



The Influence of Economic Value and Environmental Threat on Waste Management Behavior Among University Students

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ABSTRACT: This study investigates the role of economic value and environmental threats in influencing waste management behaviors among Generation Z online shoppers. The rapid increase in e-commerce activities has led to a significant rise in packaging waste, particularly plastic, posing severe environmental threats. This research aims to understand how perceptions of economic benefits and environmental threats drive waste management behaviors, with a focus on engagement levels as a mediating factor. The research employs a quantitative approach, using surveys distributed to Generation Z online shoppers in Java and Sumatera, Indonesia. The data reveals that both economic value and environmental threats significantly impact waste management behaviors. Specifically, economic incentives and financial rewards encourage better waste management practices, while heightened awareness of environmental threats drives individuals to adopt sustainable behaviors. The level of engagement plays a crucial mediating role, enhancing the effects of both economic value and environmental threats on waste management behaviors.

KEYWORDS: Economic Value, Environmental Threats, Level of Engagement, Online Shopping Behaviour, Waste Management.

INTRODUCTION

Indonesia's e-commerce landscape has undergone rapid transformation, marked by significant growth and evolving consumer behaviors driven by technological advancements and demographic shifts. According to a report by Google, Temasek, and Bain & Company, the Indonesian internet economy is projected to grow from \$40 billion in 2019 to \$130 billion by 2025, fueled by an internet penetration rate exceeding 64% of the population in 2019. This growth is supported by a young, tech-savvy demographic, with over 60% of the population under the age of 30, as noted by McKinsey. These young consumers are highly adaptable to new technologies, making them prolific users of online shopping platforms for a variety of products.

Generation Z stands out as a dominant demographic, profoundly shaping online shopping trends. This generation, born into a digital age, seamlessly integrates technology into their daily lives. Data indicates that 32% of Gen Z consumers shop online at least once a day, with platforms like TikTok and Instagram becoming their primary avenues for product searches and purchases. Gen Z's approach to shopping is deeply intertwined with their environmental values. A substantial 74% of Gen Z consumers consider the environmental values and beliefs of brands important in their purchasing decisions, with many willing to pay a premium for sustainable products.

The exponential growth of e-commerce in Indonesia has brought significant convenience and economic growth but has also led to increased packaging waste. According to the Journal of Environmental Management, the rise in e-commerce correlates with an uptick in packaging materials like cardboard and plastic, essential for shipping but often discarded after a single use. This increase is particularly evident in Indonesia, where every online purchase requires new packaging, multiplying the volume of waste.

Consumer behavior in Indonesia exacerbates this problem. The World Bank highlights a broad variance in recycling practices globally, with regions like Indonesia lacking robust recycling infrastructures. This gap leads to higher volumes of waste being sent to landfills, as many Indonesian consumers choose convenience over environmental responsibility. Urbanization trends further exacerbate the issue, increasing per capita waste generation. Current environmental policies in Indonesia are yet to catch up with the rapid expansion of e-commerce, creating a regulatory vacuum where sustainable practices are not sufficiently encouraged or mandated.

The COVID-19 pandemic has significantly altered global consumer behaviors, particularly in retail shopping. With restrictions such as physical distancing and lockdowns, traditional shopping at physical stores has markedly decreased. Consumers have pivoted towards online shopping, facilitated by the efficiency of e-commerce platforms. However, this convenience comes at



an environmental cost. Research by the Indonesian Institute of Sciences (LIPI) revealed that online shopping activities in the DKI Jakarta area increased by 62% during the pandemic, causing a 96% increase in plastic waste. Each package, typically wrapped in plastic packaging and bubble wrap, becomes a single-use waste item immediately after use. This study aims to explore how environmental threat perception, economic value, and the level of engagement in waste management influence behavior change among university students in Java, Indonesia. Preliminary findings highlight significant issues in waste management and emphasize the critical roles of economic and environmental values. Effective waste management is a pressing issue in Indonesia, especially with the increasing trend of online shopping among university students, generating substantial packaging waste.

Qualitative data from surveys, analyzed using NVivo, provide a comprehensive understanding of students' attitudes and behaviors toward waste management. Key findings from the study highlight significant engagement in waste management among university students, with 75% actively participating in managing packaging waste and 60% repurposing materials like cardboard and plastic bottles. Additionally, 80% of students expressed high concern about environmental issues, recognizing the impact of waste on health and the environment. Economic incentives also play a crucial role, as 70% of respondents noted that benefits such as cost savings and potential revenue from recycling motivate them to engage in waste management practices. These findings suggest that both environmental awareness and financial motivations significantly enhance engagement in sustainable behaviors among university students.

