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RESEARCH PAPER

Sustainable packaging: Consumers' evaluation of eco-labels in the Ghana's packaging sector

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Abstract. Fostering environmentally conscious consumer behaviour requires a clear understanding of eco-labels and sustainable packaging. However, there is a lack of research on how consumers in developing countries, especially Ghana, perceive these ideas. The study intends to address that gap by evaluating how customer perceptions of eco-friendly packaging and eco-labels are influenced by gender, age, and educational attainment. The contribute to the ongoing discourse on the predictors of environmental attitudes and behaviours. Data were collected through a cross-sectional survey with systematic sampling. Results showed that environmental perceptions were not significantly influenced by gender, age, or educational attainment. Although respondents demonstrated awareness of sustainable packaging, they had limited understanding of eco-labels, with 61% unable to correctly identify various eco-labels. The findings suggest that marketing strategies for eco-friendly products should consider factors beyond demographic characteristics. The complex interaction among demographic variables calls for a more nuanced approach to engaging consumers in sustainability initiatives. Further research is needed to explore alternative predictors of environmental attitudes and to design educational interventions that resonate with diverse consumer segments. A deeper understanding of what drive pro-environmental behaviour is essential to reduce packaging waste.

Keywords: Eco-friendly; eco-labels; sustainable packaging; environmentally friendly

1. Introduction

Recent studies have underscored the increasingly significant role of sustainable packaging in influencing consumer behaviour across diverse nations, reflecting a substantial shift in market dynamics (Hwang, 2024). Empirical evidence suggests that consumers with heightened environmental awareness demonstrate a greater propensity to purchase sustainably packaged products, with approximately 60% expressing a willingness to incur higher costs for such environmentally friendly options (Hwang, 2024). A multitude of determinants, such as eco-labelling, readiness to incur additional costs, degree of environmental awareness, and dominant perceptions regarding sustainability, play a significant role in influencing consumer purchasing behaviour (Hyder & Amir, 2023). Consumer knowledge, encompassing both subjective perceptions and objective information regarding sustainability, has emerged as a critical factor in guiding environmentally conscious food choices. For example, approximately 20% of consumers

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in Canada and Germany reported their readiness to embrace footprint labels as part of their purchasing decisions (Peschel et al., 2016). The influence of sustainable packaging on consumer behaviour have significant ramifications for businesses striving to align with shifting market demands and for policymakers advocating the implementation of environmentally responsible practices (Chopde, 2024).

While consumers are aware of the negative effects of plastics on the planet and environment, they do not necessarily connect this with their purchasing behaviour. When considering environmentally friendly purchases, consumers mainly consider their functionality and price over sustainability. Young (2008) found that 40–45% of consumers reported that their purchasing preference was mostly driven by packaging functionality and product protection, with sustainable features being a secondary concern. Eco-labels as an essential source of information for consumers in developing countries such as Pakistan and significantly influence the acceptance and consumption of eco-friendly products (Hameed & Waris, 2018). Recent investigations have underscored the intricate interplay between sustainable packaging, eco-labels, and consumer behaviour (Mahmoud et al., 2022). Consumers generally trust product with eco-labels and demonstrate readiness to incur additional costs for them (Henaku & Amu, 2023). The design of eco-labels is pivotal, for example the use of a traffic light system and an objective sustainability score has been shown to enhance perceived sustainability while alleviating adverse impacts on perceived usability (Krah et al., 2019). However, Scott and Vigar-Ellis (2014) revealed that South African consumers exhibited limited knowledge of what environmentally friendly packaging, especially how to identify it and understand its benefits. In Ghana, although environmental consciousness exerts a favourable influence on green purchasing behaviour, the direct effect of green packaging remains minimal (Mahmoud et al., 2022), aligning with findings from Decardi-Nelson et al. (2019) that suggest many Ghanaians have a limited understanding of eco-friendly packaging. Moreover, the level of awareness and use of eco-labels among university students in Ghana remains low (Henaku & Amu, 2023).

To advance sustainable packaging initiatives, stakeholders should prioritise the enhancement of consumer awareness, refinement of eco-label designs, and addressing the factors that influence sustainable behaviour (Boz et al., 2020). Consequently, the objective of this study is to evaluate the extent of sustainable packaging awareness through eco-labels in Ghana.

2. Literature review

Research on sustainable packaging and eco-labels reveals that consumers generally exhibit positive attitudes towards eco-labels; however, their level of knowledge and trust vary (Witek, 2017). While sustainable packaging enhances perceived environmental responsibility, it may negatively affect perceived usability. Nevertheless, a well-designed eco-label that includes a clear sustainability score can mitigate these negative effects and positively influence consumer decision-making (Krah et al., 2019). Consumers tend to prefer eco-friendly materials such as paper, glass, and cardboard, with recycling and environmental preservation being the main reasons for purchasing sustainably packaged products (Orzan et al., 2018).

