Sustainable Choices in Cosmetics: How Environmental Concerns and Perceived Value Influence Young Generation Female's Purchase Intention for Green Packaging

Nanda Ravenska[1], Martha Fani Cahyandito[2], Kurniawan Saefullah[3], Sutisna[4]

{nanda23007@mail.unpad.ac.id[1], cahyandito@unpad.ac.id[2], kurniawan.saefullah@unpad.ac.id[3], sutisna_mmunpad@yahoo.com[4]}

Universitas Padjadjaran, Bandung, Indonesia[1,2,3,4]
Politeknik STIA LAN Bandung, Bandung, Indonesia[1]

Abstract. The increasingly complex environmental problems, one of which is caused by cosmetic waste, have triggered an increase in awareness of the importance of environmentally friendly packaging. This study aims to analyze the purchase intention of female Generation Z toward cosmetics with sustainable packaging. This study examines how environmental concern and perceived value influence purchase intention through attitude toward sustainable packaging as a mediating variable. Data were collected through a survey of female Generation Z respondents in Bandung City and analyzed using the SEM method. The results showed that environmental concern positively contributed to a good attitude towards sustainable packaging, ultimately increasing the purchase intention of environmentally friendly cosmetic products. Whereas perceived value does not influence purchase intention directly. The implications of these findings provide insight into the cosmetics industry's need to focus on communicating environmental benefits, and in marketing cosmetic products with environmentally friendly packaging, it is necessary to emphasize the importance of sustainability.

Keywords: eco-friendly packaging, environmental concern, purchase intention, young generation

1 Introduction

In recent decades, the increasing volume of waste has become one of the significant environmental issues worldwide. Waste from various sectors, including households and industries, increases pollution and ecosystem damage. Plastic waste, which is difficult to decompose and contains hazardous chemicals, is one of the most threatening types of waste [1]. Plastic pollution has severely impacted nearly all ocean species and ecosystems, with some regions facing critical ecological risks [2]. One type of plastic waste that is now increasingly in the spotlight is cosmetic waste, which includes plastic packaging for skin care products, makeup, and other beauty products [3]. This condition is worsened by cosmetic waste, such as bottles, tubes, and plastic packaging of beauty products that are often not recycled. The high use of single-use plastic in cosmetic products worsens the accumulation of waste that has a long-term impact on the environment [4].

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The cosmetics industry is starting to respond to this environmental challenge by introducing products that support sustainability [5]. Many cosmetic companies innovate using natural ingredients and minimizing hazardous chemicals in their product formulations. In addition, eco-friendly packaging is also a major focus, using recycled, biodegradable materials and designs that make it easy to recycle [6]. These steps aim to reduce carbon footprints and create more environmentally responsible products. These initiatives appeal to environmentally conscious consumers, who increasingly support sustainability products. They also create competition among brands to offer more environmentally friendly products [7].

Previous studies have shown that consumers' environmental concerns significantly influence their preferences for purchasing environmentally friendly products [8]. Empirical studies have confirmed that the higher consumers' environmental concerns, the more likely they are to choose products with sustainable packaging. However, several previous studies have shown that environmental concerns do not always have a positive relationship with purchase intention [9], [10]. In addition, previous research has shown that environmental concern has a significant relationship with attitude [11], [12]. Based on previous studies results that showed different results, this prompted this study to re-examine the influence of environmental concern on purchase intention and how it is mediated by the attitude in the context of cosmetics with environmentally friendly packaging.

In addition, the perceived value of environmentally friendly packaging has also been shown to influence the purchase intention [13], [14], [15]. Consumers who perceive that environmentally friendly packaging has aesthetic value, safety, and environmental benefits tend to have a higher intention to purchase the product. Empirical studies have revealed that consumers with positive attitudes toward environmentally friendly packaging tend to be more interested in purchasing products packaged in this way [16]. This positive attitude arises because consumers feel that purchasing products with sustainable packaging is an action that reflects their values, such as social responsibility and sustainability.