These insights highlight the importance of environmental and economic values in shaping waste management behaviors. The study concludes that a multi-faceted approach combining environmental awareness, economic incentives, and engagement activities is most effective in promoting sustainable waste management practices among university students in Java. Increased engagement in waste management behaviors enhances both economic value perception and environmental threat awareness, driving changes in waste management behavior. These findings provide valuable insights for stakeholders to develop strategies that enhance engagement, communicate economic benefits, and raise environmental awareness, ultimately fostering more sustainable waste management behaviors.

CONCEPTUAL FRAMEWORK

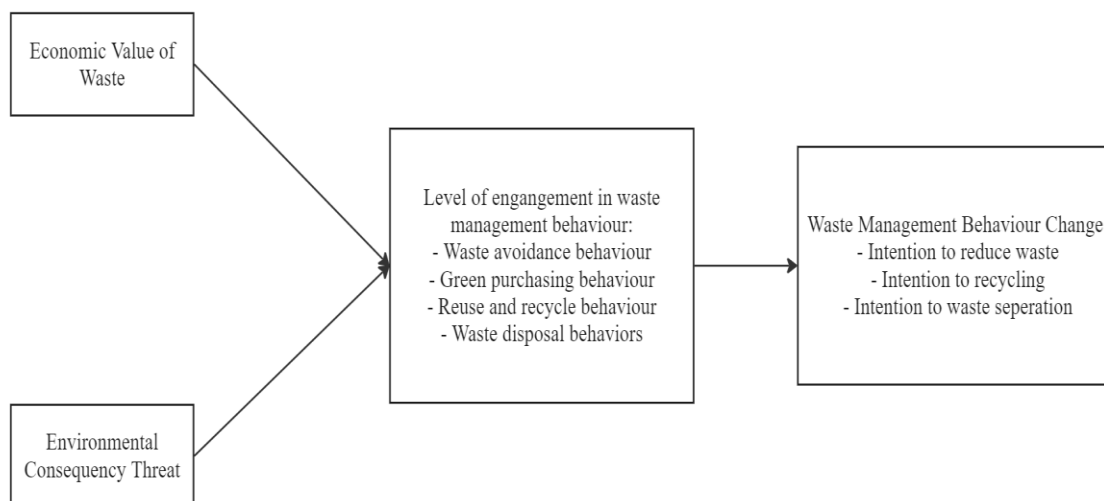


Figure 1. Conceptual Framework

The hypothesis proposed in this research is:

- H1:** The economic value of waste positively influences the level of engagement in waste management behaviors
- H2:** The environmental threat positively influences the level of engagement in waste management behaviors
- H3:** Higher levels of engagement in waste management behaviors lead to stronger intentions to change waste management behavior



METHODOLOGY

This study employs a qualitative research approach for exploratory investigation. A qualitative approach involves an open-ended and exploratory technique, utilizing small samples to provide a comprehensive understanding of the topic. This method is effective for generating novel research concepts and gaining in-depth comprehension of specific issues (Bhandari, 2020). The qualitative methodology aims to authenticate the problem, offering a detailed analysis and logical deductions to produce a substantiated argument (George, 2021). This approach is particularly valuable during the initial stages of the study to gather extensive data.

The main research in this study employs a quantitative research approach. Quantitative research provides precise numerical representations of the attitudes, trends, and beliefs of a specific group, emphasizing the objectivity of the collected data (Creswell, 2014). This approach relies on numerical data to make significant discoveries and gain a deeper understanding of ideas and concepts (Malhotra & Birks, 2005). The objective is to establish the correlation between independent and dependent variables, facilitating hypothesis testing and enhancing the generalizability of the findings (Bell et al., 2019).

Research Objects, Population, and Samples

This research focuses on evaluating waste management behaviors among university students in Java, Indonesia. The primary objective is to examine how environmental threat perception, economic value, and the level of engagement in waste management influence behavior change. The targeted population comprises Indonesian citizens aged 17 to 34 years, specifically focusing on Generation Z due to their significant role in household sustainability decisions and their proficiency with digital platforms. A sample size of 200 respondents has been selected to ensure statistical validity and reliability. To achieve this, a purposive sampling technique is employed, targeting individuals likely to provide rich insights into waste management behaviors.