However, the adopting sustainable behaviours continues to be significantly hampered by cost barriers and informational gaps (Jerzyk, 2016; Orzan et al., 2018). Among younger customers', buying intentions might be greatly influenced by packaging that conveys clear and informative ecological messages (Jerzyk, 2016). Overall, both products and brands can gain a competitive advantage through the efficient design and communication of sustainability-relate content on packaging (Jerzyk, 2016).

Although eco-labels are important tools for communicating sustainability in packaging, their effectiveness depends on consumer comprehension and trust (Brécard, 2017; Boz et al., 2020). To maximize the impact of eco-labels, organizations should prioritize transparent communication, cultivate consumer trust, and invest in sustainability education. Additionally, standardizing eco-

labels formats and improving public awareness may help to clear up misconceptions and increase the overall effectiveness of sustainable packaging initiatives (Brécard, 2017; Boz et al., 2020).

2.1. Sustainable packaging definition

Green packaging reduces the carbon footprint throughout the product's life cycle (Bravo & Vieira, 2024). The transition to eco-friendly packaging is driven by private sector initiatives, legislative instruments, and increasing pro-environmental consumer behaviour (Bravo & Vieira, 2024). Consumers demand greener packaging due to their concern for the natural environment and their support for environmental protection legislation (Mahmoud et al., 2022). In line with the view of Bravo and Vieira (2024), Boks and Stevels (2007) categorised eco-friendliness into three types. First is scientific green, which deals with Life Cycle Assessment. The second is government green, which addresses regulations and taxes related to product pollution, often framed as extended producer responsibility (EPR). The third is customer green, which relates to consumers' understanding of eco-friendly products and their emotions responses to them.

The adoption of green packaging as more sustainable alternative has led to the application of various theories to better understand consumer behaviour (Bravo & Vieira, 2024). According to Nguyen et al. (2020), participants perceived ecologically friendly packaging as non-toxic and less harmful to the environmental. Furthermore, Vietnamese consumers associated sustainable packaging primarily with recyclability (Nguyen et al., 2020), aligning with Young's (2008) findings that consumers in the USA, Germany, China, and the UK also associated environmentally friendly packaging with recyclability. However, consumers generally have a limited understanding of what constitutes sustainable packaging, often focusing narrowly on recyclability while overlooking broader social and economic aspects (Boz et al., 2020).

Some consumers equated eco-friendly packaging with recyclability, as highlighted in the above examples. However, in Vietnam, consumers perceive eco-friendly packaging through three key dimensions: packaging materials, manufacturing technology, and market appeal (Nguyen et al., 2020). Nevertheless, consumers' perceptions of sustainable packaging do not always align with actual environmental impact as measured by life-cycle assessments (Boz et al., 2020). in contrast to the abovementioned views on sustainable packaging, Magnier and Crié (2015) define eco-friendly packaging as packaging that explicitly or implicitly conveys its ecological characteristics, whether through its materials, reduction, reusability, or a range of ecological signals. They also note that such packaging relies on structural, graphical, and informational signals to convey environmental friendliness. Similarly, Chiellini (2008) argued that green packaging involves the reuse and recycling of materials such as glass, paper, and metal, which can be reprocessed after their useful use. Additionally, a study by Herbes et al. (2020) found that French consumers perceive a package's material and colour as indicators of sustainability, whereas German consumers place greater importance on the personal evaluation of the packaging material and rely less on colour. In contrast, American consumers exhibited an urge to seek out information about a package's environmental footprint. The Sustainable Packaging Coalition (2011) proposed a general framework for sustainable packaging, which has become a blueprint for designers and manufacturers. The eight-point framework includes the following criteria; beneficial, safe, and healthy for individuals and communities throughout its life cycles; meet market criteria for performance and cost; sourced, manufactured, transported, and recycled using renewable energy; optimizes the use of renewable or recycled source materials; manufactured using clean production technologies and best practices; made from healthy materials throughout its life cycle; physically designed to optimize materials and energy use; capable of being effectively recovered and utilized in biological and/or industrial closed-loop systems. On the other hand, Magnier and Schoormans (2015) argue that a person's perception of a package's eco-friendliness depends largely on their level of environmental concern.

2.2. Theoretical framework

The Theory of Planned Behaviour (TPB) has been one of the most widely used frameworks over the past two decades to explain consumer purchasing behaviour, including preferences for foods products in eco-friendly packaging (Popovic et al., 2019). Bravo and Vieira (2024) found that Ajzen TPB framework is particularly effective in understanding consumer perceptions and behaviours related to green packaging.

The key components of the TPB are attitude, subjective norms, and perceived behaviour control. Attitude refers to the degree to which a person has a favourable or unfavourable evaluation of a given behaviour, whereas subjective norms indicate perceived social pressure to perform or not perform the behaviour. Perceived behavioural control refers to an individual perception of the ease or difficulty of performing the behaviour (Ajzen, 1991).

