



The dynamics of fast fashion consumption among Indonesian youth and its socio-ecological sustainability implications

Sabrina Agistia Ritonga^{1,*}

¹ Department of Environmental Science, Graduate School of Sustainable Development, Universitas Indonesia, Central Jakarta, DKI Jakarta 10430, Indonesia

*Correspondence: sabrina.agistia51@ui.ac.id

Received Date: July 3, 2026

Revised Date: August 11, 2026

Accepted Date: August 21, 2026

ABSTRACT

Background: The fast fashion phenomenon has intensified patterns of overconsumption, particularly among younger generations, driven by advertising, rapidly shifting styles, and social media influence. In Indonesia, high social media penetration significantly shapes lifestyle preferences and encourages impulsive purchasing behaviors. While the environmental and social impacts of fast fashion have been widely studied globally, comprehensive research linking industrial dynamics, digital culture, and youth consumer behavior within Indonesia's socio-ecological context remains limited. This study aims to identify consumption patterns and purchase drivers among digitally active young consumers, assess the social and environmental consequences of accelerated clothing turnover, and explore community-based and circular economy strategies that could support more responsible consumption. **Methods:** A convergent mixed-methods design was adopted, integrating the Triple Bottom Line (TBL), Theory of Planned Behavior (TPB), and Value-Belief-Norm (VBN) frameworks. A questionnaire survey (N = 412) measured attitudes, subjective norms, perceived behavioral control, awareness of consequences, responsibility attribution, and purchase intention among respondents aged 17–30. This was complemented by ten semi-structured interviews with sustainable fashion practitioners, designers, and engaged young consumers, analyzed thematically alongside descriptive and inferential statistical analysis of the survey data. **Findings:** Approximately 76% of respondents had purchased fast fashion at least once in the past two months, driven largely by affordability and digital trend exposure ($\pm 64\%$). A substantial attitude-behavior gap emerged: while 71% acknowledged environmental impacts, only 29% consistently considered sustainability in purchases. Purchase frequency was higher among women, while quality and brand sensitivity were more pronounced among higher-income respondents. Qualitative findings revealed ecological awareness that remains largely cognitive, social-digital pressures normalizing impulsive buying, and structural barriers inhibiting sustainable switching. **Conclusion:** Fast-fashion practices, digital culture, and individual values jointly shape consumption outcomes, indicating that policy, industry practices, and digital-platform interventions are needed alongside consumer education to catalyze socio-ecological transitions in Indonesia's fashion system. **Novelty/Originality of this article:** This study integrates macro-level industry analysis through the Triple Bottom Line with micro-level consumer psychology through TPB and VBN, offering contextualized insight into fast fashion consumption within Indonesia's digitally mediated youth culture.

KEYWORDS: consumer behavior; fast fashion; Indonesian youth; sustainability; theory of planned behavior; triple bottom line; value-belief-norm.

1. Introduction

The fashion industry plays a significant role in the global economy and is characterized by highly competitive market dynamics (Gazzola et al., 2020). However, it is often regarded

Cite This Article:

Ritonga, S., A. 2026. The dynamics of fast fashion consumption among Indonesian youth and its socio-ecological sustainability implications. *Critical Issue of Sustainable Future*, 3(2), 148-164. <https://doi.org/10.61511/crsusf.v3i2.3944>

Copyright: © 2026 by the author. This article is distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).



as one of the most exploitative industrial sectors and a major contributor to textile waste, which in turn fuels the growing heterogeneity of urban solid waste due to the fast-fashion phenomenon (Farooq et al., 2021; Garcia-Ortega et al., 2023). This phenomenon is marked by low-cost production, rapid turnover in apparel design, and marketing cycles that respond quickly to short-lived consumer trends (Aponte et al., 2024). Fast fashion has intensified patterns of overconsumption, particularly among younger generations. These trends are heavily shaped by advertising, rapidly shifting styles, and the influence of social media. In Indonesia, the high penetration of social media significantly shapes lifestyle preferences and encourages impulsive purchasing behaviors (Koning et al., 2023).

Fast fashion imposes considerable environmental strain, most notably during the production of textile fibers and the dyeing of fabrics. Polyester, a widely used synthetic material, is responsible for an estimated 82% of microplastic contamination worldwide. It is further estimated that 35% of microplastic fibers in aquatic systems originate from laundering synthetic apparel (Mikolajczak, 2019; Periyasamy & Tehrani-Bagha, 2022). Moreover, the extensive production of garments gives rise to various socio-ecological challenges, such as precarious employment, economic inequality, and public health threats associated with environmental degradation. Waste generated across the production and consumption chain is frequently discarded domestically or exported to lower-income nations, intensifying global waste management challenges (Bocken & Short, 2016).

In response to these challenges, sustainable fashion has emerged as an approach aimed at slowing down production processes, reducing environmental degradation, improving labor conditions, and promoting circular or collaborative business models. This approach prioritizes the use of organic materials with lower ecological footprints (Adamkiewicz et al., 2022; Gurova, 2024; Palm, 2023). Practices such as slow fashion, eco-fashion, and ethical fashion have gained traction as methods for reducing the textile sector's negative impacts (Farghaly et al., 2024). Moreover, companies are encouraged to operationalize circular economy strategies by extending product lifecycles and fostering more mindful consumption, thereby reducing the demand for new resource-intensive products (Bocken & Short, 2016; Niinimäki et al., 2020).

The Triple Bottom Line (TBL) framework, developed by John Elkington in the 1990s, derives from the fundamental notion of sustainability: meeting current needs while safeguarding the capacity of future generations through the responsible use of natural and other vital resources (Elkington, 1997; Nica et al., 2025). TBL argues that organizational performance should be evaluated not only in terms of economic profit but also through social responsibility and environmental care, giving equal weight to the three pillars of profit, people, and planet. Currently, TBL has become a strategic reference point for sustainable product development across industries, including fashion, where sustainability is increasingly recognized as part of a company's duty to support long-term sustainable development (Nica et al., 2025).

Moreover, empirical research combining the Theory of Planned Behavior (TPB) and the Value-Belief-Norm (VBN) framework in sustainable fashion remains scarce, limiting understanding of the determinants of purchase intention and their implications for socio-ecological sustainability. The VBN framework (Stern et al., 1999) adds that pro-environmental behavior depends on personal values, ecological beliefs, perceived consequences, responsibility attribution, and personal norms. Combining the TPB and VBN frameworks yields a comprehensive approach to understanding sustainable fashion consumption. Attitude, subjective norms, and perceived behavioral control contribute to consumers' purchasing intentions, while customer value is informed by functional, social, emotional, symbolic, and ethical factors.

