

Rethinking sustainability.

When social conformity and identity transform students' consumption

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Keywords: sustainable consumption behaviour; environmental education; conformity; social environment; self-concept



Abstract. *In the face of intensifying environmental degradation and unsustainable consumption trends, fostering sustainable consumption behaviour among university students has become a strategic imperative for global sustainability agendas. Although environmental education is widely endorsed as a key driver of pro-environmental behaviour, its real-world impact often remains limited when psychosocial dynamics are overlooked. This study investigates how conformity, social environment, and self-concept function as moderating factors that enhance the impacts of environmental education on sustainable consumption behaviour. Employing a large-scale quantitative design, data were collected from students across 122 public universities in Indonesia using structured questionnaires. The model was tested using Structural Equation Modelling with Partial Least Squares (SEM-PLS) through WarpPLS. The findings reveal that these psychosocial factors significantly strengthen the link between environmental education and sustainable consumption, suggesting that social identity and peer context are critical enablers of behavioural change. The study offers a novel contribution to the sustainable consumption literature by integrating educational, social, and psychological constructs within a cohesive theoretical framework. It also provides actionable insights for higher education institutions and policymakers to design transformative educational interventions that cultivate social influence, internalized norms, and environmentally responsible identities among students.*

1. Introduction

The intensifying global ecological crisis, driven by unsustainable consumption patterns and systematic environmental degradation, underscores the urgency of promoting sustainable behaviours more comprehensively across all sectors of society (Liu, 2023). University students, as future leaders and agents of change in reshaping consumption norms within peer environments, represent a strategically significant demographic in the pursuit of social transformation toward sustainability (Lee et al., 2023). Despite the longstanding recognition of

environmental education as a crucial vehicle for cultivating ecological awareness and knowledge, its capacity to engender consistent behavioural transformation remains inconclusive (Li et al., 2024; Rahmania, 2024). Emerging evidence demonstrates that knowledge acquisition alone rarely suffices to close the gap between awareness and sustained behavioural engagement (Zhang & Cao, 2025). This persistent conceptual gap has consequently sparked renewed theoretical discourse on the necessity for multidimensional frameworks that systematically integrate cognitive, social, and psychological determinants of sustainable consumption (Whitmarsh et al., 2021; Hasan & Ghosh, 2024).

In this context, several psychosocial variables - including conformity, peer group norms, and self-concept - have been shown to play a significant role in shaping pro-environmental intentions and behaviours (González, 2024; Polisetty et al., 2024; Romano et al., 2024; Abbas et al., 2025; Capasso et al., 2025). The Social Norms Approach (Cialdini et al., 1991; Capasso et al., 2025) underscores that injunctive and descriptive norms within peer groups can influence consumption practices through processes of value internalization. Furthermore, Self-Identity Theory (Horowitz, 2012) posits that individuals' self-perceptions are strongly associated with the consistency of their pro-environmental behaviours. Nevertheless, most prior studies have examined these psychosocial constructs in isolation and through linear models, leaving their contributions to a more integrative theoretical framework insufficiently articulated, particularly within higher education contexts (Milfont & Markowitz, 2016; Van de Wetering et al., 2022). Additionally, there remains a notable geographic bias in the empirical evidence, as most studies have been conducted in Western or high-income countries. This gap raises critical questions regarding how psychosocial and cognitive dynamics manifest in Global South contexts such as Indonesia, which is characterized by a collectivist cultural orientation, tightly interwoven social norms, and structurally distinct educational infrastructures (Wieckardt et al., 2020; Acosta Castellanos et al., 2021).

This study directly addresses this research gap by offering an integrative perspective that synthesizes three key dimensions of sustainable consumption behaviour: the cognitive dimension (knowledge acquired through environmental education), the social dimension (peer group influence and social norms), and the psychological dimension (pro-environmental self-concept). In contrast to the predominantly linear models prevalent in prior literature, this study adopts a multidimensional conceptual lens that conceptualizes sustainable behaviour as the outcome of dynamic interactions among internalized identity, normative pressure, and the rationalization of knowledge (Yang et al., 2022; He & Li, 2025).

This approach is consistent with the theoretical underpinnings of the Norm Activation Model (Schwarz, 2020), which emphasizes the interplay between consequence awareness, responsibility attribution, and personal norms, as well as the Theory of Planned Behaviour (Ajzen, 1991), a framework widely utilized to predict consumer behaviour but seldom adapted in a contextualized manner within developing countries (Pu et al., 2022; Van de Wetering et al., 2022). By integrating these frameworks, this study advances a more holistic and socio-culturally sensitive conceptual model specifically tailored to the Indonesian context.

Indonesia, characterized by its demographic dividend arising from a predominantly young population, rich socio-cultural heterogeneity, and mounting ecological pressures, constitutes a highly pertinent empirical context for investigating the interplay among social conformity, environmental norms, and self-perception in the processes of sustainability education (Purnama et al., 2024). Despite the implementation of various national policies aimed at mainstreaming sustainability issues within higher education curricula, the extent to which these initiatives are internalized within students' psychosocial frameworks remains insufficiently understood (Novawan & Aisyiyah, 2020; Parmawati et al., 2023; Gunawan et al., 2025).

The originality of this study lies in its theoretical innovation and contextual relevance. Specifically, it aims to examine how conformity, the social environment, and self-concept function as moderating factors that amplify the influence of environmental education on sustainable consumption behaviour among Indonesian university students. By explicitly integrating the frameworks of Social Norms Theory, Self-Identity Theory, and the Norm Activation Model into a unified conceptual model tested in a relatively understudied context, this research seeks to bridge conceptual fragmentation and extend the empirical landscape of sustainable consumption behaviour. The contribution of this study extends beyond the domain of sustainability science. It also advances scholarly understanding in educational psychology and consumer behaviour by offering a more comprehensive account of the determinants of pro-environmental actions in the Global South. Furthermore, the research aligns with recent calls to reorient sustainability education interventions beyond information-based cognitive processing models (Schwarz et al., 2020; Sampson et al., 2023), toward transformative conceptual frameworks that incorporate identity, social affiliation, and cultural norms as critical levers for behavioural change. Thus, this study provides timely empirical evidence and a robust theoretical foundation relevant for designing 21st-century sustainability learning strategies.