Data Collection Technique

The data collection process for this research is divided into several stages to ensure a comprehensive understanding of the subject matter. Initially, preliminary research was conducted using observation to collect data in natural settings, which involved recording behaviors and interactions as they naturally unfold (Angrosino, 2007). This stage also included structured interviews with 15 to 30 students responsible for household waste management, providing qualitative insights into their practices and attitudes toward waste disposal. For the main research phase, surveys were distributed via Google Forms to collect quantitative data from respondents. The questionnaire was designed with 25 closed-ended questions, organized into sections covering demographic information, environmental threat perception, economic value, level of engagement in waste management, and waste management behaviors. These questions were adapted from previous studies to ensure their relevance and comprehensiveness, and a six-point Likert scale was used to capture respondents' stances, ranging from "strongly disagree" to "strongly agree."

Data Analysis Technique

The data analysis for this research involves several critical steps to ensure the validity and reliability of the collected data. Initially, descriptive statistics are used to summarize and interpret the data, providing a clear overview of its characteristics (Thompson, 2009). Visualization tools such as scatter plots help illustrate relationships between variables (Kaliyadan & Kulkarni, 2019), and measures of variability, including range, interquartile range, variance, standard deviation, coefficient of variation, mean, mode, median, skewness, and kurtosis, are assessed. To evaluate complex models focusing on prediction and theory development, Partial Least Square Structural Equation Modeling (PLS-SEM) is employed (Hair et al., 2010). This method is particularly effective for assessing intricate models with several components and mediating effects, maximizing the variance explained by dependent constructs (Ringle et al., 2012).

Reliability and validity analyses are conducted to ensure the accuracy of measures, with reliability assessed using composite reliability (CR), where a score of 0.7 or higher indicates acceptable reliability (Kwong, 2013). Validity ensures the accuracy of measures through content validity, construct validity (convergent and discriminant validity), and Average Variance Extracted (AVE), which should be 0.5 or greater (Malhotra et al., 2016). The Coefficient of Determination (R^2) is used to indicate the proportion of variance in the dependent variable that is predictable from the independent variables, with higher R^2 values indicating a better fit, using thresholds like 0.25, 0.5, and 0.7 to represent weak, moderate, and strong coefficients of determination, respectively (Hair et al., 2010). The F-Square Effect Size measures the influence of independent variables on a model, capturing the change in explanatory power (R-square) when a specific variable is excluded, with effect size benchmarks suggesting values less



than 0.02 as small, 0.15-0.35 as medium, and above 0.35 as large (Cohen, 1988). Mediation analysis examines whether a third variable mediates the relationship between an independent and dependent variable (Baron & Kenny, 1986), identifying types of mediation (full, partial, or no mediation) and detecting suppression or irregular mediation effects (Sidhu et al., 2021).

RESULT

Internal Consistency Reliability

To further establish the reliability of the measurement instrument, researchers employed an internal consistency reliability test focused explicitly on latent variables. Wong (2013) states that a composite reliability score exceeding 0.7 indicates acceptable internal consistency. In this study, all latent variables surpassed the minimum threshold, demonstrating strong internal consistency and confirming that the items reliably measure their respective constructs.

Table 1. Internal Consistency Reliability

Variables	Composite reliability	Reliability
Level of Engagement is Waste Management Behaviour	0.717	Reliable
Economic Value	0.854	Reliable
Environmental Threat	0.846	Reliable
Waste Management Behaviour Change	0.942	Reliable

Construct Validity Test

Malhotra et al. (2016) state that the AVE (average variance extracted) must be 0.5 or greater for the validity test, which is used to determine how transparent and true the responses from the respondents are. As a result, all variables are considered valid because they meet the required minimum score.

Table 2. Convergent Validity

Variables	Average variance extracted (AVE)	Validity
Level of Engagement is Waste Management Behaviour	0.510	Valid
Economic Value	0.579	Valid
Environmental Threat	0.606	Valid
Waste Management Behaviour Change	0.619	Valid

Discriminant Validity

Discriminant validity examines whether the constructs in a study are distinct. This research employed the Fornell-Larcker criterion within SmartPLS to assess discriminant validity. This approach compares the square root of the Average Variance Extracted (AVE) for each variable with its correlations to other variables. According to Wong (2013), for acceptable results, the square root of the AVE for a variable should be greater than its correlation with any other variable in the model. In Table, the bold numbers on the diagonal represent each variable's square root of the AVE. These diagonal values should be larger than those in their rows and columns (correlations with other variables).