Heightened awareness of environmental impacts and a sense of personal duty strengthen personal norms, ultimately motivating pro-environmental behavior. Prior studies also demonstrate that gender differences and social influences shape purchase intention, underscoring the need for marketing and educational strategies that communicate the ecological, social, and personal advantages of sustainable fashion for

young consumers (Yang et al., 2023; Wu & Lee, 2025). When combined, TBL, TPB, and VBN offer a strong theoretical base for interpreting consumer decision-making in sustainable fashion, addressing organizational priorities, industry impacts, and consumer values simultaneously. This integration is particularly relevant for understanding consumer preferences toward sustainable fashion alternatives.

The fast fashion phenomenon has been extensively examined in global literature, particularly regarding its significant environmental impacts, including carbon emissions, water pollution, microplastic release, and the accumulation of textile waste (Chang et al., 2023; Gold & Turner, 2023). However, most of these studies focus on global contexts or developed countries with high levels of consumption, while comprehensive examinations of fast fashion dynamics in Indonesia remain relatively limited. In fact, Indonesia holds an important position due to its very high social media penetration and the dominance of young people as the main consumer group. These conditions indicate that fast fashion consumption patterns in Indonesia are influenced not only by economic factors and product availability, but also by the digital culture that shapes the values, lifestyles, and social identities of younger generations (Wu & Lee, 2025).

Thus, fast fashion consumption patterns in Indonesia can be considered distinctive compared to other countries, making more contextualized research necessary. Furthermore, previous studies tend to highlight environmental issues, economic impacts, or business practices separately (Garcia-Ortega et al., 2023). Few studies attempt to link these issues with youth consumer behavior within broader socio-ecological settings. This highlights the urgent need to understand how structural and cultural elements interact to shape fast fashion consumption among Indonesia's younger generations, thereby filling the gap in knowledge concerning the intersections between consumption behavior, digital culture, and socio-ecological sustainability.

As a result, Indonesia's fast fashion consumption patterns differ from those in other countries, making more context-specific studies necessary. Prior research tends to examine environmental, economic, or business-related issues separately, with only a few studies attempting to link them to youth consumer behavior within socio-ecological contexts. This reveals a need to better understand the interaction between structural and cultural influences in shaping youth consumption patterns. The novelty of this research lies in its integration of macro approaches through the Triple Bottom Line and micro approaches through TPB and VBN to explain both industrial practices and individual decision-making. This combined approach addresses gaps in previous research that examined these frameworks independently. Thus, this study aims to analyze youth fast fashion consumption, integrate TBL, TPB, VBN to explain value perceptions, and interpret the rise of sustainable fashion as part of broader shifts in youth consumption and socio-ecological relationships an adequate background, context of the problems based on the literature review.

2. Methods

The study uses a mixed-methods strategy, merging quantitative and qualitative data to obtain a deeper and more holistic understanding of fast fashion behaviors among young people in Indonesia and their socio-ecological implications. This method is selected due to the multifaceted nature of fast fashion, which involves behavioral, social, and environmental dimensions that no single dataset can fully explain. By combining both types of analysis, the research identifies numerical consumption trends while also uncovering the underlying meanings, motivations, and value systems influencing these actions.

The quantitative component of this study focuses on mapping fast fashion consumption patterns among youth, including how often they buy clothing, what motivates their purchases, how they use their garments, and how they dispose of them. Data collection was conducted through an online survey distributed to respondents between 17 and 30 years old. This group was selected because they are the core consumers of fast fashion and

simultaneously the most active users of social media in Indonesia, which means their purchasing behaviors are strongly shaped by digital trends, online promotions, and influencer-driven marketing. The survey instrument was constructed using the Theory of Planned Behavior (TPB) covering attitudes, subjective norms, and perceived behavioral control and the Value-Belief-Norm (VBN) framework, which includes awareness of consequences, personal responsibility, and personal norms supporting sustainable consumption. Quantitative data were analyzed using descriptive and inferential statistics to examine the relationships among consumption variables, socio-ecological motivations, and the propensity to adopt sustainable behaviors (Chang et al., 2023; Mufsiroh et al., 2022).

In parallel, the qualitative component involved conducting in-depth interviews with local fashion industry practitioners, creative community members, and environmental activists. This method was intended to provide a deeper insight into how actors across the fashion value chain perceive production, distribution, and consumption processes, and to examine how communities and civil society organizations engage in promoting alternatives through awareness initiatives, circularity efforts, and collective actions supporting sustainable fashion.

The overall research design is structured to address three main objectives. First, to identify fast fashion consumption patterns among young people by considering the influences of social media, personal values, and socio-ecological norms. Second, to analyze the social and environmental impacts of textile waste accumulation and excessive consumption, which have implications for the sustainability of Indonesia's socio-ecological systems. Third, to explore community-based strategies and circular economy practices that can serve as alternative solutions for encouraging more responsible fashion consumption among youth. By integrating quantitative analysis, qualitative interviews, and cross-scale theoretical frameworks, this study aims to provide both empirical and theoretical contributions to the discourse on fashion sustainability in Indonesia and to offer new perspectives that bridge environmental issues, consumer behavior, and community strategies.

This research employs a combination of quantitative and qualitative techniques to obtain a comprehensive understanding of fast fashion consumption dynamics among Indonesian youth. Quantitative data are collected through questionnaire-based surveys, while qualitative insights are gathered through semi-structured interviews. This design ensures that the findings not only reveal behavioral patterns and statistical relationships, but also capture the social meanings and contextual factors that shape consumption decisions.

Quantitative data were collected through an online questionnaire (Google Form) distributed to respondents aged 17–30 via social media platforms such as Instagram, TikTok, and WhatsApp. Participants were selected using purposive sampling with the criteria that they were active social media users and had purchased new clothing within the past 12 months. The questionnaire items were developed based on indicators from the Theory of Planned Behavior (TPB) including attitude, subjective norm, perceived behavioral control, and behavioral intention and the Value-Belief-Norm (VBN) framework, which comprises values, awareness of consequences, ascription of responsibility, and personal norm. All constructs were measured using a five-point Likert scale (1 = strongly disagree to 5 = strongly agree) (Joshi et al., 2020). Demographic information such as age, gender, education level, and clothing purchase frequency was also collected to support further analysis. In addition to the survey, qualitative data were gathered through semi-structured interviews guided by a set of core questions with representatives from the sustainable fashion industry, environmental communities, and young consumers engaged in sustainable fashion movements. These interviews aimed to deepen the understanding of the Triple Bottom Line (TBL) framework, particularly how social (people), environmental (planet), and economic (profit) dimensions intersect within Indonesia's sustainable fashion system. The interview questions centered on sustainability strategies, consumer perceptions of ethical value, and the challenges of promoting responsible fashion

consumption among young people.

