

The Role of Digital Green Campaigns in Shaping Willingness to Pay for Carbon Accounting: The Mediating Effect of Green Awareness among Gen-Z

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Abstract. This study confirms that digital green campaigns can significantly foster students' willingness to financially support carbon accounting mechanisms beyond simple green product purchases through the mediating role of green awareness. The findings clarify how digital exposure translates into internalized pro-environmental values that drive demand for transparency in carbon emissions reporting. These insights offer both theoretical and practical implications for sustainability communication, particularly in emerging economies such as Indonesia. Future research should explore how WTP for carbon accountability evolves across age groups, under different digital campaign designs, and in alignment with national carbon policy instruments. A cross-sectional survey was conducted among 324 university students in Indonesia using validated scales. Data were analyzed using PLS-SEM to examine direct and indirect relationships. The findings indicate that both green awareness and digital engagement have a significant and positive effect on WTP. In particular, digital engagement, measured by the frequency of interactions with environmental content on social media, shows stronger predictive power. These results suggest that increasing digital exposure to sustainability issues could enhance support for carbon accountability programs. The study offers practical implications for sustainability campaigns targeting Gen Z and contributes to the literature on sustainability accounting.

1 Introduction

The escalating environmental crisis has prompted global initiatives to promote sustainable consumption patterns, with the United Nations Sustainable Development Goal 12 emphasizing responsible consumption and production [1]. Among these efforts, carbon accounting has gained increasing prominence as a mechanism for tracking, managing, and reporting greenhouse gas (GHG) emissions at both organizational and individual levels. In the Indonesian context, carbon accounting is also becoming relevant due to recent policy developments, such as the Law on Harmonization of Tax Regulations No. 7/2021, which introduces a carbon tax framework. While implementation is still limited, the law reflects

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growing institutional recognition that carbon emissions must be accounted for and internalized through financial instruments.

Carbon accounting is defined as a system that gathers, records, and analyzes climate-related data to evaluate and communicate an entity's environmental performance [2], [3]. Initially focused on organizational disclosures, carbon accounting is now increasingly discussed in the context of individual-level behavior [4], particularly about willingness to pay (WTP) for emissions reduction. [2] emphasize that individuals are not merely passive consumers; they are also daily contributors to carbon emissions through transportation, energy use, and consumption patterns. As such, their behavioral intention to financially support carbon accountability, whether through taxation or sustainable purchasing, represents a valuable foundation for legitimizing and expanding carbon accounting frameworks.

Recent studies suggest that psychological and demographic factors significantly influence WTP for carbon-related initiatives [2], [5], [6], [7], [8]. However, a critical research gap remains in directly connecting WTP to carbon accounting, especially in countries like Indonesia, where both sustainability awareness and digital media penetration are rapidly evolving [9], [10], [11]. While the concept of WTP is often applied to sustainable products, its application to carbon-specific accountability remains limited, particularly among young consumers.

Generation Z individuals, born roughly between 1997 and 2012, emerge as a crucial demographic in this discourse. Gen Z not only exhibits strong environmental concern but also dominates digital media spaces where environmental messages are frequently disseminated [9], [12]. According to the Indonesia Gen Z Report [13], 88% of Gen Z agree that climate change is a serious issue, and 94% believe that systemic reform is necessary. However, only 82% express a willingness to pay more for eco-friendly goods, and fewer still consistently act on this intention. This gap between expressed concern and real financial commitment highlights the need to investigate psychological mediators that can translate exposure to digital green campaigns into actual willingness to support carbon initiatives.

Digital green campaigns and environmental messages disseminated on platforms such as Instagram, TikTok, and YouTube have become increasingly influential in shaping environmental attitudes [14]. However, their effectiveness in driving carbon-specific behavioral outcomes, such as WTP for carbon accounting, remains underexplored. Most prior studies have focused on how digital content influences purchase decisions for eco-labeled products [15], [16] rather than on support for systemic environmental tools such as carbon accounting.