2.3. Sustainable packaging and theory of planned behavour

Numerous studies have demonstrated that pro-environmental consciousness, attitude, subjective norms, and perceived behaviour control are key determinants influencing customers' choices of ecologically packaged food products (Popovic et al., 2019). According to Bravo and Vieira (2024), in Western societies, dominant social norms significantly impact individual purchasing behaviour, since people usually seek peer approval for their eco-friendly choices. On the other hand, in Eastern cultures, the influence of social and familial bonds may be greater, leading to different motivations for purchasing eco-friendly products. This implies that consumers' intentions to buy environmentally friendly products are shaped by attitudes, subjective norms, and perceived behavioural control. In a related study, Prakash and Pathak (2017) found that purchasing intention toward eco-friendly packaging was significantly influenced by personal norms, attitudes, environmental concerns, and willingness to pay. Among these, personal norms emerged as the strongest predictor of purchase intention. Attitude was also found to have a significant positive relationship with the purchase intention toward eco-friendly packaged products. Similarly, attitude exerts influence in shaping the behaviour of young consumers (Nguyen et al., 2021). Those with a positive attitude towards green packaging are more likely to purchase green-packaged products to reduce packaging-related environmental harm (Nguyen et al., 2021). Similarly, improving consumers' environmental attitudes and concerns can increase their buying intention for eco-friendly packaging (Hussain & Huang, 2022). A study conducted in India by Chaudhary and Bisai (2018) indicated that millennials showed a strong positive attitude towards the purchasing eco-friendly products and services. Although young consumers demonstrate a high intention to purchase green products. However, this intention does not always translate into actual purchasing behaviour (Chaudhary & Bisai, 2018).

The findings of Prakash and Pathak (2017) and Bravo and Vieira (2024) showed that attitude influences young consumers' purchase intentions for green packaged products. However, the strong positive attitudes and purchase intentions observing among millennials do not always translate into actual purchase behaviour. There appears to be no direct link between pro-environmental behaviour and subjective norms in influencing consumers' purchase intentions. Therefore, social influences (e.g. family, friends, peers) may have limited impact in directly shaping consumers' green purchase intentions (Chaudhary & Bisai, 2018).

On the other hand, a study by Chan and Lau's (2000) in China found that consumers' intentions significantly influence their actual behaviour in purchasing green products. Similarly, a positive attitude toward green purchasing and environmental awareness are important predictors of consumers' intentions to purchase sustainably packaged products (Martinho et al., 2015). Trivedi et al. (2018) demonstrated that internal environmental attitudes and attitudes toward green packaging play a significant role in shaping green purchase intentions, while external environmental attitudes were found non-significant.

In line with this, scientific evidence indicates that packages with eco-friendly visual cues and claims tend to positively influence consumer perceptions (Magnier & Schoormans, 2015). In the

context of Mexico, Müller et al (2021) found that perceived behavioural control, ecological conscience, and moral obligation directly and positively influence the intention to purchase green products. Conversely, their study revealed that attitude, subjective norms, and willingness to pay did not significantly affect green purchase intention. In contrast, Mahmoud et al. (2022) found that in Ghana, the greenness of packaging itself does not significantly influence consumers' purchase decisions. Instead, consumers' willingness to pay for green products was positive and significant predictor of their actual purchase behaviour.

It is evident that pro-environmental behaviour is shaped by many factors, including demographic, external, and internal influences (Kollmuss & Agyeman, 2002). Demographic factors have been found to influence consumers' purchase decisions regarding green-packaged products (Kollmuss & Agyeman, 2002; Popovic et al., 2019). Two key demographic factors that affect environmental attitudes and pro-environmental behaviour are gender and years of education (Kollmuss & Agyeman, 2002). For example, while women generally possess less extensive environmental knowledge than men, they tend to be more emotionally engaged, show greater concern about environmental destruction, are less reliant on technological solutions, and are more willing to adopt behavioural changes (Fliegenschnee & Schelakovsky, 1998). Gender has been show to influence environmental attitudes and behaviours, with women demonstrating higher levels of concern for environmental issues (Economou & Halkos, 2020; Echavarren, 2023; Mandarić & Hunjet, 2024). Furthermore, women also express stronger support for recycling policies and a more positive perception of the health impacts of ecological problems compared to men (Mandarić & Hunjet, 2024).

On the other hand, a study conducted in India by Bhattacharyya and Rahman (2020) found that personal values and attitudes towards environmental responsibilities do not significantly differ by gender. Tüzemen and Kuru (2018) observed that consumers with lower levels of education and income tend to prioritize product utility over packaging and exhibit greater price sensitivity. In contrast, those with high education and income levels demonstrate more concern for packaging and heightened environmental awareness. Similarly, Ivanova et al. (2014) found a strong correlation between participants' educational levels and their understanding of sustainability labels. On the contrarily, Kollmuss and Agyeman (2002) and Powdthavee (2020) argue that while higher education increases awareness of environmental issues, but it does not necessarily translate into more pro-environmental behaviours.