Table 1. TPB and VBN questionnaire indicators

Construct	Indicator Description	Scale
Attitude (TPB)	Evaluation of purchasing fast fashion vs. sustainable products	Likert 1–5
Subjective Norm (TPB)	Influence of peers, trends, social media	Likert 1–5
Perceived Behavioral Control (TPB)	Difficulty/ease of buying sustainably	Likert 1–5
Behavioral Intention (TPB)	Intention to reduce fast fashion consumption	Likert 1–5
Values (VBN)	Biospheric, altruistic, egoistic values	Likert 1–5
Awareness of Consequences (VBN)	Awareness of environmental & social impacts	Likert 1–5
Ascription of Responsibility (VBN)	Personal responsibility for sustainability	Likert 1–5
Personal Norm (VBN)	Moral obligation to act sustainably	Likert 1–5

(Joshi et al., 2020)

Prior to the main data collection, a pilot test involving approximately 30 respondents was conducted to assess linguistic clarity, reliability, and item validity. All participants provided informed consent, and data were collected anonymously to ensure confidentiality. Quantitative data were analyzed using descriptive and inferential statistics (e.g., regression or path analysis), while qualitative data were examined using thematic analysis to identify key patterns and meanings (Braun & Clarke, 2022). The integration of both data types offered a comprehensive understanding of the factors shaping fast fashion consumption intentions and behaviors, as well as their implications for socio-ecological sustainability in Indonesia.

Data analysis constitutes a fundamental stage of the research process, as it transforms raw data into meaningful information capable of answering the research questions comprehensively. This study employs an integrated combination of quantitative and qualitative analytical techniques to obtain a deeper and more contextualized understanding of the examined phenomenon. The use of both approaches reflects the need not only to test statistical relationships among variables but also to interpret the social contexts and meanings underlying the numerical findings. This methodological choice aligns with the core principles of mixed methods research, in which numerical and narrative results are combined to generate richer and more nuanced interpretations (Creswell & Clark, 2021).

For the quantitative component, descriptive and inferential statistical techniques were applied to describe respondent characteristics and to identify patterns and relationships among variables. Descriptive statistics including means, percentages, and standard deviations were used to provide an overview of data distribution and key tendencies within the sample (Flick, 2022). SPSS was selected as the primary analytical software due to its high computational accuracy, efficiency in processing complex statistical procedures, and user-friendly output for interpretation (Pallant, 2020; Yazici et al., 2022). The software is widely adopted in applied social research because it reduces human error and enhances the reliability of statistical analysis (Hair et al., 2021).

For the qualitative phase, a systematic thematic analysis was conducted, drawing on Braun & Clarke's (2006) original framework and the methodological refinements proposed by Naeem et al. (2023). This approach emphasizes systematic and transparent analytic procedures to ensure strong traceability between raw data, interpretive steps, and final conclusions. The analysis followed six structured stages: (1) transcription and data familiarization; (2) identification of key terms; (3) initial coding; (4) theme development; (5) conceptual refinement and inter-theme linkage; and (6) synthesis of the analytic narrative. The refinements offered by Naeem et al. (2023) strengthen analytical rigor by promoting methodological consistency and enhancing dependability and credibility in qualitative inquiry.

To ensure the validity and coherence of the findings, methodological triangulation was employed by integrating insights from both quantitative and qualitative analyses (Donkoh & Mensah, 2023). This triangulation enabled cross-verification of evidence from multiple sources including survey responses, interviews, and observational insights—resulting in more robust and comprehensive conclusions. Ultimately, the combination of analytical techniques not only enhances data quality and reliability but also provides a holistic understanding of the phenomenon under study, consistent with the overarching goals of mixed methods research to integrate empirical precision with interpretive depth within a unified analytical framework.

3. Results and Discussion

This study involved 412 respondents representing Indonesian youth aged 17 to 30 years. Participants were distributed across major urban and semi-urban regions, with the largest concentrations located in Jakarta (28%), Bandung (18%), Yogyakarta (14%), Surabaya (12%), and Denpasar (8%), while the remaining 20% originated from other areas within and outside Java. This demographic spread captures diverse socio-economic backgrounds and a wide range of cultural exposure to contemporary consumption patterns, thereby providing an adequate representation of fast fashion behavior among digitally active young consumers.

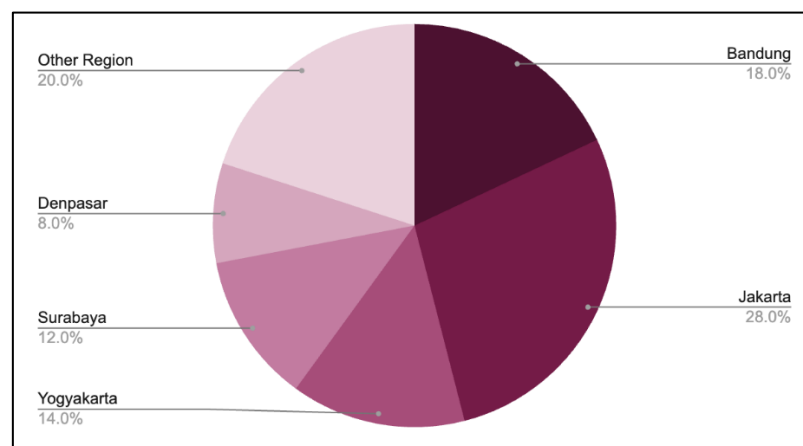


Fig. 1. Distribution of respondents by region

Quantitative data were collected through an online survey based on constructs from the Theory of Planned Behavior (TPB) and the Value–Belief–Norm (VBN) framework. The instrument measured variables relating to attitudes toward fast fashion consumption, subjective norms, perceived behavioral control, environmental values, and ecological beliefs (Yang et al., 2023). All items were rated on a five-point Likert scale ranging from “strongly disagree” to “strongly agree.” Complementing the survey, ten semi-structured interviews were conducted with sustainable fashion practitioners, local designers, and young consumers actively involved in sustainable fashion movements, forming the qualitative component of this study (Joshi et al., 2020).