2. Literature review and hypotheses development

2.1 *Environmental education and sustainable consumption behaviour*

Environmental education is conceptualized as a strategic intervention that facilitates the internalization of ecological values, enhances environmental awareness, and cultivates pro-environmental identities underpinning sustainable consumption behaviour (Bennetta & Oeppen Hill, 2022). Grounded in the Norm Activation Model (NAM) (Schwarz, 2020), such behaviour arises when personal norms are triggered through ecological consequence awareness and individual responsibility ascription (Li & Fang, 2022). Yet, NAM alone may overlook socio-cultural dynamics such as perceived social norms and ecological self-identity. To address this, the current framework incorporates Social Norms Theory (Cialdini et al., 1991; Capasso et al., 2025), which highlights injunctive norms - perceptions of socially approved behaviours - as both direct antecedents and reinforcers of personal norms (Yip & Schweitzer, 2022). Furthermore, Self-Identity Theory (Horowitz, 2012) posits that ecological identity forms through value internalization and habitual engagement in pro-environmental actions, mediating the link between norms and behavioural commitment (Lavuri et al., 2023). Accordingly, environmental education fosters cognitive awareness, norm activation, ecological identity, and socially reinforced practices (Van de Wetering et al., 2022). This integrative model advances psychosocial understandings of sustainable consumption, especially in the Global South, where environmental challenges intersect with cultural and structural complexities. Based on this framework, the hypothesis is proposed:

H1: Environmental education positively affects sustainable consumption behaviour.

2.2 *Environmental education, conformity, and sustainable consumption behaviour*

Grounded in the Norm Activation Model (NAM) (Schwarz, 2020), environmental education activates personal norms by increasing individuals' awareness of ecological consequences and ascription of responsibility. This activation has been empirically linked to stronger intentions toward sustainable behaviour (Zhang et al., 2024). However, NAM is limited in explaining the well-documented intention-behaviour gap, a concern increasingly addressed in recent literature on sustainable behaviour (Savari et al., 2023). To bridge this gap, scholars have advocated for integrating social and affective dimensions. According to Self-Identity Theory, internalizing an ecological identity fosters

consistency between behaviour and sustainability values, reinforcing normative commitment through affective alignment (Horowitz, 2012). Complementing this, Social Norms Theory highlights the role of collective conformity, especially through descriptive and injunctive norms, in shaping individual consumption patterns (Cialdini et al., 1991; Melnyk et al., 2021; Capasso et al., 2025). Recent findings suggest that conformity significantly mediates the relationship between behavioural intention and actual behaviour through internalized collective pressures (Nascimento & Loureiro, 2024). Elevated conformity strengthens the adoption of pro-environmental norms, amplifying the effectiveness of environmental education in fostering sustainable consumption (Lissillour et al., 2025). These insights emphasize the need for multifaceted interventions that integrate cognitive, affective, and normative domains - especially within collectivist cultural contexts of developing countries (Vighnesh et al., 2022; Yang et al., 2024). Based on the theoretical framework above, the following hypotheses are proposed:

H2a: Conformity positively affects sustainable consumption behaviour.

H2b: Conformity moderates the effect of environmental education on sustainable consumption behaviour.

2.3 Environmental education, social environment, and sustainable consumption behaviour

The effectiveness of environmental education in promoting sustainable consumption behaviour is not universal; rather, it is contingent upon complex social environmental characteristics (Al-Nuaimi & Al-Ghamdi, 2022). Drawing on Social Norms Theory, descriptive norms - i.e., individuals' perceptions of what most others do - and injunctive norms - i.e., perceptions of what others approve or disapprove - form a cognitive schema that significantly influences beliefs and commitments toward sustainable practices (Cialdini et al., 1991; Rimal & Yilma, 2021; He & Qian, 2023). A supportive social environment reinforces the perceived legitimacy of pro-environmental actions and enhances collective efficacy, thereby facilitating the internalization of sustainability norms (Nivedhitha et al., 2024; Zhang & Cao, 2025). Complementarily, Self-Identity Theory posits that ecological identity emerges from the alignment between self-perception and perceived social expectations, encouraging individuals to engage in and sustain environmentally responsible behaviours as expressions of their self-concept (Chen & Hsieh, 2023; Cao et al., 2023). Empirical findings further suggest that educational interventions are more impactful when delivered within social contexts that actively endorse and model sustainability norms (Linder et

al., 2021; Sharma, 2022; Kherazi et al., 2024). Thus, integrating the social dimension into the conceptual framework is critical to explaining contextual variations in sustainable consumption behaviour. Based on the foregoing theoretical framework, the research hypotheses are formulated as follows:

H3a: The social environment has a positive effect on sustainable consumption behaviour.

H3b: The social environment moderates the relationship between environmental education and sustainable consumption behaviour.