Chawla (1999) identified several factors that influence and shape individuals' decisions and attitudes toward becoming environmentalist, including childhood experiences, subjective norms, role models, education, participation in pro-environmental organisations, and experiences of pro-environmental degradation. The complexity of factors influencing consumers' pro-environmental behaviour makes it difficult to represent such behaviour within a single framework or model (Kollmuss & Agyeman, 2002). Kollmuss and Agyeman (2002) proposed a model that categorizes the drivers of pro-environmental behaviour into internal and external factors. Internal factors include personal motivations, values, attitudes, and emotional responses, while external factors include institutional, economic, and social pressures that shape individuals' behaviour. The model also introduces the concept of pro-environmental consciousness, which encompasses environmental knowledge, values, attitudes, and emotional involvement. This consciousness is viewed as a result of the complex interaction between internal and external influences that ultimately shape behaviour. Additionally, the model identifies various barriers to pro-environmental behaviour, such as entrenched habits and long-established behaviour patterns. Based on the theoretical framework of TPB and the preceding arguments, I hypothesise that:

H1: *Socio-demographic factors (such as age, gender and educational level) significantly impact consumers' perception of sustainable packaging in Ghana.*

2.4. Eco-labels and Theory of Planned Behaviour

Customers' choices of eco-labels and their intention to buy eco-labelled products are greatly influenced by the TPB. Numerous studies (Waris & Ahmed, 2020; Kumar & Basu, 2023) have found that consumers' eco-label preferences and green purchasing behaviour are significantly influenced by the three main core TPB components: attitude, subjective norms, and perceived behavioural control.

Several factors, such as consumers' understanding of sustainability, trust in eco-friendly products, and ecological knowledge, affect how eco-labels are evaluated in the packaging industry (Hameed & Waris, 2018). Eco-labels serve as essential sources of information about the environmental attributes of products, highlighting their reduced environmental impact. Nonetheless, there is ongoing debate about the effectiveness of eco-labels in promoting environmentally responsible consumer behaviour (Hameed & Waris, 2018). Research suggests that green trust play a crucial mediating role in the relationship between eco-labels and customers' environmentally conscious behaviour (Hameed & Waris, 2018). However, the proliferation of diverse eco-labels in the market can lead to consumer confusion and misinformed (Brécard, 2017). If consumers assume that all eco-labels represent equally high environmental standards, it may dilute the competitive advantage of companies offering genuinely sustainable products (Brécard, 2017). This misconception can also create incentives for some businesses to engage in greenwashing, potentially resulting in adverse consequences for societal welfare (Brécard, 2017).

Attitude towards eco-labelled products has consistently been demonstrated to have a positive influence on consumers' intentions to purchase such products (Jin et al., 2019; Waris & Ahmed, 2020; Ateş, 2021). Likewise, subjective norm, which reflecting the perceived social pressure to engage in a behaviour, have been found to positively influence purchase intentions across the majority of studies (Jin et al., 2019; Waris & Ahmed, 2020; Sobuj et al., 2021).

Additionally, consumers' intention to purchase natural food items has been linked to personal norms shaped by pro-environmental values and trust in the natural food supply chain (Carfora et al., 2021). However, Chaudhary and Bisai (2018) found no significant impact of subjective norms on purchase intention. Another important predictor of the intention to buy eco-labelled products is perceived behavioural control, which indicates the perceived ease or difficulty of performing the behaviour (Waris & Ahmed, 2020; Ateş, 2021). According to Testa et al. (2015), eco-labels considerably boost consumers' perceived behavioural control by reinforcing their ability to make environmentally responsible purchasing decisions. Furthermore, the detrimental impacts of sustainable packaging on perceived usability can be mitigated by high-scoring eco-labels (Krah et al., 2019).

Eco-labels positively influence eco-conscious behaviour (Hameed & Waris, 2018). Customers' pro-environmental attitudes and behaviours are enhanced by their understanding of environmental issues and eco-labels, as well as by their trust in such labels (Taufique et al., 2016). Educating consumers about the environment and eco-labels increases their knowledge and trust, which in turn promotes environmentally supportive behaviour (Taufique et al., 2016). While the effects of age appear mixed, eco-labels tend to be more effective among women and individuals with higher levels of education or income. Given these arguments and TPB, I propose the following hypothesis:

H2: *Socio-demographic factors (such as age, gender and education level) significantly impact consumers' evaluations of eco-labels in Ghana.*

The TPB offers a comprehensive framework for understanding customer behaviour in relation to eco-labels and sustainable packaging. Previous research has demonstrated that consumers' perception significantly influence their purchasing decisions regarding eco-labelled products (Ateş, 2021). For example, customers are more likely to choose sustainable alternatives when they hold favourable opinion of eco-labels (Chaudhary & Bisai, 2018; Jin et al., 2019; Waris

& Ahmed, 2020; Ateş, 2021). In addition to attitudes, subjective norms are also important. Social influences, such as community expectations and sustainability norms, can shape individual behaviours (Jin, et al., 2019; Waris & Ahmed, 2020; Sobuj et al., 2021). This is particularly relevant in Ghana, where communal norms may strongly influence consumer choices regarding eco-labelled products.