The quantitative findings reveal that 76% of respondents had purchased fast fashion products at least once in the previous two months, with the highest frequency recorded among individuals aged 18–24. Furthermore, 64% indicated that affordability and rapidly shifting trends were the primary drivers of their purchasing decisions. These results suggest a strong tendency toward impulsive consumption driven by the desire to continually update personal style in alignment with social media trends. Interestingly, although 71% of respondents acknowledged awareness of the environmental impacts associated with the fashion industry, only 29% consistently considered sustainability and

ethical production in their purchasing decisions.

Subgroup analysis highlights additional differences across demographic segments. Female respondents reported a significantly higher purchasing frequency than male respondents, particularly for casual apparel and accessories. Meanwhile, participants from middle- to upper-income brackets demonstrated a stronger inclination to prioritize product quality and brand characteristics in their consumption decisions. Collectively, these patterns indicate that fast fashion engagement is shaped by both socio-demographic attributes and exposure to digital lifestyle trends.

Overall, the initial findings reveal a substantial gap between environmental awareness and actual purchasing behavior. Although many young consumers possess foundational knowledge about textile waste and labor-related issues in the fashion industry, such awareness appears insufficient to motivate consistent behavioral change. Perceived behavioral control central within the TPB framework also emerged as an influential determinant of sustainable consumption intention, with approximately 58% of respondents expressing that they lacked viable alternatives due to limited access, higher prices, and the scarcity of environmentally friendly products in the local market.

Qualitative evidence reinforces these insights. Interviews with sustainability-oriented consumers suggest that although interest in sustainable products is increasing, perceptions of sustainable fashion as expensive, less trendy, and less accessible continue to impede adoption. At the same time, digital culture intensifies consumption pressures: influencer-driven marketing, “haul” videos, outfit-of-the-day (OOTD) content, and rapidly cycling microtrends all contribute to a social environment in which retaining an ever-changing wardrobe is implicitly encouraged, normalizing impulsive purchasing practices among young consumers.

Insights from sustainable fashion practitioners further reveal persistent structural challenges. Many noted that small-scale production and fragmented supply chain capacity limit their ability to maintain competitive prices in comparison to large fast fashion brands. Although awareness of sustainability is rising, market demand remains insufficient to support mass production models that could reduce prices and increase accessibility. Practitioners also emphasized the critical role of consumer education, narrative framing, and visual storytelling particularly through digital platforms in shaping perceptions of sustainable fashion and in encouraging long-term behavioral shifts among youth audiences.

The thematic analysis of qualitative data indicates that fast fashion consumption among Indonesian youth is characterized by three intersecting patterns. First, although ecological awareness is increasing, this awareness remains primarily cognitive and has not yet been internalized into actual consumption behavior. Second, social pressure and digital trend culture act as strong drivers of rapid consumption, as youth navigate social expectations mediated by online fashion displays and algorithm-driven recommendation systems. Third, a persistent intention–action gap emerges in sustainable consumption practices, with economic considerations, limited product accessibility, and insufficient structural support inhibiting the translation of pro-sustainability intentions into concrete behavioral change.

Taken together, these initial findings demonstrate that fast fashion consumption among Indonesian youth is shaped by a complex interplay of psychological factors (values, norms, beliefs), structural market conditions (availability, affordability, accessibility), and socio-digital influences (media exposure and online community norms). While the potential for a transition toward more sustainable consumption is evident, such progress requires coordinated efforts involving policy intervention, consumer education, and cross-sector collaboration among industry actors, government institutions, and educational organizations. Accordingly, these findings not only map the existing landscape of youth fast fashion behavior but also establish a critical empirical foundation for developing context-specific socio-ecological interventions aimed at promoting sustainable consumption practices in Indonesia.

The analysis of research findings was conducted based on key variables developed

through the integration of three theoretical frameworks: the Triple Bottom Line (TBL), the Theory of Planned Behavior (TPB), and the Value-Belief-Norm (VBN) framework. This integrative approach enables a comprehensive assessment of the psychological, social, and sustainability-related values that shape fashion consumption behavior. The variables analyzed include attitudes toward fast fashion, subjective norms, perceived behavioral control, awareness of consequences, personal responsibility, personal norms, and perceptions of the social, emotional, and ethical value of sustainable fashion products. In addition, demographic variables (namely age, gender, and frequency of clothing purchases) were examined to identify potential variations in consumption patterns across respondent groups. This approach allows for a richer mapping of the determinants of consumer behavior within the context of sustainable fashion.

Table 2. Summary of findings based on key variables

No.	Variable/Criteria	Key Findings	Interpretation
1.	Consumption Patterns and Purchasing Frequency	More than 70% of respondents reported purchasing new clothing at least once every two months. Female respondents showed higher purchasing frequency than male respondents. While approximately 40% expressed growing interest in sustainable alternatives such as thrifting and natural-fiber clothing, the actual adoption rate remains low.	Fast fashion purchasing is largely driven by trend-seeking, impulse buying, and social media exposure. The results illustrate a clear attitude–behavior gap, in which environmental awareness does not yet translate into consistent sustainable consumption practices.
2.	Attitudes toward Fast Fashion (TPB)	Fast fashion is perceived as affordable, practical, and an easy way to stay updated with current trends, despite respondents acknowledging its environmental impact.	This indicates value ambivalence: environmental knowledge is insufficient to counterbalance the social and hedonic motivations associated with trend-oriented consumption. Attitudes remain the strongest predictor of purchase intention.
3.	Subjective Norms (TPB)	Around 60% of respondents stated that their purchasing decisions were influenced by peers or social media personalities on platforms such as TikTok and Instagram. Digital interactions have become stronger sources of normative pressure than traditional social groups.	Social influence within digital ecosystems significantly shapes fashion choices. Social media now functions as a key socializing agent that molds lifestyle aspirations and perceived social expectations.
4.	Perceived Behavioral Control (TPB)	Respondents reported difficulties avoiding fast fashion due to low prices, easy access, and social pressure. However, many indicated a willingness to switch to sustainable products if these were more accessible and affordable.	These findings highlight the potential for promoting <i>affordable sustainability</i> . Economic and structural barriers—not lack of awareness—are the main constraints limiting sustainable fashion adoption.
5.	Awareness of Consequences (VBN)	Approximately 80% of respondents recognized the environmental consequences of fast fashion, including textile waste, water pollution, and carbon emissions.	Although environmental awareness is relatively high, it does not automatically lead to behavioral change. Practical considerations such as price, convenience, and self-presentation still carry greater influence.