2.4 Environmental education, self-concept, and sustainable consumption behaviour

Contemporary studies increasingly affirm that ecological self-concept is a multidimensional psychological construct encompassing pro-environmental values, beliefs, and identity, which significantly shapes individuals' sustainable consumption behaviour (Haratbar et al., 2025; Yeo & Hwang, 2025). Within the Self-Identity Theory framework, individuals with a strong ecological self-concept are intrinsically motivated to maintain identity coherence, thereby expressing environmentally responsible behaviours as a form of self-actualization (Cao et al., 2023). Despite its growing theoretical relevance, recent literature identifies a limited exploration of ecological self-concept as a moderating mechanism in the domain of environmental education (Wang et al., 2022; Zhang et al., 2022). Drawing on the Norm Activation Model (NAM), environmental education facilitates awareness of environmental consequences and the ascription of moral responsibility. However, the strength of personal norm activation is contingent upon the degree of ecological identity internalization (Schwarz, 2020; Savari et al., 2023; Sajjad et al., 2024). Individuals with a highly developed ecological self-concept tend to exhibit heightened sensitivity to educational content, perceive stronger material relevance, and demonstrate deeper integration of sustainability values into their self-schema (Abutaleb et al., 2022; He & Sui, 2024).

Furthermore, according to Social Norms Theory, the influence of descriptive and injunctive norms - communicated through collective socialization - relies heavily on congruence with the individual's ecological identity (Cialdini et al., 1990; Slocum et al., 2021; Ali et al., 2022). Hence, strengthening ecological self-concept not only serves as a direct antecedent of sustainable behavioural intention but also enhances the effectiveness of environmental education by reinforcing the activation of personal norms. Based on the above theoretical framework, the following hypotheses are proposed:

H4a: Ecological self-concept has a positive and significant effect on sustainable consumption behaviour.

H4b: Ecological self-concept moderates the effect of environmental education on sustainable consumption behaviour.

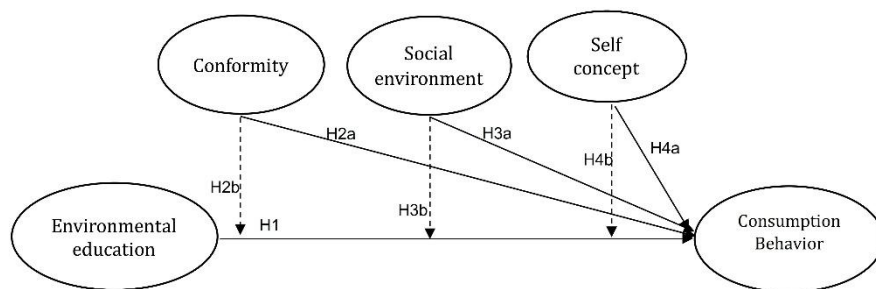


Figure 1. Conceptual model

3. Methods

3.1. Research design

This study adopts a quantitative approach with an associative explanatory design grounded in the positivist paradigm to examine the causal relationships between the exogenous variable - environmental education (EE) - and the endogenous variable - students' sustainable consumption behaviour (SCB). Additionally, the moderating roles of Conformity (CON), social environment (SE), and self-concept (SCT) are analysed as in the figure 1. A cross-sectional survey design was employed to capture a temporal snapshot of the socio-psychological constructs under investigation, allowing for objective measurement and hypothesis testing. This methodological approach is appropriate for examining the interactions among latent variables within a theory-driven structural equation model, particularly using PLS-SEM.

3.2. Sampling

Purposive sampling was employed based on theoretical considerations, recognizing that students constitute a transitional age group actively shaping

personal values, social identities, and receptiveness to institutional norms related to sustainability. The inclusion criteria required participants to be in at least their second semester, to have completed at least one course incorporating environmental education content, and to be currently enrolled in public or private universities across Indonesia's western, central, and eastern regions. This sampling strategy adheres to the principle of theoretical congruence by aligning participant characteristics with the socio-psychological constructs under investigation (Eklund & Helmeffalk, 2022), while simultaneously ensuring sample heterogeneity through institutional diversity. The sample size was determined using three methodological standards appropriate for partial least squares structural equation modelling (PLS-SEM). First, a power analysis using G*Power indicated a minimum sample size of 103 respondents, assuming a medium effect size ($f^2 = 0.15$), a significance level of 0.05, and statistical power of 0.80 (Faul et al., 2009; Hahs-Vaughn, 2024). Second, the inverse square root method (ISRM) estimated a requirement of 179 respondents (Kock & Hadaya, 2018). Third, the 10-times rule recommended a minimum of 300 respondents based on the maximum number of structural paths directed at a latent construct (Hair et al., 2021). In total, data from 315 respondents who met the inclusion criteria were collected to ensure the stability and reliability of the two-stage reflective moderation model.

3.3. Indicators and measurement

All constructs in this study are conceptualized as reflective and measured using instruments validated in prior international research. These instruments were subsequently adapted both semantically and contextually through a rigorous cross-cultural adaptation process, which involved back-translation and expert panel review to ensure content validity within the Indonesian sociocultural context. The dependent variable, sustainable consumption behaviour (SCB), was adapted from Hamza et al. (2023) and Kara and Min (2023). It comprises 12 items capturing three dimensions: resource efficiency (e.g., "I try to conserve energy and water in my daily life"), environmental preservation (e.g., "I purchase products labelled as environmentally friendly"), and ethical values (e.g., "I consider social justice aspects in my consumption decisions"). The construct exhibited excellent internal consistency, with a Cronbach's alpha of 0.882.

The exogenous variable, environmental education (EE), was adopted from Van de Wetering et al. (2022) and Prieto-Sandoval et al. (2022), reflecting both formal and informal learning experiences related to environmental issues. This construct is measured through six items (e.g., "I gain environmental knowledge through

curricular and extracurricular activities”) and demonstrated a high reliability coefficient ($\alpha = 0.864$). The three moderating variables represent theoretically grounded and empirically tested psychosocial factors. Conformity (CON), adapted from Martinelli and De Canio (2022) and Ou et al. (2022), consists of six items (e.g., “I tend to follow the consumption lifestyle of people around me”), with a Cronbach’s alpha of 0.801.