Table 3. Discriminant Validity

	Environmental Threat	Economic Value	Level of Engagement is Waste Management Behaviour	Waste Management Behaviour Change
Environmental Threat	0.778			
Economic Value	0.532	0.761		
Level of Engagement is Waste Management Behaviour	0.653	0.505	0.788	
Waste Management Behaviour Change	0.322	0.301	0.437	0.715

Structural Path Significance

According to Wong (2013), bootstrapping offers a reliable way to test the significance of these relationships in PLS-SEM. It essentially acts as a statistical test for both the inner and outer models. Bootstrapping allows calculation of t-values for each path in the model. These t-values determine whether the hypothesized relationships between the variables are statistically significant. A two-tailed t-test served as the statistical foundation for this research. Considering a 5% significance level, any t-value exceeding 1.96 would be considered statistically significant.

Table 4. Structural Path Significance

Path	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T statistics
Environment Threat → Level of Engagement Waste Management	0.226	0.230	0.070	3.242
Economic Value → Level of Engagement Waste Management	0.181	0.193	0.071	2.562
Level of Engagement Waste Management → Waste Management Behaviour Change	0.437	0.447	0.061	7.193

Coefficient of Determination (R²) and Stone-Geisser (Q²) Test

This study employed two key metrics: the average coefficient of determination (R²) and the cross-validated redundancy (Q²). These values essentially indicate the proportion of variance in the dependent variables that the independent variables in the model can explain. A Goodness-of-Fit (GoF) index was then calculated, following the approach suggested by Wong (2013), to provide a combined measure of model fit..

Table 5. Goodness of Fit

Variables	R ²	Q ²
Waste Management Behaviour Change	0.191	0.176
Level of Engagement inWaste Management	0.127	0.100
Average	0.159	0.138
GoF	0.148	



Hypothesis Testing

This research examined both the inner and outer models to assess the proposed hypotheses' validity. This evaluation involved analyzing the t-statistics and p-values generated by SmartPLS for each path in the model. A p-value less than 0.05 and T statistics greater than 1.96 are considered statistically significant.

Table 6. Hypothesis Testing

Hypothesis	Path	T statistics	P values	Result
H1	Environment Threat → Level of Engagement Waste Management	3.242	0.001	Accepted
H2	Economic Value → Level of Engagement Waste Management	2.562	0.010	Accepted
H3	Level of Engagement Waste Management → Waste Management Behaviour Change	7.193	0.000	Accepted

Mediating Analysis

Table 7. Total Effects Result

Structural Path	T-Statistic	P-Values
Environmental Threat → Level of Engagement Waste Management	3.242	0.001
Economic Value → Level of Engagement Waste Management	2.562	0.010
Level of Engagement Waste Management → Waste Management Behaviour Change	7.193	0.000
Environmental Threat → Waste Management Behaviour Change	2.487	0.013
Economic Value → Waste Management Behaviour Change	2.233	0.026

The direct effects of Environmental Threat, Economic Value, and Level of Engagement on Waste Management Behavior Change are significant, with T-statistics exceeding 1.96 and P-values below 0.05. Table 7 shows significant indirect effects of Environmental Threat and Economic Value on Waste Management Behavior Change through the Level of Engagement, indicating the mediating role of engagement. Increased awareness of environmental threats and perceived economic benefits significantly enhance engagement in waste management, which in turn drives significant changes in waste management behaviors. These findings underscore the importance of environmental and economic factors in promoting sustainable waste management practices and highlight the crucial role of engagement in amplifying their impact.

DISCUSSION

H1: *The economic value of waste positively influences the level of engagement in waste management behaviors*

Environmental Threat (ET) positively impacts the Level of Engagement in Waste Management (LE), is substantiated by a significant T-statistic of 3.242 and a P-value of 0.001. This indicates that individuals who perceive higher environmental threats are more likely to engage in waste management behaviors. The effect size ($F^2 = 0.042$) underscores the role of environmental awareness in encouraging sustainable practices.

H2: *The environmental threat positively influences the level of engagement in waste management behaviors*

Economic Value (EV) has a positive impact on the Level of Engagement in Waste Management (LE), is validated with a T-statistic of 2.562 and a P-value of 0.010. Although the effect size ($F^2 = 0.027$) is smaller, it signifies that economic incentives, such as financial rewards or cost savings, play a meaningful role in motivating individuals to participate in waste management activities. This aligns with prior research emphasizing the efficacy of financial incentives in promoting environmental behaviors.



H3: *Higher levels of engagement in waste management behaviors lead to stronger intentions to change waste management behavior*

Level of Engagement in Waste Management (LE) positively impacts Waste Management Behaviour Change (WMBC), is confirmed. The T-statistic of 7.193 and P-value of 0.000, along with an F² value of 0.236, indicate a strong and significant effect. This demonstrates that higher engagement levels directly lead to significant changes in waste management behaviors, highlighting the critical role of active participation in driving behavior change.