6.	Ascription of Responsibility (VBN)	Most respondents believed that responsibility for addressing environmental impacts lies primarily with fashion companies rather than individual consumers.	Low personal responsibility weakens the motivation to reduce fast fashion consumption. These insights point to the need for educational approaches that emphasize consumer agency within sustainability practices.
7.	Personal Norms (VBN)	Respondents who held stronger pro-environmental personal values tended to be more selective in their clothing purchases and more open to alternatives such as thrifting and upcycling. However, the overall effect of personal norms remains weaker than social and economic factors.	Personal norms support sustainable choices but are often overshadowed by affordability and social influence. More creative and lifestyle-oriented communication strategies may help strengthen ethical engagement among youth.
8.	Ethical and Sustainability Values (TBL)	While respondents appreciated the ethical and environmental aspects of sustainable fashion, aesthetic appeal, comfort, and price remained the most influential considerations.	Ethical values need to be conveyed in ways that resonate with youth culture, particularly through visually driven and lifestyle-based narratives that blend sustainability with aesthetics.
9.	Demographics (age, gender, frequency of purchase)	Younger respondents (17–24) and women displayed the highest levels of fast fashion consumption. Interest in thrifting was more common among the 18–22 age group.	Behavioral differences across demographic groups suggest the importance of targeted communication and segmented sustainability strategies.
10.	Sustainability Impact (People–Planet–Profit)	Fast fashion contributes to increased textile waste, resource use, and social issues such as poor labor conditions. At the same time, growing interest in slow fashion and thrifting reflects emerging opportunities for circular practices.	Meaningful progress in sustainable fashion requires both consumer behavior change and industry innovation. The findings underscore the need for integrated approaches that link environmental, social, and economic dimensions.

Meanwhile, studies by Farooq et al. (2021) and Garcia-Ortega et al. (2023) highlight the ecological impacts of fast fashion, particularly its contribution to water pollution and microplastic release from synthetic fibers. However, these studies primarily emphasize global production processes rather than individual consumption behaviors. In contrast, this research seeks to link structural aspects of the industry with the psychological factors shaping young Indonesian consumers' decisions through an integrative application of the Triple Bottom Line (TBL), the Theory of Planned Behavior (TPB), and the Value-Belief-Norm (VBN) framework. This approach aims to provide a more holistic understanding of the relationships between industrial practices, personal values, and the socio-ecological norms that influence consumption behaviors.

Findings from Yang et al. (2023) show that sustainable fashion consumption is strongly shaped by personal values and awareness of environmental impacts. Their study identifies personal norms as a strong predictor of pro-environmental behavior among young consumers in China. However, it does not examine in depth the role of social media and digital culture, which exert considerable influence on consumption patterns in Southeast Asia. In the Indonesian context, the present study finds that influencer culture, online second-hand marketplaces, and TikTok “haul” trends significantly reinforce impulsive consumption, even among individuals with high environmental awareness. Thus, this study

extends prior findings by demonstrating that social values and norms do not operate in isolation; rather, they interact with social media algorithms and emerging digital norms.

Furthermore, studies by Wu & Lee (2025) and Gold & Turner (2023) highlight the intention–behavior gap among Generation Z consumers in sustainable fashion contexts. Although these consumers often express support for environmental issues, purchasing decisions remain shaped by convenience, product availability, and price. Similar patterns are observed in this study: while most respondents acknowledge the environmental impacts of the textile industry, only a minority actually choose sustainable products. Through qualitative analysis, this study finds that social identity, how individuals wish to be perceived within their social groups, functions as a primary determinant of actual behavior. In this regard, eco-friendly products have yet to acquire strong symbolic or social-status value among Indonesian youth, limiting their ability to compete with the normative appeal of conventional fashion trends.

Research by Adamkiewicz et al. (2022) and Palm (2023) emphasizes the transformation of businesses toward circular economy models through the use of organic materials and take-back systems. However, much of this literature focuses on large European companies and pays limited attention to the dynamics of small-scale local industries. This study contributes new insights by incorporating the perspectives of local fashion actors in Indonesia, including independent brands and creative communities that implement zero-waste principles and ethical production. Interviews reveal that although local actors face challenges related to limited capital and market access, they tend to be more adaptive and innovative in adopting sustainability practices. These findings underscore that systemic change in Indonesia's fashion industry has strong potential to emerge from grassroots initiatives rather than solely from corporate policies or government strategies.

In addition, Chang et al. (2023) highlight the importance of the TBL framework for assessing sustainability in the fashion industry, yet their work does not link these dimensions to consumer value perceptions. This study fills that gap by connecting the people, planet, and profit dimensions with young consumers' perceptions of the social, ethical, and emotional value of fashion products. These findings reinforce Nica et al. (2025), who emphasize the need to balance economic gains with social and environmental contributions, while adding that such balance has not yet been achieved in Indonesia due to disparities between consumer value perceptions and industry practices.

Overall, compared with previous research, this study contributes in three key ways. First, theoretically, it expands the integrative application of TBL, TPB, and VBN frameworks to explain fast fashion consumption in a developing-country context. Second, empirically, it offers contextual evidence of how digital culture and social norms shape the consumption behaviors of Indonesian youth—beyond conventional economic variables. Third, practically, it highlights the importance of community-based interventions and social education strategies to mitigate the socio-ecological impacts of fast fashion while strengthening sustainability awareness at both individual and industry levels. Accordingly, this study not only complements global literature on sustainable fashion but also provides original insights into local dynamics and the potential for socio-ecological transformation in Indonesia.