Social environment (SE) refers to perceived social support for sustainable consumption practices and was adapted from Winston (2021) and Phan-Le et al. (2024). It is measured through five items (e.g., “People close to me support pro-environmental consumption decisions”), yielding a reliability coefficient of $\alpha = 0.845$. Lastly, self-concept (SCT) reflects the internalization of sustainability values into one’s self-identity. This construct was adapted from van der Lavuri et al. (2023) and Zhao et al. (2024), comprising five items (e.g., “Caring about the environment is part of who I am”) and showing solid internal reliability ($\alpha = 0.832$). All constructs were subjected to both theoretical and empirical validation through a pilot study, which included exploratory factor analysis (EFA) and preliminary reliability assessments.

3.4. Data collection technique

Data collection was carried out using an online self-administered questionnaire distributed via Google Forms, utilizing a five-point Likert scale for all items. The instrument underwent a rigorous cross-cultural adaptation process, including back-translation and expert content validation by three specialists in environmental education and consumer psychology. A pilot study was conducted involving 30 students with comparable demographic and academic profiles, confirming the internal consistency of all constructs with Cronbach’s alpha values exceeding the threshold of 0.70. Insights from this pilot study were employed to refine item wording and ensure both semantic clarity and cultural sensitivity, thereby enhancing the instrument’s content validity and contextual fit within the Indonesian educational context. Ethical clearance was granted by the Social and Humanities Research Ethics Committee at Universitas Negeri Semarang (Protocol No. 148/KEPK-UNNES/VI/2025). The questionnaire was disseminated through multiple channels, including academic networks, WhatsApp class groups, student forums, and official institutional platforms. Participation was strictly voluntary, and respondent authenticity was ensured through verification via institutional email credentials.

To address the risk of common method bias (CMB), both procedural and statistical remedies were implemented. Procedural techniques included limiting

submissions to one per account, enforcing a minimum response time of 10 minutes, and embedding two covert attention-check items. Responses that failed these internal validation checks were excluded from the final analysis. Statistically, Harman's single-factor test and the marker variable technique were utilized following established guidelines by Podsakoff et al. (2012) and Legate et al. (2023), confirming that common method variance did not substantially distort the interrelationships among constructs. Despite the comprehensive procedural and statistical remedies employed - such as restricting responses to single accounts, imposing minimum completion times, embedding attention-check items, and applying Harman's single-factor and marker-variable tests - it remains prudent to recognize that self-reported measures are inherently susceptible to social desirability bias. Such bias may artificially inflate associations between perceptual constructs (e.g., perceived social norms) and behavioural outcomes (e.g., sustainable consumption behaviour). Contemporary research underscores that this form of bias cannot be entirely eradicated and often requires methodological triangulation for validation (Fisher & Katz, 2000; Paulhus, 2002). Accordingly, future investigations should integrate indirect elicitation techniques (e.g., crosswise models), ecological momentary assessments (EMA), or passive behavioural indicators (e.g., transaction logs, digital footprints, or energy-use records) to enhance measurement validity and mitigate potential distortions associated with self-report methodologies (Podsakoff et al., 2012; Krumpal & Voss, 2020).

3.5. Data analysis technique

Data analysis was performed using Partial Least Squares Structural Equation Modeling (PLS-SEM) through the WarpPLS 8.0 software. This analytical approach was selected due to its robustness in handling non-normal data distributions, nonlinear associations, and complex models that include reflective-moderation interactions, as supported by prior methodological literature (Usaki & Rasoolimanesh, 2023; Henseler & Schubert, 2025). The evaluation of the measurement model involved assessing indicator reliability (loadings > 0.70), internal consistency (using Cronbach's alpha and composite reliability), convergent validity (via Average Variance Extracted or AVE), and discriminant validity (through cross-loadings and the Heterotrait-Monotrait ratio or HTMT). For the structural model, the analysis included the estimation of path coefficients, coefficients of determination (R^2), predictive relevance (Q^2), effect sizes (f^2), and significance testing via bootstrapping with 5,000 subsamples.

Additionally, the overall model fit was assessed using multiple global model fit indices, including Average Path Coefficient (APC), Average R-squared (ARS), Average Adjusted R-squared (AARS), Average block Variance Inflation Factor (AVIF), Average Full Collinearity Variance Inflation Factor (AFVIF), Goodness-of-Fit (GoF), Simpson's Paradox Ratio (SPR), R-squared Contribution Ratio (RSCR), Statistical Suppression Ratio (SSR), Nonlinear Bivariate Causality Direction Ratio (NLBCDR), Standardized Root Mean Squared Residual (SRMR), Standardized Mean Absolute Residual (SMAR), Standardized Chi-Squared (SChS), Standardized Threshold Difference Count Ratio (STDCR), and Standardized Threshold Difference Sum Ratio (STDSR), as recommended by Kock (2024).

4. Results

4.1. Respondent demographics

Table 1 presents the demographic characteristics of the 180 respondents, indicating a nearly balanced gender distribution, with 49.44% male and 50.56% female participants. This balance suggests inclusive engagement across gender lines in issues related to sustainability. The majority of respondents were in the age groups ≤ 25 years (46.67%) and 26–45 years (46.11%), which correspond to psychosocially active life stages critical for the development of values and the internalization of prosocial consumption norms. Educational attainment was predominantly at the undergraduate (46.67%) and master's (46.11%) levels, indicating a relatively high degree of cognitive and reflective capacity in addressing complex environmental challenges, as supported by Gifford and Nilsson (2014). In terms of institutional affiliation, the distribution was almost evenly split between public (50.56%) and private (49.44%) universities, thereby offering a diverse normative context that may influence sustainability-related attitudes and behaviours. Variations in reported daily income - 35.56% earning less than USD 5, 31.11% earning between USD 5–10, and 33.33% earning more than USD 10 - reflect a broad spectrum of purchasing power, which is essential for mapping behavioural tendencies in sustainable consumption. Collectively, this demographic structure strengthens the robustness of the moderation analysis involving conformity, social environment, and self-concept within a contemporary psychosocial framework.