This study focuses on female Generation Z, born between 1997-2012 [17], as the unit of analysis because this group has unique characteristics relevant to sustainability and cosmetic consumption [18]. Generation Z is known to have high environmental awareness and tends to be more open to products committed to sustainability, including environmentally friendly packaging [19], [20]. This group is the leading consumer in the cosmetic industry, so understanding their preferences regarding environmentally friendly packaging is essential for cosmetic brands that want to meet market expectations while supporting sustainable environmental goals.

Although much research has been conducted to understand the factors that influence consumers' purchase intention toward sustainable products, there is still a gap to be filled by this research. Previous research has focused on the direct and indirect relationships between environmental concern, perceived value, and attitude toward purchase intention. However, few have explored how these factors interact holistically in the context of cosmetic products. This study examines the factors influencing consumer purchase intention, especially the young female generation (Gen Z) 's preference for cosmetic products with environmentally friendly packaging. It also identifies the mediating effect of attitude on purchase intention.

This research benefits researchers and practitioners who are engaged in the field of sustainable packaging. By exploring consumer interest in environmentally friendly cosmetic packaging, this study provides insights that help align product development with sustainability goals. The results of this study can later provide input for companies and policymakers to prioritize critical factors that significantly impact purchasing intentions. Additionally, the findings may guide companies in identifying consumer preferences and promoting eco-friendly

packaging options more effectively. For policymakers, these insights support the development of policies that encourage sustainable packaging practices. Overall, this research contributes to creating a deeper understanding of how packaging innovations can drive positive environmental and consumer behavior changes.

2 Methodology

2.1 Sampling, Data Collection, and Measurement Instruments

This study surveyed female Generation Z, focusing on Generation Z who were college students in Bandung City, West Java. A questionnaire was developed to collect data to test the influence between variables. Female college students were targeted as respondents because cosmetics are usually attached to items used by females. The questionnaire was distributed using an online form where the first page contained a statement from the researcher to ensure the security of the respondents' data. The results were only used for research purposes. In addition, the first page also contained a statement of consent that needed to be filled in by respondents who were willing. The following section of the questionnaire contained 15 questions that needed to be answered by the respondents. The survey collected 194 respondents according to valid criteria to be continued to the next stage. Fig.1 shows the conceptual model of this research.

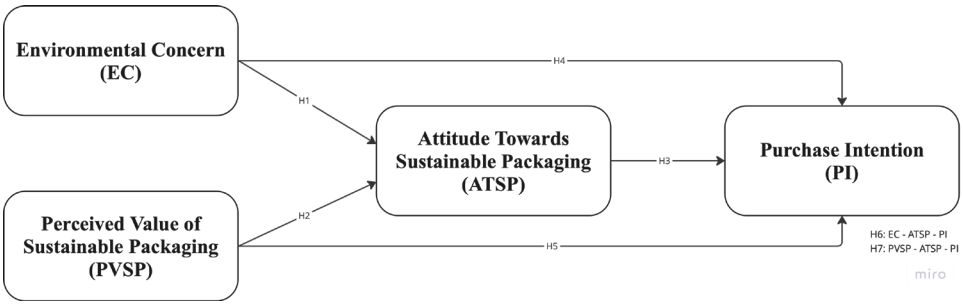

Fig. 1. Conceptual Model

Researchers used several questionnaire items in hypothesis testing, each containing complete indicators for the four variables. The Perceived value of sustainable packaging (PVSP) variable adopted Duarte's (2024) [21] measurement with five items asking about consumer preferences for products with environmentally friendly packaging based on expected performance, environmental function value, ecological benefits, environmental awareness, and sustainability of the product. Researchers measured environmental concern using four items adapted from Petkowicz's (2024) [22] that relate to a deep concern for the environment, willingness to reduce personal consumption, belief in the need for social change, and major policies to protect the environment. Furthermore, the attitude towards sustainable packaging (ATSP) used Petkowicz's (2024) [22] measurement with three items indicating consumers' positive beliefs that buying products with environmentally friendly packaging is a profitable choice, a good idea, and safe. The last is the purchase intention variable. It uses Duarte's (2024) [21] measurement with three items reflecting consumers' intentions to support sustainability by switching to brands that use environmentally friendly packaging, considering their positive environmental impact, and choosing products that pollute less.