The findings of this study affirm that the fast-fashion consumption behavior of young Indonesians is shaped by a complex interaction of individual psychological factors, social dynamics, and the structural pressures of the global fashion industry. The integration of the Theory of Planned Behavior (TPB) and the Value-Belief-Norm (VBN) framework demonstrates that consumption intentions are influenced not only by attitudes and subjective norms, but also by awareness of socio-ecological impacts and the moral values individuals uphold. However, despite young people expressing positive attitudes toward sustainability, only a small proportion actively seek information about a brand's ethical practices before making a purchase (Kurniaty et al., 2024). This indicates a persistent attitude–behavior gap, wherein awareness of sustainability does not consistently translate

into concrete action. Price, product quality, and durability remain the primary considerations, while sustainability is often perceived as an added value rather than a determining factor in purchasing decisions (Park & Lin, 2020). The findings further emphasize the importance of viewing fast-fashion consumption behavior as part of an interconnected socio-ecological system. Individual purchasing decisions cannot be separated from the broader social context that shapes them, especially the role of social media, which has become a dominant space for the construction of identity and lifestyle trends. Thus, behavioral change cannot rely solely on individual awareness. Fast-fashion consumption must instead be understood as embedded within a mutually influencing socio-ecological system, where social media plays a central role in shaping identity, fashion trends, and sustainability narratives. Kurniaty et al. (2024) highlight that the influence of social media on young people's fashion preferences is even stronger than internal factors such as age and income level. Platforms such as Instagram and TikTok serve as key mediums through which perceptions of fashion and sustainability are formed. Therefore, a shift toward sustainable consumption patterns requires broader cross-sectoral interventions, beyond moral appeals, awareness campaigns, or isolated industry policies, grounded in circular economic principles.

From a social perspective, qualitative interview findings indicate that the emergence of sustainable fashion communities in Indonesia marks a shift in how consumption practices are understood. The presence of influencers and community-based movements promoting sustainable fashion, thrifting, and upcycling initiatives reflects the formation of new social values grounded in ethics, responsibility, and creativity in clothing use. This aligns with Kağıtçı (2022), who found that young consumers with positive environmental attitudes and high ecological responsibility are more likely to engage in sustainable consumption behaviors. In the Indonesian youth context, these collective movements function as social spaces that reinforce environmentally friendly norms, expand ecological solidarity networks, and cultivate a sense of involvement and ownership over sustainability issues.

Beyond social influences, ecological awareness also plays a significant role in shaping consumption behaviors, particularly related to textile waste and sustainable practices. However, the gap between awareness and actual action remains substantial. Most consumers continue to purchase fast-fashion products due to low prices, easy access, and social media-driven trend pressure. Meanwhile, the rise of illegal imports of secondhand clothing further exacerbates the situation: in addition to weakening the competitiveness of the local textile industry, approximately 30% of these imported items contain non-biodegradable plastic materials, contributing to the national waste burden (Kurniaty et al., 2024). This situation illustrates that the social and ecological dimensions of fast fashion are deeply interconnected and require cross-sectoral approaches (Mandarić & Vuković, 2022). These intertwined social and ecological conditions provide an empirical basis for enriching theoretical models of sustainable consumption behavior.

Theoretically, this study contributes to the development of sustainable consumption behavior models in developing countries by enhancing the integration of TPB and VBN frameworks within digital and local cultural contexts. The findings show that media exposure, online social norms, and economic capacity act as moderating variables that may strengthen or weaken the relationship between attitudes and behavioral intentions (Kurniaty et al., 2024). These insights extend cross-cultural pro-environmental behavior models by positioning digital interaction and the construction of collective identity as essential components in shaping the ecological commitments of young people. Therefore, sustainable behavioral change is more effective when driven through the formation of new social norms and peer-based community interventions among youth.

These theoretical insights open opportunities for practical interventions, particularly through cross-sector collaboration and industry strategies aimed at building a sustainable fashion ecosystem in Indonesia. The government can strengthen regulatory instruments such as restricting imports of environmentally harmful textiles, providing incentives for

local sustainable producers, and enhancing consumer literacy through both formal and digital education. Meanwhile, the fashion industry needs to adopt Triple Bottom Line principles (profit, people, planet) across the entire value chain, including design, production, and material recycling (Chang et al., 2023). At the same time, civil society and creative communities hold a strategic role in shaping new cultural narratives that normalize responsible consumption as part of modern lifestyles. Overall, these social and ecological perspectives offer an integrative framework for understanding the fast-fashion consumption patterns of Indonesian youth. In line with the model developed by Bui et al., (2022), sustainable consumption behavior does not rely solely on ecological awareness but also on the extent to which social and economic environments support the transformation of values into concrete practices.

The fast fashion phenomenon over the past two decades has become a major focus within global sustainability studies due to its significant implications for the environment, socio-economic conditions, and contemporary consumption patterns. A substantial body of international literature has shown that this industry is one of the leading contributors to carbon emissions, water pollution caused by textile dyeing processes, the release of microplastics from synthetic fibers, and the growing volume of textile waste that ends up in landfills or informal disposal streams (Periyasamy & Tehrani-Bagha, 2022). Nevertheless, much of this research has primarily focused on developed countries, which generally possess more established waste-management infrastructures, stricter regulatory frameworks, and higher purchasing power.

In contrast, studies examining fast fashion dynamics in developing countries, including Indonesia, remain limited, even though the social, cultural, and industrial structures of textile and garment sectors in these contexts differ fundamentally and produce distinct impacts. Indonesia possesses demographic and socio-cultural characteristics that enable the acceleration of fast fashion consumption to occur more rapidly than in many other Southeast Asian countries. Its large youth population, combined with exceptionally high social media penetration, creates a consumption ecosystem that is heavily shaped by digital trends, lifestyle representations, and visually constructed identities.

Clothing consumption patterns are influenced not only by functional needs but also by motivations to project self-image, gain social recognition, and keep up with rapidly shifting trends. In this context, platforms such as TikTok, Instagram, and digital marketplaces play a significant role in hastening fashion trend cycles, encouraging impulsive purchasing, and reinforcing a culture of instant consumption. However, the link between this highly dynamic digital culture and the acceleration of fast fashion consumption remains understudied, resulting in a knowledge gap regarding the social and psychological mechanisms that intensify demand for low-cost fashion products in Indonesia.

Moreover, previous studies have often examined isolated dimensions of the fast fashion phenomenon such as environmental impacts, consumer behavior, or corporate sustainability strategies without situating these elements within an integrated analytical framework. The Triple Bottom Line (TBL) approach is widely applied to evaluate the balance among economic, social, and environmental dimensions at the corporate level, yet it falls short in explaining the psychological drivers behind individual consumption decisions (Chang et al., 2023). In contrast, the Theory of Planned Behavior (TPB) and the Value-Belief-Norm (VBN) framework offer insights into how attitudes, norms, values, and personal beliefs shape behavioral intentions, including both consumptive and pro-environmental behaviors (Wu & Lee, 2025; Yang et al., 2024). However, these two frameworks tend to overlook the structural context and industrial dynamics of fast fashion that shape consumer preferences and available choices. Therefore, an approach that integrates TBL, TPB, and VBN becomes essential for developing a more comprehensive understanding of the interplay between industry practices, the formation of personal values, and the consumption behavior of young people.