Table 1. Respondent demographics

Characteristic	Information	Frequency	Percentage
Gender	Male	89	49,44%
	Female	91	50,56%
Age	≤ 25 years old	84	46,67%
	26-45 years old	83	46,11%
	≥46 years old	13	7,22%
Education Degree	Bachelor	84	46,67%
	Master	83	46,11%
	Ph.D.	13	7,22%
University Status	State University	91	50,56%
	Private University	89	49,44%
Income per day	> 5US\$	64	35,56%
	> 5 US\$ – 10 US\$	56	31,11%
	> 10 years	60	33,33%

4.2. Measurement / Outer model analysis

Table 2 presents the results of convergent validity and construct reliability tests for the five main variables in the research model: Sustainable Consumption Behaviour (SCB), Environmental Education (EE), Conformity (CON), Social Environment (SE), and Self-Concept (SCT). All outer loading (λ) values exceed the recommended threshold of 0.70, indicating that each indicator significantly represents its underlying construct (Hair et al., 2021). The Average Variance Extracted (AVE) values, ranging from 0.559 to 0.656, meet the minimum criterion of 0.50, thereby demonstrating acceptable convergent validity (Fornell & Larcker, 1981). Furthermore, the Composite Reliability (CR) values fall between 0.879 and 0.967, while Cronbach's alpha (α) ranges from 0.866 to 0.929 - both well above the commonly accepted threshold of 0.70 - indicating high internal consistency and reliability across the constructs. These findings confirm that the measurement model is both valid and reliable, providing a robust foundation for subsequent interaction analysis within the PLS-SEM framework. This ensures that the moderation effects tested can be interpreted with confidence.

Table 2. Convergent validity and reliability

Variable	λ	AVE	C.R	(α)
SCB (23 item)	0,702 - 0,821	0,596	0,907	0,899
EE (15 item)	0,711 - 0,881	0,615	0,926	0,911
CON (15 items)	0,703 - 0,796	0,559	0,879	0,866
SE (10 items)	0,705 - 0,816	0,656	0,967	0,929
SCT (10 items)	0,707 - 0,799	0,589	0,911	0,902

The next step involves assessing discriminant validity. Table 3 presents the discriminant validity of the main constructs using the Fornell-Larcker criterion. The square roots of the Average Variance Extracted (AVE), displayed along the diagonal, are consistently higher than the corresponding inter-construct correlations, indicating that each construct demonstrates adequate discriminant validity (Fornell & Larcker, 1981). The correlation between Environmental Education (EE) and Sustainable Consumption Behaviour (SCB) is 0.277, suggesting a moderate direct association. Additionally, the correlations of EE with Conformity (0.340), Social Environment (0.291), and Self-Concept (0.212), along with the respective associations of these constructs with SCB, indicate sufficient conceptual and statistical relationships to warrant the investigation of potential moderating effects. From a methodological perspective, these results provide a robust foundation for testing interaction effects in the structural model. The correlation values reflect both discriminant validity and the theoretical plausibility of inter-construct linkages, thus supporting the structural model specification (Hair et al., 2021).

Table 3. Discriminant validity

Variable	SCB	EE	CON	SE	SCT
SCB	0,457				
EE	0,277	0,477			
CON	0,214	0,340	0,456		
SE	0,283	0,291	0,328	0,416	
SCT	0,239	0,212	0,277	0,263	0,534

Table 4 presents the results of discriminant validity assessment among constructs using the Heterotrait-Monotrait ratio (HTMT), which is widely regarded as the most sensitive and reliable method for detecting construct discriminability in variance-based structural models (Henseler et al., 2015; Hair et al., 2021). All

HTMT values fall below the conservative threshold of 0.85, indicating the absence of discriminant validity concerns. This confirms that each construct - including Conformity (CON), Social Environment (SE), and Self-Concept (SCT) - is conceptually distinct from both Environmental Education (EE) and Sustainable Consumption Behaviour (SCB). These results further reinforce the structural validity of the model, particularly in substantiating the moderating roles of the three constructs in the relationship between EE and SCB. Moreover, the findings ensure that the estimation of cross-construct relationships is not compromised by semantic redundancy or multicollinearity among latent variables.

Table 4. Heterotrait-monotrait ratio

Variable	SCB	EE	CON	SE
SCB				
EE	0,509			
CON	0,276	0,448		
SE	0,334	0,353	0,538	
SCT	0,209	0,313	0,248	0,498

Table 5 presents the Variance Inflation Factor (VIF) values used to detect potential multicollinearity in the moderation model involving Environmental Education (EE), Conformity (CON), Social Environment (SE), and Self-Concept (SCT) in relation to Sustainable Consumption Behaviour (SCB). All VIF values fall below the conservative threshold of 3.3, as recommended by Kock (2015), confirming the absence of collinearity that could bias the estimation of structural paths. The absence of multicollinearity indicates that each construct contributes independently to the model and can be meaningfully interpreted within the interaction context. This supports the methodological robustness of testing the moderating effects of the three psychosocial constructs on the relationship between EE and SCB.

Table 5. Full collinearity VIFs

SCB	EE	CON	SE	SCT
1,962	1,457	1,538	1,936	1,593

4.3. Inner model analysis and hypothesis test

After the measurement model (outer model) met the validity and reliability tests, we proceeded to evaluate the structural model (inner model) by assessing the model fit indices and model quality based on 15 criteria, ranging from APC to STDSR. The results of this evaluation are as follows.