Environmental awareness, also known as green awareness, has been identified as a key psychological mechanism in sustainability-related decision-making. Defined as an individual's knowledge, concern, and sense of responsibility toward environmental issues [17], [18], [19], [20], green awareness may serve as a bridge between digital exposure and behavioral intention. The Elaboration Likelihood Model [21] suggests that repeated exposure to persuasive environmental content can result in either central or peripheral processing, both of which can increase awareness. Meanwhile, the Theory of Planned Behavior [22] supports the idea that awareness-based attitudes translate into concrete behavioral intentions, such as WTP.

Building on these theoretical frameworks, this study examines how exposure to digital green campaigns influences Generation Z's willingness to pay for carbon accounting, with green awareness as a mediating variable. By focusing on university students in Indonesia, a digitally active group in an emerging market, this research seeks to fill a significant empirical and contextual gap. Furthermore, by explicitly framing WTP in terms of support for carbon accounting rather than general sustainable products, this study provides new insights into behavioral drivers that can support the legitimization and implementation of carbon-based regulations and reporting mechanisms.

2 Literature and Hypothesis Development

This study draws upon two complementary theoretical frameworks: the Elaboration Likelihood Model (ELM) and the Theory of Planned Behavior (TPB). ELM [21] explains how persuasive environmental messages embedded in digital green campaigns are cognitively processed through either central or peripheral routes, leading to varying levels of environmental awareness. Once awareness is formed, the TPB [22] is employed to explain how this awareness influences behavioral intentions, such as the willingness to pay (WTP) for carbon accounting. In this framework, green awareness functions as the attitudinal component driving pro-environmental intentions, particularly financial support for carbon disclosure practices. Among Generation Z, who are highly active on platforms like Instagram and TikTok, exposure to digital green content may trigger both routes, depending on relevance and personal involvement. When digital green campaigns successfully stimulate cognitive elaboration, they can enhance green awareness, defined as an individual's knowledge, concern, and sense of responsibility toward environmental issues. According to ELM, this awareness serves as a foundation for forming pro-environmental behavioral intentions, such as the willingness to pay (WTP) for carbon accounting, a critical mechanism for supporting climate-related transparency and governance. Thus, ELM provides a theoretical basis to understand how repeated digital exposure translates into increased environmental awareness, which subsequently leads to support for carbon accounting systems through financial willingness.

Digital platforms have become central channels for environmental messaging, particularly among youth audiences. Prior studies show that social media campaigns significantly enhance environmental knowledge and concern by offering visually rich, easily accessible, and peer-reinforced content [23], [24]. Generation Z, as digital natives, frequently engages with environmental messages across Instagram, TikTok, and YouTube, which can increase cognitive elaboration, as explained by the Elaboration Likelihood Model [21]. Studies have found that frequent digital exposure leads to greater awareness of environmental issues [25], [26], [27]. Accordingly, individuals who regularly consume environmental content online are more likely to become aware of sustainability issues, including carbon emissions and climate-related risks.

H1: Exposure to digital green campaigns has a positive relationship to green awareness among Generation Z.

Environmental awareness plays a critical role in shaping behavioral intentions related to sustainability. According to the Theory of Planned Behavior [22], increased awareness leads to more favorable attitudes and stronger intentions to act in environmentally responsible ways. Green awareness, which includes concern for climate change, knowledge of sustainability practices, and a sense of personal responsibility, has been consistently linked to willingness to pay (WTP) for pro-environmental actions [17], [28], [29]. In the context of carbon accounting, [2] found that individuals with strong environmental concerns are more likely to support carbon tax mechanisms, which rely on accurate and accountable carbon accounting systems. Therefore, individuals who are more aware of the environmental consequences of carbon emissions are more willing to pay for systems that help monitor and reduce such impacts.