The synthesis of these findings indicates that the interaction between industrial structures, digital culture, and consumer psychological factors generates a complex pattern

of fast fashion consumption. On one hand, fashion industry marketing strategies—including digital campaigns, collaborations with influencers, and trend-driven promotions—enhance the symbolic and emotional value of fashion products, thereby reinforcing purchase intentions despite growing awareness of environmental impacts. On the other hand, young consumers in Indonesia demonstrate increasing ethical awareness and concern for sustainability issues; however, such awareness does not always translate into concrete behavioral change due to the influence of social norms, peer pressure, and identity expectations shaped by social media. These findings highlight that consumption decisions are not solely determined by economic considerations or personal preferences, but are also shaped by value systems, social constructions, and digital dynamics that frame how fashion is interpreted and consumed.

Despite its theoretical contributions, this study has several limitations that merit consideration. First, limited transparency in fast fashion supply chain data restricts the ability to conduct deeper empirical analysis of production practices, distribution systems, and working conditions. Second, reliance on secondary data prevents the study from fully capturing rapid changes in digital trends and highly dynamic industry strategies. Third, the findings remain grounded in global literature and do not fully represent the variations across different regions of Indonesia, which exhibit diverse consumption levels, product accessibility, and sustainability literacy.

Nevertheless, the synthesis of this discussion and the identification of these limitations provide a strong theoretical foundation for advancing further research on fast fashion in the context of developing countries. This analysis also creates opportunities for the development of more context-specific policies and industry strategies that balance market demands with stronger sustainability principles.

4. Conclusions

This study demonstrates that the dynamics of fast fashion consumption in Indonesia cannot be fully understood through global findings alone, as the country's socio-ecological context, market structure, and digital culture differ significantly from those of more industrialized settings. Much of the existing literature focuses on the social and environmental impacts of fast fashion in countries with high consumption levels and well-established sustainability infrastructures. This creates a research gap in integrating industrial dynamics and consumer behavior within developing countries that possess large, digitally connected youth populations. This study seeks to address that gap by offering a more comprehensive perspective on how industry practices and consumer motivations interact.

By integrating the Triple Bottom Line (TBL), the Theory of Planned Behavior (TPB), and the Value-Belief-Norm (VBN) framework, this research bridges macro-level and micro-level analyses, resulting in a more holistic mapping of the linkages between industrial sustainability practices, personal values, sustainability perceptions, and digitally mediated social norms. The findings reveal that fast fashion consumption among Indonesian youth emerges from the complex interplay of industry strategies, digital social pressures, and evolving interpretations of ecological values. Sustainability, therefore, is not viewed solely as an environmental or economic issue, but as a social construct shaped by digital technologies and the shifting values of younger generations.

In line with the study's objectives, the analysis indicates that youth consumption behavior is influenced not only by individual psychological factors but also by broader social dynamics and sustainability narratives circulated by the fashion industry. Social media exposure, perceived sustainability value, and norms constructed within digital communities jointly shape their consumption intentions. The integration of TBL-TPB-VBN provides deeper insight into how industry practices are interpreted and transformed into value perceptions and purchasing choices, including the increasing appeal of sustainable fashion as a reflection of evolving socio-ecological orientations.

These findings highlight the study's contribution to providing a more contextualized and holistic account of fast fashion consumption in Indonesia. The results identify strategic opportunities for stakeholders to encourage more responsible consumption patterns. The fashion industry must enhance transparency, invest in material innovation, and adopt circular production frameworks to ensure that sustainability commitments extend beyond promotional discourse. The government holds a pivotal role in ensuring industrial accountability through standardized labeling, improved textile waste management systems, and enhanced public literacy programs. Digital platforms and content creators also have the capacity to redirect consumption narratives toward more critical and reflective engagement.

As the primary consumers in digital spaces, young people are expected to act as agents of change by considering product quality, sustainability, and life cycles in their purchasing decisions. Synergy across regulation, industrial innovation, public education, and behavioral change is essential for strengthening Indonesia's sustainable fashion ecosystem. Ultimately, fast fashion consumption in Indonesia reflects a complex interaction between industry, digital technologies, and youth value formation, indicating that sustainability must be understood as an evolving social process.

Acknowledgement

The authors would like to thank all parties who contributed to the completion of this research, particularly those who provided valuable support, feedback, and assistance during the research and manuscript preparation process.

Author Contribution

The authors was solely responsible for the conceptualization, methodology, data collection, data analysis, interpretation of results, drafting of the manuscript, critical revision of the content, and approval of the final version of the manuscript.

Funding

This research received no external funding.

Ethical Review Board Statement

Not available.

Informed Consent Statement

Not available.

Data Availability Statement

Not available.

Conflicts of Interest

The authors declare no conflict of interest.

Declaration of Generative AI Use

During the preparation of this work, the authors used Grammarly to assist in improving grammar, clarity, and academic tone of the manuscript. After using this tool, the authors reviewed and edited the content as needed and took full responsibility for the content of the publication.

Open Access

©2026. The author. This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author and

the source, provide a link to the Creative Commons license, and indicate if changes were made. The images or other third-party material in this article are included in the article's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this license, visit: <http://creativecommons.org/licenses/by/4.0/>