Table 6. Structural model assessment

Fit Index	Cut-off Value	Analysis Result	Remark
R ²	Substantial = 0.75 Moderate = 0.50 Weak = 0.25 (Hair et al., 2020)	SCB = 0,891	Substantial
f ²	f ² Small = 0.02 f ² Medium = 0.15 f ² Large = 0.35 (Hair et al., 2020)	EE → SCB = 0.272 CON → SCB = 0.226 SE → SCB = 0.246 SCT → SCB = 0.205 EE*CON → SCB = 0.161 EE*SE → SCB = 0.158 EE*SCT → SCB = 0.169	Medium Medium Medium Medium Medium Medium Medium
Q ²	>0 = meaningful/small predictive accuracy >0.25 = medium predictive accuracy >0.50 = large predictive accuracy (Hair et al., 2020)	SCB = 0,689	Large
APC	P>0,05	0,269, P<0,001	Fit
ARS	P>0,05	0,326, P<0,001	Fit
AARS	P>0,05	0,305, P<0,001	Fit
AVIF	Acceptable if ≤ 5, ideally ≤ 3.3	1,811	Acceptable
AFVIF	Acceptable if ≤ 5, ideally ≤ 3.3	1,845	Acceptable
Tenenhaus GoF	Small ≥ 0.1, medium ≥ 0.25, large ≥ 0.36	1,852	Large
SPR	Acceptable if ≥ 0.7, ideally = 1	1,000	Ideal
RSCR	Acceptable if ≥ 0.9, ideally = 1	1,000	Ideal
RSK	Acceptable if ≥ 0.7	1,000	Acceptable
NLBCDR	Acceptable if ≥ 0.7	1,000	Acceptable
SRMR	Acceptable if ≤ 0.1	0.029	Acceptable
SMAR	Acceptable if ≤ 0.1	0.019	Acceptable
SChS	P<0.05	P<0.001	Fit
STDC	Acceptable if ≥ 0.7, ideally = 1	0.989	Acceptable
STDSR	Acceptable if ≥ 0.7, ideally = 1	0.918	Acceptable

Table 6 confirms the structural model's robustness. The R² value of 0.891 for Sustainable Consumption Behaviour (SCB) reflects substantial explanatory power (Hair et al., 2020), supported by a high Q² value of 0.689. The moderating effects of conformity (f² = 0.161), Social Environment (f² = 0.158), and Self-Concept (f² = 0.169) indicate medium effect sizes, validating their significant roles in moderating the influence of Environmental Education (EE) on SCB.

Model fit indices further confirm statistical adequacy: APC (0.269), ARS (0.326), AARS (0.305), all significant at $p < 0.001$; AVIF (1.811) and AFVIF (1.845) remain below the 3.3 threshold. The GoF score of 1.852 is exceptionally high. SPR, RSCR, RSK, and NLBCDR values equal 1.000, confirming model completeness. Additional indices (SRMR = 0.029, SMAR = 0.019, STDC = 0.989, STDSR = 0.918, SChS: $p < 0.001$) support model validity. Finally, hypothesis testing was conducted using the PLS-SEM bootstrapping technique ($t \geq 1.96$; $p < 0.05$, one-tailed). The finalized model is depicted in Figure 2, with detailed results summarized in Table 7.

Table 7. Path coefficient and hypothesis test

Path	β	p-value	Decision
Direct path			
Environmental education \rightarrow Sustainable consumption behaviour	0.295	0.000	H1: Supported
Conformity \rightarrow Sustainable consumption behaviour	0.211	0.000	H2a: Supported
Social environment \rightarrow Sustainable consumption behaviour	0.369	0.000	H3a: Supported
Self-concept \rightarrow Sustainable consumption behaviour	0.386	0.000	H4a: Supported
Moderation Path			
Environmental education* Conformity \rightarrow Sustainable consumption behaviour	0.224	0.000	H2b: Supported
Environmental education* Social environment \rightarrow Sustainable consumption behaviour	0.284	0.000	H3b: Supported
Environmental education* Self-concept \rightarrow Sustainable consumption behaviour	0.294	0.000	H4b: Supported

Table 7 presents the path coefficient analysis, confirming that all relationships are statistically significant. Environmental education positively influences sustainable consumption behaviour ($\beta = 0.295$; $p < 0.001$), with additional direct effects from conformity ($\beta = 0.211$), social environment ($\beta = 0.369$), and self-concept ($\beta = 0.386$). Moderating effects are also significant: conformity ($\beta = 0.224$), social environment ($\beta = 0.284$), and self-concept ($\beta = 0.294$; all $p < 0.001$). These findings underscore the critical role of psychosocial factors in amplifying the impact of environmental education. The final model is illustrated in Figure 2.

Given that all hypothesized relationships were empirically supported, additional robustness analyses were undertaken to ensure the stability and validity of the model estimates. Two complementary procedures were applied. First, a Gaussian

copula endogeneity test was conducted to address potential concerns regarding causal endogeneity and to verify that the estimated path coefficients were not biased by omitted variables or simultaneity effects. Second, a multi-group analysis (MGA), preceded by the Measurement Invariance of Composite Models (MICOM) procedure, was implemented to test the structural equivalence of the model across distinct contextual settings - specifically, urban and rural groups. The results of the Gaussian copula endogeneity test are presented below, offering an additional layer of empirical rigor and confirming the robustness of the causal inferences derived from the primary model estimation.