H2: Green awareness is positively associated with the willingness to pay for carbon accounting among Generation Z.

Although digital green campaigns can influence sustainable behavior, their effects are often indirect and mediated by psychological mechanisms, such as awareness or concern. As proposed by dual-process models of persuasion, including the ELM, individuals do not act

solely based on media exposure; instead, information must be cognitively processed to influence behavior [30]. Recent empirical studies support this mediating role. For example, [31], [32], [33] found that environmental concern mediates the relationship between social media exposure and green purchase intentions. Likewise, [2] demonstrated that health consciousness and mortality salience mediate willingness to pay for carbon taxes. Applying this reasoning, it is expected that the effect of exposure to the digital green campaign on WTP for carbon accounting is primarily channeled through green awareness.

H3: Green awareness mediates the relationship between exposure to digital green campaigns and willingness to pay for carbon accounting.

3 Method

A purposive sampling technique was employed to recruit participants who met the following inclusion criteria: active university students aged 18 to 25 residing in Indonesia, who used social media for at least 2 hours per day, and had access to platforms such as Instagram, TikTok, and YouTube. Data collection was conducted online via Google Forms from April to June 2025. The questionnaire was distributed through university mailing lists, student associations, and social media groups, with prior permission obtained. A total of 324 valid responses were gathered. Prior to full-scale distribution, a pilot test involving 30 participants was conducted to assess the clarity of the language, content validity, and the survey instrument's preliminary reliability. Based on feedback from the pilot, minor revisions were made to enhance item comprehension. Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) via SmartPLS 4.

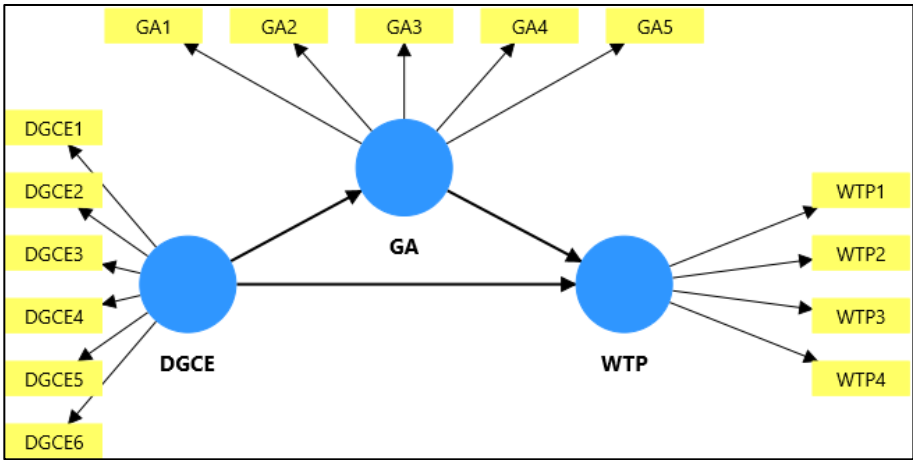


Fig1. Research Model

All constructs were measured using established scales adapted from previous research and validated through expert review and pilot testing. Items were translated into Bahasa Indonesia using back-translation procedures to ensure semantic equivalence. All WTP items were operationalized to reflect a willingness to financially support carbon accountability through purchasing decisions or corporate transparency.