Furthermore, perceived behavioural control plays a critical role in determining whether consumers feel capable to buy eco-labelled products. This perception is greatly influenced by factors such as consumer education and product availability (Testa et al., 2015; Chaudhary & Bisai, 2018). By examining these dimensions, this study seeks to uncover the complex interrelationships that shape consumers' evaluations of eco-labels within Ghana's packaging industry.

3. Material and method

This deductive approach was used because as it allows the testing of hypotheses using empirical data, thereby making it feasible to generalise from sample to the entire population (Johnson & Christensen, 2014).

3.1. Research strategy: Questionnaire survey

A questionnaire survey was selected as the primary method for this research due to its ability to reach a large and diverse population, while also offering respondents the flexibility to complete the survey at their own convenience (Fink, 2017). This approach is particularly effective for collecting original data directly from individuals, enabling a comprehensive description of broad populations that may be impractical to observe directly. The study employed a cross-sectional design, wherein data were collected at a single point in time, providing a snapshot of the population under investigation (Fink, 2017).

3.2. Sampling strategy: Systematic sampling

A comprehensive list of 18 major retail operators and supermarkets (7 males and 11 females) within the Navrongo municipality was compiled. Additionally, three secondary schools were simply randomly selected from a total of six within the municipality. From these schools, a list of 140 male and 24 female teachers was generated. Furthermore, students (87 males and 10 females) were randomly selected from the School of Environment and Life Sciences at C. K. Tedam University of Technology and Applied Sciences, Navrongo, across two faculties. The inclusion of these particular categories of participants was based on the assumption that individuals within these demographics are more likely to purchase products with eco-labels or possess knowledge indicating awareness of such labels and sustainable packaging.

The total compiled list encompassed 279 participants, forming the sampling frame for the research. To minimize potential cyclical bias and enhance the advantages of equitable stratification, the list was carefully organized by categorical variables, with male participants listed first, followed by female participants (Kalton, 1983; Babbie, 2014; Johnson & Christensen, 2014). For the systematic sampling, a random initial point ($N^{th} = 5^{th}$) was determined within the ordered list, establishing the selection interval. Each fifth (5^{th}) name was then chosen from this origin point (Johnson & Christensen, 2014). An online random number generator (www.randomizer.com) was utilized to generate 150 random numbers in alignment with the systematic sampling framework. These generated numbers were consequently matched to the corresponding names on the compiled list of 279 participants. A sample size of $n = 150$ was used, representing more than half of the total population ($N = 279$) which is considered adequate for achieving representative sampling and enabling generalization (Babbie, 2014).

3.3. Questionnaire design and data collection procedure

A closed-ended questionnaire was developed to ensure consistent interpretation by respondents, thereby enhancing objective of scoring, analysis, and interpretation (Fink, 2017). The questionnaire included a series of items specifically focused on eco-labels and sustainable

packaging. To validates its clarity and effectiveness, the structured questionnaire underwent a pre-test with a sample of ten university students, five shopping mall attendants, and twenty teachers. Based on the feedback received, necessary revisions and corrections were made prior to the final distribution. Informed consent forms outlining the study's objectives were provided to all participants before to administering the questionnaire. A total of 150 questionnaires were disseminated to participants selected from the sampling frame. Follow-up visits were conducted workplaces to collect completed questionnaires. In total, 137 questionnaires were retrieved, resulting a response rate of 91.33%. The eco-labels and questionnaire items were presented In Table 1.

3.4. Questions on sustainable packaging

The questions below were presented in the questionnaire in order shown and were numbered from 1 to 6 to facilitate coding for data interpretation.

- *Have you ever heard of the term sustainable packaging?*
- *Would you consider package recycling as sustainable?*
- *Does reusing packages represent sustainable packaging?*
- *Does making packages from renewable materials represent sustainable packaging?*
- *Does the quantity of material used for packages represent sustainable packaging?*
- *Do packages that are ecologically safe represent sustainable packaging?*

The items assessing knowledge of eco-labels and sustainable packaging were designed using categorical ("Yes-or-No") responses. This format is well-suited for survey-based research, as it enhances efficiency and ensures consistent, reliable data collection (Fink, 2017).

4. Result and discussion

IBM SPSS (version 26) was used to analyse the results, which are displayed according to the structure of the questionnaire. Data analysis was guided by the study's objectives. The completed questionnaires were first sorted and appropriately coded. Coding began with categorical variables: gender was coded as "1" for male and "2" for female. Age was coded as follows: "1" for the ages 24-34, "2" for 35-44, "3" for 45-54, and "4" for 55-59. For educational qualifications, "1" was assigned to diploma holders; "2" for degree holders; and "3" to those with a master's degree. Knowledge of eco-labels and sustainable packaging was coded as "1" for Yes and "0" for No. All data were entered into SPSS and subsequently cross-checked and verified against the original completed questionnaires to ensure accuracy.

4.1. Reliability

To assess the reliability of the collected data, Cronbach's alpha reliability was calculated for all eight constructs (see Table 2). The test yielded an alpha value of 0.725, which meets the commonly accepted threshold of 0.70 for research purposes (Johnson & Christensen, 2014). This result provides a basic assurance of the reliability of the constructs under investigation.