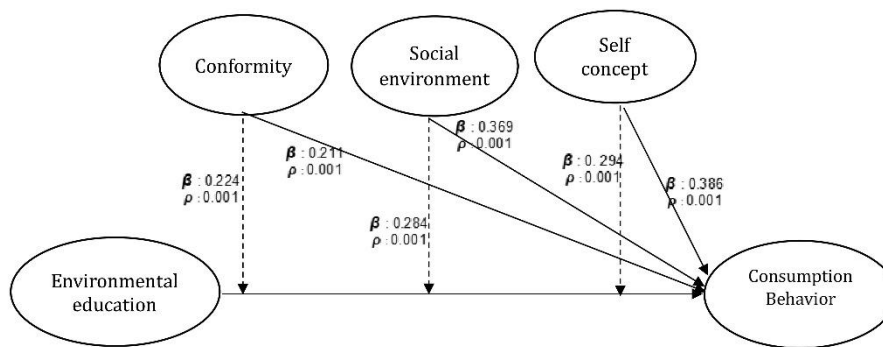


Figure 2. Output model

As shown in Table 8, the Gaussian Copula test results reveal that all direct and moderating paths exhibit p-values exceeding the 0.05 significance level. This outcome indicates the absence of endogeneity, suggesting that the estimated parameters are not distorted by simultaneity or omitted variable bias. Consequently, the structural coefficients can be considered both consistent and reliable, reinforcing the internal validity of the model. These results provide empirical assurance that the causal inferences drawn from the structural relationships are robust and not artifacts of endogeneity. Building upon this validated estimation, a subsequent multi-group analysis (MGA) was conducted to further explore the potential differences in structural relationships between urban and rural groups, thereby enhancing the contextual interpretability and external validity of the model.

Table 8. Summary of gaussian copula for endogeneity test on each path

Path	β	p-value
Direct path		
GC (Environmental education) → Sustainable consumption behaviour	0,145	0,076
GC (Conformity) → Sustainable consumption behaviour	0,098	0,251
GC (Social environment) → Sustainable consumption behaviour	0,119	0,13
GC (Self-concept) → Sustainable consumption behaviour	0,112	0,154
Moderation Path		
GC (Environmental education* Conformity) à Sustainable consumption behaviour	0,111	0,158
GC (Environmental education* Social environment) à Sustainable consumption behaviour	0,137	0,085
GC (Environmental education* Self-concept) à Sustainable consumption behaviour	0,135	0,087

Table 9. Results of the urban and rural multi-group analysis (MGA)

Path	Urban		Rural	
	β	p-value	β	p-value
Direct path				
Environmental education → Sustainable consumption behaviour	0,281	0.000	0,266	0.000
Conformity → Sustainable consumption behaviour	0,199	0.000	0,184	0.000
Social environment → Sustainable consumption behaviour	0,351	0.000	0,333	0.000
Self-concept → Sustainable consumption behaviour	0,367	0.000	0,352	0.000
Moderation Path				
Environmental education * Conformity → Sustainable consumption behaviour	0,212	0.000	0,194	0.000
Environmental education * Social environment → Sustainable consumption behaviour	0,271	0.000	0,255	0.000
Environmental education * Self-concept → Sustainable consumption behaviour	0,276	0.000	0,26	0.000

As presented in Table 9, the results exhibit a consistently strong and statistically significant pattern across all structural paths - both direct and moderating - with p-values below the 0.001 threshold. This robustness underscores that, within both urban and rural contexts, psychological and social determinants exert substantial influence on sustainable consumption behaviour. The significant and positive moderating effects further indicate that contextual interactions reinforce, rather than weaken, these relationships. Collectively, these findings

attest to the structural stability and cross-contextual validity of the proposed model, suggesting that the underlying mechanisms shaping sustainable behavioural intentions operate uniformly across spatial environments, thereby strengthening the generalizability of the theoretical framework.

5. Discussion

The analysis results indicate that environmental education has a positive and significant effect on sustainable consumption behaviour. This finding supports the theoretical framework of the Norm Activation Model (NAM), which posits that environmental education activates personal norms by enhancing awareness of consequences and individuals' moral responsibility toward the environment (Van de Wetering et al., 2022). Environmental education also functions as a catalyst in shaping injunctive norms, directing sustainable consumption behaviours in alignment with social expectations (Yip & Schweitzer, 2022; Cialdini et al., 1991). Within this context, Social Norms Theory explains how socially internalized norms through education influence perceptions of socially acceptable actions.

Furthermore, Self-Identity Theory strengthens these findings by emphasizing the importance of pro-environmental identity formation as an outcome of educational experiences (Horowitz, 2012; Capasso et al., 2025). Individuals who perceive themselves as sustainable consumers tend to demonstrate consistency between their values and behaviours (Lavuri et al., 2023). Metacognitive experiences also influence this process in consumer decision-making (Schwarz et al., 2020), reinforcing the role of education as a strategic intervention for shaping identity, norms, and attitudes toward sustainable consumption over time.

Rooted in the Norm Activation Model (NAM) as the primary theoretical framework, the analysis further shows that conformity significantly and positively influences sustainable consumption behaviour and enhances the impact of environmental education through a significant moderating effect. These findings support NAM's postulate that personal norms are shaped through activation of social norms triggered by exposure to environmental education (Savari et al., 2023). In this context, Social Norms Theory explains that individuals tend to internalize group norms when making consumption decisions, especially when the social environment emphasizes sustainability values (Cialdini et al., 1991; Melnyk et al., 2021). The moderating effect of conformity demonstrates that the success of environmental education is strongly influenced by individual sensitivity to dominant social norms. Moreover, this finding aligns with literature

on self-identity Theory, which highlights that conformity acts as a bridge between ecological identity and social pressure shaping prosocial consumption behaviour (Capasso et al., 2025; Horowitz, 2012). Individuals with strong social ties and pro-environmental identities show increased receptivity to educational messages, enhancing processing fluency and moral resonance (Schwarz et al., 2020; Zhang et al., 2024). This dynamic is reinforced in collectivist cultural contexts through the internalization of collective values and intergenerational value transfer (Lissillour et al., 2025; Yang et al., 2024). However, conformity can also be ambivalent when dominant norms do not reflect sustainability values, indicating that transformative and participatory norm-setting strategies must accompany environmental education.