CONCLUSION

The purpose of this study is to determine how the level of engagement in waste management behaviors, perceived economic value, and environmental consequences affect the intention to change waste management behaviors among university students in Java, Indonesia. Using quantitative methods, data were obtained from surveys and analyzed using descriptive statistics and PLS-SEM.

RQ1: *What is the influence of Environmental Threat and Economic Value on the Level of Engagement in Waste Management Behaviour?*

The analysis shows a significant positive relationship between the level of engagement in waste management behaviors and both the perceived economic value of waste and the perception of environmental consequences. The T-statistic scores of 4.509 for economic value and 3.242 for environmental threat indicate that higher engagement levels correlate with a greater recognition of the economic benefits of waste management and increased awareness of environmental impacts. Respondents who actively participate in waste management practices tend to appreciate the financial advantages, such as cost savings and potential revenue from recycling initiatives, and are more aware of the environmental impacts of improper waste disposal.

RQ2: *What is the influence of the Level of Engagement in Waste Management Behaviour on Waste Management Behavior Change?*

The findings show that the level of engagement in waste management behavior positively impacts waste management behavior change. The T-statistic of 7.193 suggests that students who are more engaged in waste management activities are more likely to change their waste management behaviors. This highlights the importance of engagement activities in promoting sustainable waste management practices.

RECOMMENDATION

To address the issues identified in the study, several recommendations can be made to enhance waste management practices among Gen Z online shoppers. These recommendations focus on increasing environmental awareness, providing economic incentives, fostering engagement in sustainable behaviors, and implementing policy and infrastructure improvements. The findings indicate that many Gen Z consumers lack awareness about the environmental impacts of waste. Stakeholders should develop targeted educational campaigns using social media and influencers popular among Gen Z to highlight the environmental consequences of improper waste disposal and the benefits of sustainable practices. Promoting practical tips and success stories on reducing waste, recycling, and reusing materials can make the information relatable and actionable, thereby increasing environmental awareness and encouraging sustainable behaviors.

Economic incentives can significantly motivate Gen Z to adopt better waste management practices. Policymakers and e-commerce platforms should introduce financial rewards, such as discounts, loyalty points, or cashback, for participating in recycling programs or purchasing products with sustainable packaging. Integrating these incentives directly into e-commerce platforms can make sustainable choices more appealing and financially rewarding. Highlighting cost savings through promotional materials can further emphasize the financial benefits of proper waste management.

Increasing engagement in waste management activities is crucial. Waste management organizations and community leaders should organize community-based programs, such as launching online challenges like a "Zero Waste Challenge," encouraging participants to share their progress on social media. Creating online forums where Gen Z can share their waste management experiences, tips, and ideas promotes peer-to-peer learning and support, fostering a strong community focused on sustainability. Supportive policies and infrastructure are essential for sustainable waste management. Policymakers should develop and advocate for regulations that promote sustainable practices, such as mandates for eco-friendly packaging and incentives for businesses



adopting sustainable practices. Investing in innovative waste management solutions, like smart recycling bins and apps, ensures they are accessible and user-friendly, creating a conducive environment for sustainable waste management practices.

The findings of this study have significant practical implications for marketers, policymakers, waste management organizations, and e-commerce platforms. Marketers can design campaigns that emphasize environmental awareness and economic incentives, making sustainable practices more appealing to Gen Z. Policymakers can use these insights to create policies that support sustainable practices through financial incentives and infrastructure development. Waste management organizations can develop programs that engage Gen Z in sustainable practices, leveraging their digital savviness and social media engagement. The study contributes to the theoretical understanding of waste management behavior by integrating theories of environmental awareness, economic incentives, and engagement, providing a comprehensive framework for understanding waste management behaviors. It highlights the significant mediating role of engagement activities in enhancing the effects of environmental threats and economic incentives on waste management behaviors, offering new insights into behavior change mechanisms.

Future research should explore additional factors influencing waste management behavior among Gen Z online shoppers. Investigating how cultural norms and social influences shape waste management behaviors in different regions and communities can provide valuable insights. Studying the long-term effects of educational campaigns and economic incentives on behavior change will help determine their sustainability and effectiveness over time. Examining the role of emerging technologies, such as AI and blockchain, in enhancing waste management practices and consumer engagement can reveal innovative solutions. Expanding research to include different demographic groups within Gen Z, such as varying age ranges, urban versus rural populations, and different socioeconomic backgrounds, will help develop more targeted and effective strategies.

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