Table 1. Construct and measurement

Construct	Source(s)/Adapted from	Items
Digital Green Campaign Exposure (DGCE)	[23], [24]	I frequently see environmental campaigns on my social media feeds.
		I follow social media accounts that often share environmental or sustainability content.
		I often like, comment on, or share green campaign content on digital platforms.
		I regularly watch videos about environmental issues on TikTok, Instagram, or YouTube.
		I read online articles and blog posts about environmental sustainability.
		I spend time engaging with content that promotes eco-friendly or sustainable behavior.
Green Awareness (GA)	[17], [18], [19], [20]	I am knowledgeable about climate change and its impact on society.
		I am responsible for protecting the environment.
		I actively seek information about solutions to environmental problems.
		I am concerned about pollution and waste issues.
		I am aware of eco-friendly products and environmental initiatives in my daily life.
Willingness to Pay for Carbon Accounting (WTPCA)	[2], [28], [29]	I am willing to pay more for products or services that disclose their carbon footprint.
		I support companies that publicly report their carbon emissions or their efforts to reduce them.
		To reduce them. Paying more for transparent carbon accounting practices is worthwhile.
		I am willing to reduce other expenses to support companies that implement carbon accounting.

In this study, willingness to pay (WTP) was defined and explicitly measured as the intention to financially support carbon transparency through purchasing decisions or by prioritizing companies that implement and disclose verified carbon accounting practices.

4 Result and Discussion

4.1 Result

After data cleaning procedures, the final sample comprised 324 valid responses (response rate: 81%). Participants ranged in age from 18 to 25 years ($M = 21.4$, $SD = 1.7$), with 58.6% of the respondents being female and 41.4% male. The majority (76.5%) reported spending more than 3 hours daily on social media, with Instagram (91.4%), TikTok (78.7%), and YouTube (85.5%) being the most frequently used platforms for environmental content.

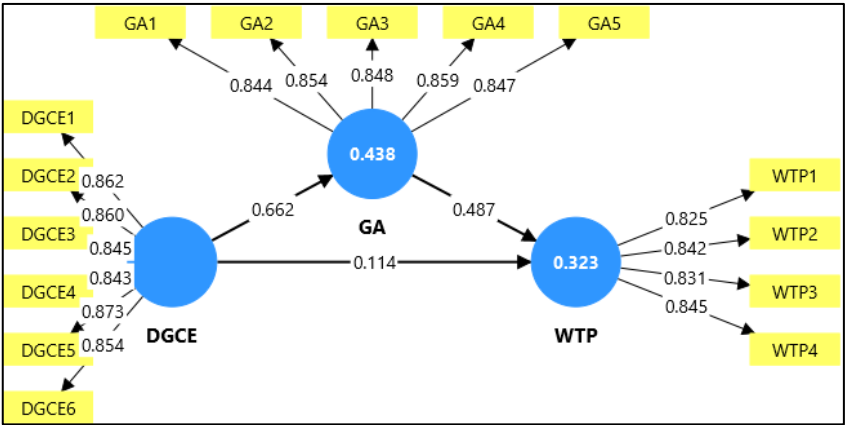


Fig2. Smart PLS Output

Figure 2 presents the structural model output from SmartPLS. It illustrates the hypothesized paths between Digital Green Campaign Exposure (DGCE), Green Awareness (GA), and Willingness to Pay Carbon Accounting (WTP).

Table 2. Evaluation of Structural Model Fit Criteria

Criteria	Output		Critical Value	Evaluation
Outer Model				
Convergent Validity	Indicator	Construct	≥ 0.7	Valid
	DGCE1	0.862678025		
	DGCE2	0.860960001		
	DGCE3	0.845021783		
	DGCE4	0.843102128		
	DGCE5	0.872464311		
	DGCE6	0.852148397		
	GA1	0.843632084		
	GA2	0.854007302		
	GA3	0.847896797		

	GA4	0.859163889			
	GA5	0.847263916			
	WTP1	0.822480846			
	WTP2	0.841901936			
	WTP3	0.833026984			
	WTP4	0.845380361			
	Discriminant validity (Average Variance Extracted/AVE)		AVE		
DGCE		0.640	0.800		
GA		0.755	0.869		
WTP		0.733	0.856		
Composite Reliability	DGCE	0.926		≥ 0.7	Reliable
	GA	0.939			
	WTP	0.916			

Table 2 evaluates the measurement model to ensure validity and reliability. All item loadings exceed the 0.7 threshold, confirming convergent validity for all indicators under the DGCE, GA, and WTP constructs. Discriminant validity is established as all AVE values are above 0.5, and the square roots of AVE exceed inter-construct correlations. Additionally, the composite reliability values for all constructs surpass the 0.7 benchmark, indicating internal consistency and reliability of the measurement model.