Table 1. Eco-labels

Green dot

EU eco-label

Compostable symbol

Mobius loop

Plastic resin symbol

Table 2. Cronbach alpha reliability statistics

Cronbach's alpha	*N* of items
.725	11

4.2. Demographic statistics

The findings are presented in the following order: respondents' recognition of eco-labels and green symbols, their knowledge on sustainable packaging, and the results of hypotheses testing. The data revealed that the respondents comprised 104 males (77.6 %) and 30 females (22.4 %), while three respondents did not disclose their gender. Participants aged ranged from 25 to 59 years, with majority (51%) between 35 and 44 years old, followed by 25 – 34 (35%), 45 – 54 (12%), and 55 – 59 (1.5%). The data also indicated a high level of education among respondents, with 75% holding a bachelor's degree, 20.6%, a master's degree, and 4.4% a diploma.

4.3. Eco-labels

Participants' responses to the Green Dot symbol found on packaging revealed that 83 respondents (60.6 %) did not know its meaning. Regarding the EU eco-label, which is commonly found on imported products, 108 participants (79.4%) indicated they were unfamiliar with its meaning. Similarly, 78.1% of respondents reported not knowing the meaning of the compostable symbol. For the mobius loop symbol, 83 participants (60.6%) failed to understand its significance. In the case of the resin identification code (RIC) symbols, 91 participants (66.9 %) did not understand their meaning. Figure 1 illustrated the percentage distribution of these responses.

4.4. Sustainable packaging knowledge

Participants' responses to the list of questionnaire items stood in stark contrast to their understanding of graphical ecological cues, such as eco-labels. The results showed that 96 respondents (70.6%) reported having heard of the term eco-friendly. In response to the second question on recycling, 78.7% of participants agreed that recycling packaging is an aspect of sustainability. Regarding the third item on reusing, 63.2% of respondents believed that reusing packaging is part of eco-friendly practices. Additionally, 77.8% of participants acknowledged that producing packaging from renewable resources is component of green packaging. Interestingly, 70.6% of the respondents disagreed that the quantity of material used in packages (reduce) is related to sustainability. Finally, 77.9% of participants stated that they perceived packaging that is less harmful to the environment to be sustainable. Two hypotheses were proposed in the study and the following section presented the findings related to these assumptions.

Hypothesis 1

A multivariate analysis of variance (MANOVA) was conducted to examine the main effects of gender, age, and educational level as independent variables, along with their interaction effects, on six variables: eco-friendly, recycle, reuse, renewable, reduce and ecological (see Table 3). The MANOVA results showed a significant effect of the intercept, suggesting that the group means differ considerably across the dependent variables, Wilks' Lambda = 0.430, $F_{(6, 107)} = 23.599$, $p < 0.001$, partial $\eta^2 = 0.570$. For gender, the analysis revealed no significant effect on consumers' perceptions, Wilks' Lambda = 0.922, $F_{(6, 107)} = 1.509$, $p = 0.182$, partial $\eta^2 = 0.078$. Age showed a marginal trend towards significance, Wilks' Lambda = 0.783, $F_{(18, 303.127)} = 1.519$, $p = 0.082$, partial $\eta^2 = 0.078$. Educational level did not show a significant effect, Wilks' Lambda = 0.908, $F_{(12, 214)}$, $p = 0.567$, partial $\eta^2 = 0.047$.

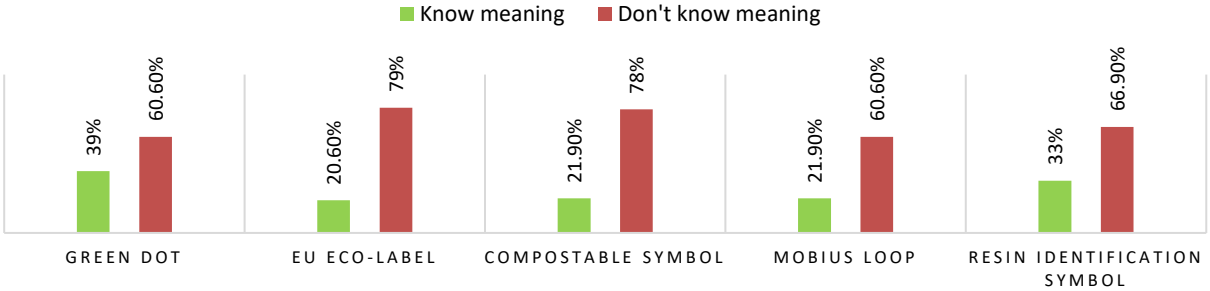

Figure 1. Percentages of knowledge of eco-labels & green symbols

Interaction terms (e.g., gender * age, gender * education) also showed no significant effects, indicating that the combined influence of gender and age or education does not significantly affect the dependent variables. See Table 4.