2.2 Data Analysis Technique

The analysis in this study was carried out using the Structural Equation Modeling Partial Least Squares (SEM-PLS) approach. This method is suitable for testing complex hypotheses involving multiple variables and relationships [23]. The software SmartPLS was used to perform the analysis, a powerful tool that provides robust capabilities for evaluating structural models [24]. The dataset comprised 194 observations, ensuring a reliable sample size for statistical testing. SEM-PLS was employed to analyze the data by examining the variables' mean, variance, and covariance to uncover underlying relationships and test the research hypotheses.

Furthermore, the validity of the structural model parameters was rigorously evaluated to ensure the reliability of the findings [25]. This involved using divergent validity to verify that constructs are distinct from one another and convergent validity to confirm that indicators effectively represent their underlying constructs. These tests ensure that the measurements are accurate and meaningful, supporting the robustness of the model's results. Integrating these validation techniques enhances the study's credibility and contributes to a deeper understanding of the relationships between the examined variables.

3 Results

3.1 Descriptive Analysis

The descriptive analysis of the latent constructs, as detailed in Table 2, reveals the mean scores for variables Attitude Toward Sustainability Packaging (ATSP), Environmental Concern (EC), Perceived Value of Sustainable Packaging (PVSP), and Purchase Intention (PI), providing an overview of their central tendencies within the dataset. Additionally, these constructs' skewness and kurtosis values were well within acceptable thresholds, with skewness remaining ±3 and kurtosis ±10 [26]. These findings indicate that the data distribution for each construct adheres to the assumptions of normality, further supporting the suitability of the dataset for subsequent statistical analyses (Table 1).

Table 1. Descriptive Statistics and Correlation Analysis

	N	Mean	SD	Kurtosis	Skewness	1	2	3	4
ATSP	194	4.144	0.605	-0.232	-0.315	1			
EC	194	4.467	0.438	-1.043	-0.190	0.534	1		
PI	194	4.147	0.586	-0.535	-0.286	0.627	0.486	1	
PVSP	194	3.923	0.718	0.705	-0.813	0.781	0.395	0.519	1

3.2 Measurement Model

Based on the results shown in Table 2, the smallest value of factor loading is 0.752, and the highest is 0.957. These values are above the minimum limit value of 0.50, which means that this study has no problems with the reliability of each item. Furthermore, the composite reliability (CR) and Cronbach's alpha values are used to determine internal consistency reliability. It shows

strong internal consistency when Cronbach's alpha is more than 0.70. In this study, the Cronbach's alpha value is in the range of 0.821 - 0.907. Then, a higher CR value indicates better internal consistency. The results of this study show a CR value above 0.880. In addition, the AVE value is more than 0.50, and the study results showed that the smallest AVE value is 0.648, which means this study meets the convergent validity requirement.

Table 2. Construct Validity and Reliability

Item	Factor Loading	Alpha	CR	AVE
Attitude Towards Sustainable Packaging (ATSP)				
ATSP1	0.957	0.896	0.936	0.831
ATSP2	0.908			
ATSP3	0.935			
Environmental Concern (EC)				
EC1	0.854	0.821	0.880	0.648
EC2	0.854			
EC3	0.752			
EC4	0.752			
Purchase Intention (PI)				
PI1	0.758	0.837	0.903	0.758
PI2	0.908			
PI3	0.935			
Perceived Value of Sustainable Packaging (PVSP)				
PVSP1	0.871	0.907	0.931	0.729
PVSP2	0.810			
PVSP3	0.860			
PVSP4	0.840			
PVSP5	0.886			

Discriminant validity (DV) measures whether each construct in the research model measures a different concept and does not overlap with other constructs. This study's results show that the constructs have good discriminant validity (Table 3).

