and customer loyalty.

African Scientific Journal
ISSN : 2658-9311
Vol : 03, Num 37 Août 2026

REFERENCES

Anderson, E. W., & Sullivan, M. W. (1993). The antecedents and consequences of customer satisfaction for firms. *Marketing Science, 12*(2), 125–143. https://doi.org/10.1287/mksc.12.2.125

Barbosa, B., Shabani Shojaei, A., & Miranda, H. (2023). Packaging-free practices in food retail: The impact on customer loyalty. *Baltic Journal of Management, 18*(4), 474–492. https://doi.org/10.1108/BJM-10-2022-0386

Boz, Z., Korhonen, V., & Koelsch Sand, C. (2020). Consumer considerations for the implementation of sustainable packaging: A review. *Sustainability, 12*(6), Article 2192. https://doi.org/10.3390/su12062192

Chaudhuri, A., & Holbrook, M. B. (2001). The chain of effects from brand trust and brand affect to brand performance: The role of brand loyalty. *Journal of Marketing, 65*(2), 81–93. https://doi.org/10.1509/jmkg.65.2.81.18255

Chen, Y.-S. (2013). Towards green loyalty: Driving from green perceived value, green satisfaction, and green trust. *Sustainable Development, 21*(5), 294–308. https://doi.org/10.1002/sd.500

Chirilli, C., Molino, M., & Torri, L. (2022). Consumers' awareness, behavior and expectations for food packaging environmental sustainability: Influence of socio-demographic characteristics. *Foods, 11*(16), Article 2388. https://doi.org/10.3390/foods11162388

Dick, A. S., & Basu, K. (1994). Customer loyalty: Toward an integrated conceptual framework. *Journal of the Academy of Marketing Science, 22*(2), 99–113. https://doi.org/10.1177/0092070394222001

Duarte, P., Silva, S. C., Roza, A. S., & Dias, J. C. (2024). Enhancing consumer purchase intentions for sustainable packaging products: An in-depth analysis of key determinants and strategic insights. *Sustainable Futures, 7*, Article 100193. https://doi.org/10.1016/j.sftr.2024.100193

González-Viralta, D., Veas-González, I., Egaña-Bruna, F., Vidal-Silva, C., Delgado-Bello, C., & Pezoa-Fuentes, C. (2023). Positive effects of green practices on the consumers' satisfaction, loyalty, word-of-mouth, and willingness to pay. *Heliyon, 9*(10), Article e20353. https://doi.org/10.1016/j.heliyon.2023.e20353

Gustafsson, A., Johnson, M. D., & Roos, I. (2005). The effects of customer satisfaction, relationship commitment dimensions, and triggers on customer retention. *Journal of Marketing, 69*(4), 210–218. https://doi.org/10.1509/jmkg.2005.69.4.210

African Scientific Journal
ISSN : 2658-9311
Vol : 03, Num 37 Août 2026

Herbes, C., Beuthner, C., & Ramme, I. (2018). Consumer attitudes towards biobased packaging: A cross-cultural comparative study. *Journal of Cleaner Production, 194*, 203–218. https://doi.org/10.1016/j.jclepro.2018.05.106

Ketelsen, M., Janssen, M., & Hamm, U. (2020). Consumers' response to environmentally-friendly food packaging: A systematic review. *Journal of Cleaner Production, 254*, Article 120123. https://doi.org/10.1016/j.jclepro.2020.120123

Kumar, V., Pozza, I. D., & Ganesh, J. (2013). Revisiting the satisfaction–loyalty relationship: Empirical generalizations and directions for future research. *Journal of Retailing, 89*(3), 246–262. https://doi.org/10.1016/j.jretai.2013.02.001

Magnier, L., & Schoormans, J. (2015). Consumer reactions to sustainable packaging: The interplay of visual appearance, verbal claim and environmental concern. *Journal of Environmental Psychology, 44*, 53–62. https://doi.org/10.1016/j.jenvp.2015.09.005

Magnier, L., Schoormans, J., & Mugge, R. (2016). Judging a product by its cover: Packaging sustainability and perceptions of quality in food products. *Food Quality and Preference, 53*, 132–142. https://doi.org/10.1016/j.foodqual.2016.06.006

Mittal, V., & Kamakura, W. A. (2001). Satisfaction, repurchase intent, and repurchase behavior: Investigating the moderating effect of customer characteristics. *Journal of Marketing Research, 38*(1), 131–142. https://doi.org/10.1509/jmkr.38.1.131.18832

Nguyen, A. T., Parker, L., Brennan, L., & Lockrey, S. (2020). A consumer definition of eco-friendly packaging. *Journal of Cleaner Production, 252*, Article 119792. https://doi.org/10.1016/j.jclepro.2019.119792

Oliver, R. L. (1999). Whence consumer loyalty? *Journal of Marketing, 63*(Special Issue), 33–44. https://doi.org/10.1177/00222429990634S105

Otto, S., Strenger, M., Maier-Nöth, A., & Schmid, M. (2021). Food packaging and sustainability: Consumer perception versus correlated scientific facts, A review. *Journal of Cleaner Production, 298*, Article 126733. https://doi.org/10.1016/j.jclepro.2021.126733

Pahlevi, M. R., & Suhartanto, D. (2020). The integrated model of green loyalty: Evidence from eco-friendly plastic products. *Journal of Cleaner Production, 257*, Article 120844. https://doi.org/10.1016/j.jclepro.2020.120844

Plotkina, D., Rabeson, L., & Bambauer-Sachse, S. (2025). The role of green brand image in explaining European consumers' reactions to different types of sustainable packaging. *Journal of Retailing and Consumer Services, 84*, Article 104228. https://doi.org/10.1016/j.jretconser.2025.104228

Prakash, G., & Pathak, P. (2017). Intention to buy eco-friendly packaged products among young consumers of India: A study on developing nation. *Journal of Cleaner Production, 141*, 385–393. https://doi.org/10.1016/j.jclepro.2016.09.116

Sirdeshmukh, D., Singh, J., & Sabol, B. (2002). Consumer trust, value, and loyalty in relational exchanges. *Journal of Marketing, 66*(1), 15–37. https://doi.org/10.1509/jmkg.66.1.15.18449

Steenis, N. D., van Herpen, E., van der Lans, I. A., Ligthart, T. N., & van Trijp, H. C. M. (2017). Consumer response to packaging design: The role of packaging materials and graphics in sustainability perceptions and product evaluations. *Journal of Cleaner Production, 162*, 286–298. https://doi.org/10.1016/j.jclepro.2017.06.036

Watson, G. F., IV, Beck, J. T., Henderson, C. M., & Palmatier, R. W. (2015). Building, measuring, and profiting from customer loyalty. *Journal of the Academy of Marketing Science, 43*(6), 790–825. https://doi.org/10.1007/s11747-015-0439-4

Zeithaml, V. A., Berry, L. L., & Parasuraman, A. (1996). The behavioral consequences of service quality. *Journal of Marketing, 60*(2), 31–46. https://doi.org/10.1177/002224299606000203