4.5. Levene's test results

With the exception for the variable Reduce, which has a *p*-value of 0.064 (greater than 0.05), the results suggests that the variances for this variable are equal across groups. For the remaining variables: eco-friendly term (*p*-value = 0.000), Recyclable (*p*-value = 0.000), Reuse (*p*-value = 0.000), Renewable (*p*-value = 0.003) and Ecological (*p*-value = 0.000), *p*-values are less than 0.05, indicating that the variances are significantly different across groups for these variables. See Table 5 for the details.

Hypothesis 2

Again, the results of the MANOVA showed no significant effects of gender, age and level of education, nor of their interaction effects, on the dependent variables: green dot, EU ecolabel, compostable symbol, mobius loop, and resin identity symbol. Specifically, the results for gender revealed no significant effect on consumers' perceptions, with Wilks' Lambda = 0.917, $F_{(5, 109)}$ = 1.980, p = 0.087, partial η^2 = 0.083.

Table 3. Multivariate test

Effect	Wilks' Lambda	F	Hypothesis df	Error df	Sig.	Partial η^2
Intercept	0.430	23.599	6	107.000	.000	0.570
Gender	0.922	1.509	6	107.000	.182	0.078
Age	0.783	1.519	18	303.127	.082	0.078
Education	0.908	0.877	12	214.000	.572	0.047
Gender * Age	0.888	0.723	18	303.127	.787	0.039
Gender * Education	0.867	1.314	12	214.000	.212	0.690
Age * Education	0.895	1.020	12	214.000	.431	0.540
Gender * Age * Education	1.000	0.000	0	109.500	-	-

Table 4: Levene's test of equality of error variances

	F	df1	df2	Sig.
Eco-friendly term	3.341	13	112	0.000
Recyclable	3.501	13	112	0.016
Reuse	5.247	13	112	0.000
Renewable	2.653	13	112	0.000
Reduce	1.730	13	112	0.000
Ecological	5.230	13	112	0.000

Table 5: Multivariate test

Effect	Wilks' Lambda	F	Hypothesis df	Error df	Sig.	Partial η^2
Intercept	0.799	5.469	5	109.000	0.000	0.201
Gender	0.917	1.980	5	109.000	0.087	0.083
Age	0.836	1.344	15	301.302	0.175	0.058
Education	0.902	1.148	10	218.000	0.328	0.050
Gender * Age	.0.869	1.051	15	301.302	0.402	0.046
Gender * Education	0.917	0.969	10	218.000	0.471	0.043
Age * Education	0.871	1.557	10	218.000	0.121	0.067
Gender * Age * Education	1.000	-	-	111.000	-	-

The effect of age was not substantial, suggesting that age does not considerably influence the dependent variables, Wilks' Lambda = 0.836, $F_{(15,\ 301.302)}$ = 1.344, p = 0.175, partial η^2 = 0.058. Similarly, the effect of educational level was not significant, indicating that educational attainment does not have a meaningful impact on the outcomes measured outcomes, Wilks' Lambda = 0.902, $F_{(10,\ 218)}$ = 1.148, p = 0.328, partial η^2 = 0.050. The effect of gender was also not statistically significant at the 0.05 level but approached significance, Wilks' Lambda = 0.917, $F_{(5,\ 109)}$ = 1.980, p = 0.087, partial η^2 = 0.083. This may may indicate a trend worth further exploration, although it does not provide strong evidence of a significant effect. Additionally, no significant three-way interaction was found among gender, age, and educational level.

4.6. Levene's test results

The significance (p) values for all eco-labels, except EU eco-label (p = 0.016), are below the conventional alpha level of 0.05. For the green dot, compostable, mobius loop, and resin identification symbol, the significance values are 0.000, indicating strong evidence that the variances differ significantly across the groups. See Table 6.

5. Discussions

This research aimed to assess the level of awareness among Ghanaian consumers regarding sustainable packaging through eco-labels. The study revealed that although a majority of respondents (70%) were acquainted with the idea of sustainable packaging, only one-third correctly identified material quantity as a key component. Despite a substantial level of educational background, 51% of participant held a university degree, the respondents demonstrated inadequate knowledge of eco-labels.

5.1. Sustainable package knowledge

The significant effect of the intercept (Wilks' Lambda = 0.430, $F_{(6,\ 107)}$ = 23.599, p < 0.001) indicates notable variation in group means for the dependent variables associated to eco-friendliness. This suggests that consumers' perceptions of eco-friendly packaging are variable and potentially influenced by factors beyond the independent variables investigated.

The finding that gender did not significantly influence consumer perceptions (Wilks' Lambda = 0.922, $F_{(6,\ 107)}$ = 1.509, p = 0.182) aligns with previous studies (Bhattacharyya & Rahman, 2020), which indicate that gender may not be a reliable predictor of environmental attitudes or behaviour. For instance, there is an argument that factors such as age, ideology, political affiliation, and feminist awareness are stronger predictors of environmental support than gender. These findings contrast sharply with other studies that identify gender as a citical determinant of pro-environmental behaviours or attitudes (Echavarren, 2023; Mandarić & Hunjet, 2024). Consequently, the relationship between gender and environmentalism appear to be complex and influenced by sociocultural psychological variables beyond biological sex.