The research findings also reveal that the social environment significantly influences sustainable consumption behaviour, reaffirming the importance of social norms as determinants of responsible consumption behaviour. These findings strengthen the position of both the Norm Activation Model (NAM) and Social Norms Theory in explaining how descriptive and injunctive norms within communities activate personal norms, raise awareness of ecological consequences, and encourage individuals to take responsibility in their consumption practices (Cialdini et al., 1991; Rimal & Yilma, 2021; He & Qian, 2023; Zhang & Cao, 2025). Additionally, the interaction between environmental education and social environment produces a significant moderating effect, showing that the effectiveness of environmental education is substantially enhanced through contextual support from social networks. This mechanism can be explained through processes such as social learning, group referencing, and affordances provided by green social networks, which reinforce the internalization of sustainability values (Nivedhitha et al., 2024; Sharma, 2022). In the context of the Global South, such as Indonesia, where collective norms and social structures heavily influence behaviour, these findings emphasize the need for sustainability education designs that include collective norm activation, identity salience reinforcement, and community participation (Chen & Hsieh, 2023; Cao et al., 2023; Al-Nuaimi & Al-Ghamdi, 2022; Kherazi et al., 2024). Therefore, the social ecosystem plays a crucial mediating role in building consumption behaviours that are socially and ecologically sustainable.

Finally, the analysis reveals that self-concept has a significant positive effect on sustainable consumption behaviour and significantly moderates the relationship between environmental education and sustainable consumption behaviour. These findings confirm the importance of self-identity as an internal determinant that strengthens intention and action toward sustainable consumption, as

theorized in Self-Identity Theory (Cao et al., 2023; Yeo & Hwang, 2025). Within the Norm Activation Model (NAM) framework, self-concept activates personal norms and moral awareness, leading individuals to internalize educational messages that emphasize ecological responsibility (Savari et al., 2023; Sajjad et al., 2024). This aligns with the findings of Haratbar et al. (2025), which show that cognitive structures within self-concept - such as moral perception and pro-environmental identity serve as key mediators in shaping sustainable consumption preferences.

The significant moderating effect indicates that environmental education becomes more effective when received by individuals with high levels of self-concept. This implies the importance of designing environmental education that is not only cognitively informative but also identity transformative. From the perspective of Social Norms Theory, self-concept also functions as a psychosocial filter that mediates the internalization of social norms into actual behaviour (Cialdini et al., 1991; Slocum et al., 2021). Thus, this study expands understanding of the role of identity dimensions in the effectiveness of environmental education, particularly in collectivist-oriented societies like Indonesia.

Despite the overall empirical substantiation of all proposed hypotheses, several methodological and epistemic considerations warrant critical reflection. Foremost, the reliance on self-reported data requires interpretive restraint. Although procedural and statistical remedies were incorporated to mitigate common method variance, the inherent susceptibility of such instruments to social desirability tendencies remains a persistent threat to internal validity. This bias may engender artificially inflated intercorrelations, complicating the inferential clarity of causal attributions. Consequently, any causal interpretation should be regarded as tentative and contextually bounded rather than definitive. A more rigorous agenda for subsequent inquiry would entail methodological triangulation - leveraging indirect response paradigms, ecological momentary assessment (EMA), or unobtrusive behavioural metrics - to reduce mono-method dependency and enhance construct validity.

Equally salient is the uniformly confirmatory pattern observed across the hypothesized linkages, which invites a degree of theoretical scepticism. This pattern may indeed reflect a strong empirical alignment between the conceptual model and the lived entrepreneurial reality of Indonesian university students. Nevertheless, it may also signal an overly confirmatory model specification, where parsimony supersedes explanatory flexibility. To preclude such epistemic complacency, this study implemented supplementary robustness diagnostics -

including endogeneity checks and multi-group analysis (MGA) - which generally reinforced the primary associations but revealed marginal heterogeneity across subsamples. These nuances suggest that the generalizability of the findings must be approached with circumspection. Future research, therefore, would profit from longitudinal or experimental strategies capable of disentangling temporal causality, testing boundary conditions, and refining theoretical specificity within diverse socio-cultural contexts.

6. Conclusions

Overall, the findings of this study confirm that environmental education - both directly and through its interaction with conformity, social environment, and self-concept - significantly contributes to the development of sustainable consumption behaviour. These results substantiate the theoretical relevance and interconnection between the Norm Activation Model (NAM), Social Norms Theory, and Self-Identity Theory in explaining the psychosocial mechanisms underpinning sustainable consumption. Theoretically, this study offers an original contribution by constructing a cross-theoretical conceptual model that integrates cognitive, normative, and identity dimensions into a comprehensive predictive framework. This integration extends beyond conventional paradigms of pro-environmental behaviour, particularly within the distinctive socio-cultural landscape of the Global South. The Indonesian context - with its plural communal values, ecologically rooted customary norms, and vulnerability to urban environmental crises - provides a compelling empirical setting to understand how environmental education operates as an embedded transformative force within collective identity formation.

The findings underscore not only the complexity of norm internalization processes but also the potential of environmental education to function simultaneously as a social identity mechanism and a transformative agent in addressing sustainability challenges. Practically, this study emphasizes the urgency of designing participatory, context-sensitive, and transformative environmental education programs - ones that integrate local values, reinforce ecological identities, and adapt to prevailing social norms. From a Global South epistemological standpoint, this approach challenges the universalist orientation of dominant Northern educational models. Nonetheless, the study is limited by its geographically narrow scope and exclusive reliance on quantitative methods, which may not fully capture the depth of socio-cultural experiences. The principal limitations of this inquiry derive from its cross-sectional design and

exclusive reliance on self-reported measures, both of which render the findings vulnerable to perceptual distortions and social desirability tendencies. Such methodological constraints inevitably delimit causal inference and may attenuate the robustness of the observed associations. To strengthen the empirical credibility and temporal generalizability of these insights, subsequent research would benefit from adopting more dynamic methodological strategies - such as longitudinal tracking, field-based quasi-experiments, or the inclusion of objective behavioral indicators - to rigorously examine the stability, replicability, and external validity of the proposed relationships across varying contextual settings.

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