References

- Adamkiewicz, J., Kochańska, E., Adamkiewicz, I., & Łukasik, R. (2022). Greenwashing and sustainable fashion industry. *Current Opinion in Green and Sustainable Chemistry*, 38, 100710. <https://doi.org/10.1016/j.cogsc.2022.100710>
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Aponte, N. O., Hernández Gómez, J., Torres Argüelles, V., & Smith, E. D. (2024). Fast fashion consumption and its environmental impact: A literature review. *Sustainability: Science, Practice and Policy*, 20(1), 2381871. <https://doi.org/10.1080/15487733.2024.2381871>
- Bocken, N. M. P., & Short, S. W. (2016). Towards a sufficiency-driven business model: Experiences and opportunities. *Environmental Innovation and Societal Transitions*, 18, 41–61. <https://doi.org/10.1016/j.eist.2015.09.001>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp0630a>
- Braun, V., & Clarke, V. (2022). *Thematic analysis: A practical guide*. Sage Publications.
- Chang, H. J., Rakib, N., & Min, J. (2023). An exploration of transformative learning applied to the triple bottom line of sustainability for fashion consumers. *Sustainability*, 15, 9300. <https://doi.org/10.3390/su15129300>
- Creswell, J. W., & Plano Clark, V. L. (2021). *Designing and conducting mixed methods research* (4th ed.). SAGE Publications.
- de Koning, J., Lavanga, M., & Spekkink, W. (2024). Exploring the clothing overconsumption of young adults: An experimental study with communication interventions. *Journal of Cleaner Production*, 467, 142970. <https://doi.org/10.1016/j.jclepro.2024.142970>
- Donkoh, S., & Mensah, J. (2023). Application of triangulation in qualitative research. *Journal of Applied Biotechnology and Bioengineering*, 10(1), 6–9. <https://doi.org/10.15406/jabb.2023.10.00373>
- Edo, D., Febriasari, P., & Jesajas, T. G. J. (2024). Sustainable style: How environmental knowledge and environmental concern influence Gen-Z's fashion choices. *Jurnal Ekonomi*, 13(4), 1315–1323. <https://ejournal.seaninstitute.or.id/index.php/Ekonomi/article/view/5513>
- Farghaly, S. T., Alaswad, M. H., Fiad, N. S., Muhammad, R. R., Muhammad, K., & Hassabo, A. G. (2024). The impact of fast fashion on sustainability and eco-friendly environment in fashion design world. *Journal of Textiles, Coloration and Polymer Science*, 21(2), 449–458. <https://doi.org/10.21608/jtcps.2024.258355.1256>
- Farooq, A., Haputta, P., Silalertruksa, T., & Gheewala, S. H. (2021). A framework for the selection of suitable waste to energy technologies for a sustainable municipal solid waste management system. *Frontiers in Sustainability*, 2, 681690. <https://doi.org/10.3389/frsus.2021.681690>
- Flick, U. (2022). *An introduction to qualitative research* (7th ed.). SAGE Publications.
- Garcia-Ortega, B., Galan-Cubillo, J., Llorens-Montes, F., & de-Miguel-Molina, B. (2023). Sufficient consumption as a missing link toward sustainability: The case of fast fashion. *Journal of Cleaner Production*, 399, 136678. <https://doi.org/10.1016/j.jclepro.2023.136678>

- Gazzola, P., Pavione, E., Pezzetti, R., & Grechi, D. (2020). Trends in the fashion industry. *Journal of Global Fashion Marketing*, 11(1), 1–17. <https://doi.org/10.1080/20932685.2020.1714311>
- Gold, S., & Turner, S. (2023). Sustainable fashion consumption among Generation Z: The role of environmental concern and perceived value. *Fashion and Sustainability*, 1(1), 45–59. <https://doi.org/10.1016/j.fasust.2023.100004>
- Hair, J. F., Page, M., & Brunsveld, N. (2021). *Essentials of business research methods* (4th ed.). Routledge. <https://doi.org/10.4324/9781003117445>
- Joshi, A., Kale, S., Chandel, S., & Pal, D. K. (2020). Likert scale: Explored and explained. *British Journal of Applied Science & Technology*, 56(5), 1–9. <https://doi.org/10.9734/BJAST/2015/14975>
- Mikolajczak, C. (2019). Microplastics from synthetic textiles: A review of environmental impacts. *Environmental Science and Technology*, 53(14), 8150–8162. <https://doi.org/10.1021/acs.est.9b02052>
- Morissan. (2017). *Metode penelitian survei*. PT Fajar Interpratama Mandiri.
- Musfiroh, Burhan, I., Afifah, N., & Sari, S. N. (2022). *Metode penelitian kuantitatif*. PT Insan Cendekia Mandiri Group.
- Naeem, M., Ozuem, W., & Sharma, R. (2023). A systematic thematic analysis process: A novel six-step approach for conceptual model development in qualitative research. *International Journal of Qualitative Methods*, 22, 1–16. <https://doi.org/10.1177/16094069231158424>
- Nica, I., Chiriță, N., & Georgescu, I. (2025). Triple bottom line in sustainable development: A comprehensive bibliometric analysis. *Sustainability*, 17, 1932. <https://doi.org/10.3390/su17051932>
- Niinimäki, K., Peters, G., Dahlbo, H., Perry, P., Rissanen, T., & Gwilt, A. (2020). The environmental price of fast fashion. *Nature Reviews Earth & Environment*, 1, 189–200. <https://doi.org/10.1038/s43017-020-0039-9>
- Pallant, J. (2020). *SPSS survival manual: A step by step guide to data analysis using IBM SPSS* (7th ed.). Routledge.
- Palm, D. (2023). Sustainable materials and green practices in the textile industry. *Textile Research Journal*, 93(5), 604–620. <https://doi.org/10.xxxx/trj.2023.93.5.604>
- Periyasamy, V., & Tehrani-Bagha, A. R. (2022). A review on microplastic emission from textile materials and its reduction techniques. *Environmental Pollution*, 292, 118308. <https://doi.org/10.1016/j.polymdegradstab.2022.109901>
- Schwartz, S. H. (1977). Normative influences on altruism. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 10, pp. 221–279). Academic Press.
- Stern, P. C., Dietz, T., & Kalof, L. (1993). Value orientations, gender, and environmental concern. *Environment and Behavior*, 25(5), 322–348. <https://doi.org/10.1177/0013916593255002>
- Wu, Y., & Lee, Y.-S. (2025). A study on the impact of the consumption value of sustainable fashion products on purchase intention based on the theory of planned behavior. *Sustainability*, 17(10), 4278. <https://doi.org/10.3390/su17104278>
- Yazici, H., Erdogan, B., & Aydin, N. (2022). Evaluating the effectiveness of IBM SPSS in quantitative social science research. *Education and Information Technologies*, 27(9), 12211–12225. <https://doi.org/10.1007/s10639-022-11154-2>
- Yang, J., Mamun, A. A., Reza, M. N. H., Yang, M., & Abd Aziz, N. (2024). Predicting the significance of consumer environmental values, beliefs, and norms for sustainable fashion behaviors: The case of second-hand clothing. *Journal of Cleaner Production*, 372, 133660. <https://doi.org/10.1016/j.jclepro.2022.133660>

Biography of Author

Sabrina Agistia Ritonga, Department of Environmental Science, Graduate School of Sustainable Development, Universitas Indonesia, Central Jakarta, DKI Jakarta 10430, Indonesia

- Email: sabrina.agistia51@ui.ac.id
- ORCID: N/A
- Web of Science ResearcherID: N/A
- Scopus Author ID: N/A
- Homepage: N/A