Upon examining the marginal trend toward significance for age (Wilks' Lambda = 0.783, $F_{(18,\ 303.127)}$ = 1.519, p = 0.082), it can be inferred that the preferences for eco-friendly packaging may indeed be influenced by age. Prior investigations (Prakash & Pathak, 2017; Chaudhary and Bisai, 2018; Nguyen et al., 2021) have suggested that younger individuals tend to show a greater

Table 6: Levene's test of equality of error variances

	F	df1	df2	Sig.
Green dot	8.292	13	113	.000
EU eco-label	2.148	13	113	.016
Compostable	4.417	13	113	.000
Mobius loop	13.613	13	113	.000
Resin identification symbol	4.428	13	113	.000

propensity than older individuals to express environmental concerns and engage in pro-environmental behaviours.

Moreover, earlier research (Kollmuss & Agyeman, 2002; Ivanova et al., 2014) identified a positive correlation between educational level and environmental awareness. However, this contrasts with the non-significant impact of educational level observed in the current study (Wilks' Lambda = 0.908, $F_{(12,\ 214)}$ = 0.877, p = 0.567). Generally, heightened environmental awareness and concern are commonly associated with higher levels of education (Tüzemen & Kuru, 2018). This divergence implies that more targeted educational interventions may be necessary to effectively influence attitudes towards environmental sustainability. Finally, the absence of significant interaction effects (e.g. gender * age, gender * education) indicates that perceptions of eco-friendly packaging are not substantially affected by the combined influence of these demographic factors.

5.2. Eco-labels

Gender had no significant impact on consumers' perceptions, as indicated by the results (Wilks' Lambda = 0.917, $F_{(5,\ 109)}$ = 1.980, p = 0.087). According to Hayes (2001) and Bhattacharyya and Rahman (2020), gender differences in environmental attitudes may not be as pronounced as previously assumed, which aligns with the findings of this study. While some research (Kollmuss & Agyeman, 2002; Nguyen et al., 2017; Olsson & Gericke, 2017; Economou & Halkos, 2020; Echavarren, 2023; Mandarić & Hunjet, 2024) suggests that women tend to engage more frequently in pro-environmental behaviours, differences in perceptions of specific eco-labels may not be statistically significant (Hayes, 2001).

The absence of a significant age effect (Wilks' Lambda = 0.836, $F_{(15,\ 301.302)}$ = 1.344, p = 0.175) indicates that judgments of eco-friendly labels are not strongly influenced by age. This finding contrast with previous research that have shown younger individuals frequently exhibit greater environmental awareness and concern (Prakash & Pathak, 2017; Chaudhary & Bisai, 2018; Nguyen et al., 2021). However, it may indicate that as eco-friendly symbols become more widespread, age-related differences in perception may be diminishing.

The non-significant effect of educational level (Wilks' Lambda = 0.902, $F_{(10,\ 218)}$ = 1.148, p = 0.328) suggests that higher education does not necessarily lead to a greater understanding or appreciation of eco-friendly symbols. This challenges the common assumption that education directly correlates with environmental awareness (Ivanova et al., 2014; Tüzemen & Kuru, 2018). Some studies have also indicated that educational interventions may not always be effective in altering consumer perceptions (Olsson & Gericke, 2017). The absence of significant interaction effects among gender, age, and education indicates that these demographic factors do not interact to meaningfully influence perceptions of eco-friendly symbols.

6. Conclusion

In summary, this study reveals a complex relationship between consumer perceptions of eco-friendly packaging and eco-labels and their demographic characteristics. The lack of a significant impact of gender suggests that gender may not be a reliable predictor of environmental attitudes, an observation that aligns with some previous studies while contradicting others that highlight its significance. Although not statistically definitive, age appears to have a modest influence, suggesting that younger customers may be more receptive to eco-friendly messaging. Moreover, the findings challenge the commonly held belief that higher educational attainment directly fosters greater environmental awareness, as no strong correlation was observed. Finally, the lack of substantial interaction effects among age, education, and gender further emphasizes that these demographic variables do not substantially shape consumer perceptions of eco-friendly products.

6.1. Implications

Companies should recognize that consumer perceptions of eco-friendly symbols may not be greatly impacted by demographic characteristics like gender, age, and education. This insight

implies that marketing effort should focus less on demographic segmentation and more on emphasizing the inherent benefits of eco-friendly products. Additionally, given the minimal impact of education on these perceptions, companies may consider investing in consumer education programs to enhance public understanding and awareness of the meanings and advantages of eco-friendly symbols, thereby fostering broader acceptance.

6.2. Recommendation

The findings highlight the need for further research to explore additional potential factors that may influence perceptions of sustainable packaging and eco-labels, such as cultural background, personal values, and economic factors. Gaining a deeper understanding of these factors could provide comprehensive insights into consumer behaviour. Despite the careful selection of respondents from diverse background, this study has some limitations. Further research could benefit from using a larger and more varied sample to enhance the generalizability of the findings.

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