Table 3. Fornell-Larcker Criterion

	ATSP	EC	PI	PVSP
ATSP	0.911			
EC	0.534	0.805		
PI	0.627	0.486	0.870	
PVSP	0.781	0.395	0.519	0.854

Table 4 demonstrates the predictive relevance of the constructs, highlighting the capability of the predictors in our model to make accurate forecasts. The closer the R-square value is to 1, the better the regression model's ability to explain data variation. This means that the independent variables used in the model significantly contribute to predicting the value of the dependent variable. This study's results show that the ATSP variable's R-square value is 0.671, which means it is included in the strong category. Furthermore, the R-square value for the PI variable is 0.428, which means it is included in the moderate category.

Table 4. Predictive Relevance of the Model

R-square		Adjusted R-square
ATSP	0.671	0.667
PI	0.428	0.419

3.3 Structural Model

This section presents the structural or inner model. The inner model assesses the relationship between latent variables in the structural model and tests hypotheses by analyzing the t-statistic value or p-value of the path coefficient using the bootstrapping procedure.

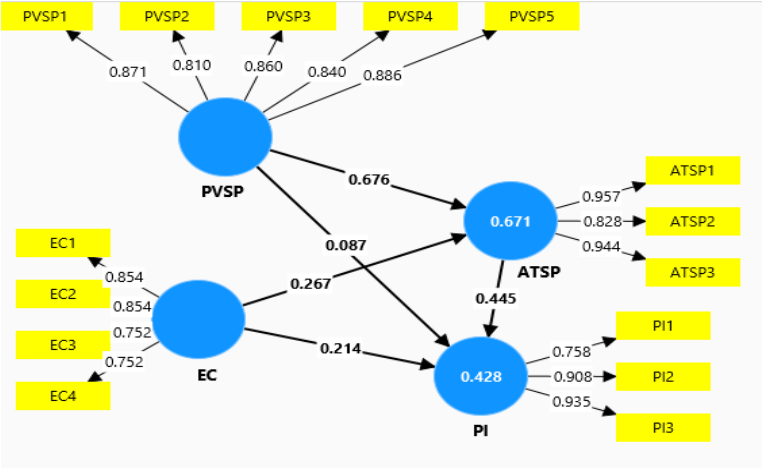

Fig 2. Structural Model

Fig 2 and Table 5 show the results of the hypothesis test. The results of direct testing are as follows:

a. Environmental Concern (EC) has a positive effect on Purchase Intention (PI) with a t-statistic of 2.568 and a p-value of 0.014.
b. Environmental Concern (EC) has a positive effect on Attitude Towards Sustainable Packaging (ATSP) with a t-statistic of 4.698 and a p-value of 0.000.
c. Attitude Towards sustainability has a positive effect on Purchase Intention (PI) with a t-statistic of 4.692 and a p-value of 0.000.
d. Perceived Value of Sustainable Packaging (PVSP) does not have a positive effect on Purchase Intention (PI) with a t-statistic of 1.377 and a p-value of 0.169.
e. Perceived Value of Sustainable Packaging (PVSP) has a positive effect on Attitude Towards Sustainable Packaging (ATSP) with a t-statistic of 0.000 13.417 and a p-value 0.000.

Here are the results of the mediating effect:

a. Environmental Concern (EC) through Attitude Towards Sustainable Packaging (ATSP) has a positive effect on Purchase Intention (PI) with t-statistic 3.879 and p-value 0.000.

b. Perceived Value of Sustainable Packaging (PVSP) through Attitude Towards Sustainable Packaging (ATSP) has a positive effect on Purchase Intention (PI) with t-statistic 4.13 and p-value 0.000.

Table 5. Results of hypothesis testing

Hypothesis	Structural Path	Coefficient	t-statistics	Remarks
Direct Effect				
H1	EC -> PI	0.214	2.468	Supported
H2	EC -> ATSP	0.267	4.698	Supported
H3	ATSP -> PI	0.445	4.692	Supported
H4	PVSP -> PI	0.087	1.377	Not Supported
H5	PVSP -> ATSP	0.676	13.417	Supported
Mediating Effect				
H6	EC -> ATSP -> PI	0.164	3.879	Supported
H7	PVSP -> ATSP -> PI	0.297	4.136	Supported

4 Discussion

This study examines the influence of environmental concern (EC) and perceived value of sustainable packaging (PVSP) on purchase intention (PI) of cosmetic products with environmentally friendly packaging. This study also examines the influence of mediation attitude towards sustainable packaging (ATSP). There are seven hypotheses (H1 – H7) in this study. H1 hypothesizes that EC significantly affects PI. The results validate the hypothesis that EC affects PI towards cosmetic products with environmentally friendly packaging. The results are in line with previous studies [12][8][13]. However, H4 shows different results from previous studies [13], where this study shows that PVSP does not affect PI. This study also shows H3, the influence of ATSP on PI. Furthermore, H2 and H5 hypothesize that there is a relationship between EC and PVSP to ATSP. The results of both hypotheses are valid, there is an influence on ATSP.

In addition to testing the direct effect, this study also tested the mediating effect. ATSP is mediator that tests the influence of EC and PVSP on PI. H6 and H7 hypothesize that there is an influence of EC and PVSP through ATSP. The results show that both hypotheses are acceptable. Several previous studies have shown an indirect effect, EC affects PI through ATSP [12], [27]. This indicates that individuals with high environmental awareness tend to develop positive attitudes towards environmentally friendly products. This positive attitude then drives the intention to buy the product. All findings offer valuable insights for policymakers in the cosmetics industry to design and implement regulations that promote environmental awareness and encourage more eco-friendly consumer purchasing intention.

5 Conclusions

This study aims to examine the factors that influence consumer purchasing intention, especially the young female generation (Gen Z), towards cosmetic products with

environmentally friendly packaging. SEM results show that environmental concern influences purchase intention, while the perceived value of sustainable packaging does not. The perceived value of sustainable packaging (PVSP) does not influence the purchase intention of female Generation Z because although they are aware of the value of desirability, their purchasing decisions are more influenced by other factors such as product quality, price, and brand relevance to their identity. Gen Z grew up in an era of increasing global concern about climate change and environmental degradation. Generation Z females tend to be more empathetic and concerned about the impact of their consumption on the planet. Therefore, products that align with their environmental concerns are more likely to attract their attention and influence their purchase intention. Attitude toward sustainable packaging (ATSP) bridges environmental concerns and the perceived value of sustainable packaging (PVSP) with purchase intention. Environmental concerns drive positive attitudes toward sustainable packaging (ATSP), while appreciation of the value of the packaging strengthens the belief in choosing environmentally friendly products. This attitude ultimately increases the purchase intention of female Gen Z towards products with sustainable packaging.

This study implies that cosmetic manufacturers need to focus on communicating the environmental benefits and positive impacts of the product as a whole because simply highlighting sustainable packaging is not enough to influence the purchase intention of female Gen Z, marketing campaigns should emphasize the importance of sustainability, and product strategies should integrate relevant sustainability aspects, not only in packaging but also in production practices and brand values. The limitations of this study include several important aspects. First, the number of samples used in this study is limited, so the results obtained may not fully represent the wider population. Second, the respondent area is focused on the city of Bandung, so the findings of this study are relevant mainly to that geographical context and may have limitations in generalization to other areas. Third, this study was conducted in a short period, which may limit the analysis of possible long-term dynamics or changes. These limitations are expected to be considered in interpreting the results of the study. Future research is suggested to involve larger and more diverse samples and cover a wider area to increase the generalizability of the results. It can also consider other factors to be tested.

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