Table 3. Results of Hypotheses 1 and 2

Relations			Path Coef	P Value	R-Squared	Adj- R-squared
GDCE	→	GA	0.662	0.000 (H1 Supported)	0.439	0.436
GA	→	WTP	0.487	0.000 (H2 Supported)	0.323	0.319
GDCE	→	WTP	0.114	0.099		

Table 3 displays the structural model results for Hypothesis 1 (H1) and Hypothesis 2 (H2). The path from DGCE to GA ($\beta = 0.662$, $p < 0.001$) supports H1, suggesting that greater exposure to digital green campaigns significantly increases green awareness. Similarly, GA has a positive effect on WTP ($\beta = 0.487$, $p < 0.001$), supporting H2. Both paths are statistically significant, and the R-squared values indicate that the model has moderate explanatory power.

Table 4. Results of Hypothesis 3

Relations			Intervening	Direct Effect	Indirect Effect	Total Effect	Result
GDCE	→	WTP	GA	0.114	0.322	0.436	(H3 Supported)

Table 4 shows the mediation analysis for Hypothesis 3 (H3). Although the direct effect of DGCE on WTP is relatively small ($\beta = 0.114$), the indirect effect through GA is much more potent ($\beta = 0.322$), resulting in a total effect of 0.436. This result supports H3, confirming that GA significantly mediates the relationship between DGCE and WTP.

4.2 Discussion

This study examined how digital green campaign exposure (DGCE) influences university students' willingness to financially support carbon accounting (WTPCA), with green awareness (GA) as a mediator. Using SmartPLS 4, the structural model confirmed support for all three hypotheses. The results confirm the robustness of the proposed model and align with the study's objective to explore digital persuasion mechanisms for sustainability among Gen Z consumers in Indonesia.

Empirically, the path coefficient from DGCE to GA was 0.662 with a p-value of 0.000, indicating a substantial and statistically significant effect. This result supports Hypothesis 1, suggesting that frequent exposure to environmental content via digital platforms significantly increases students' awareness of environmental issues. This finding echoes previous studies that show digital campaigns can enhance environmental literacy and concern [14], [23], [24]. The R-squared value for GA was 0.439, indicating that DGCE explains nearly 44% of the variance in green awareness, a considerable effect size in behavioral research. This result supports the Elaboration Likelihood Model [21], suggesting that both central and peripheral routes of information processing triggered by digital campaigns can raise environmental awareness.

The path from GA to WTP showed a coefficient of 0.487 ($p = 0.000$), supporting Hypothesis 2. This result aligns with the Theory of Planned Behavior [22], which posits that awareness and attitudes significantly influence behavioral intentions. Consistent with [17], [28], [29], this study reinforces the role of environmental awareness in predicting willingness to support sustainability initiatives. It also validates the findings of [2], which suggest that consumers who are more informed and concerned about environmental consequences are more likely to support carbon tax mechanisms and corporate carbon disclosure practices.

For Hypothesis 3, the direct effect of DGCE on WTP was $\beta = 0.114$ with a p-value of 0.099, which was not statistically significant. However, the indirect effect through GA was substantial ($\beta = 0.322$), resulting in a total effect of $\beta = 0.436$. This result indicates that green awareness fully mediates the relationship between digital campaign exposure and willingness to pay for carbon accountability. Similar findings were reported by [31], [32], [33], who found that environmental attitudes mediate the influence of social media exposure on sustainable behavioral intentions. These results underscore that awareness, not just exposure, is the key psychological pathway to meaningful engagement with climate accountability.

These patterns contribute to closing the gap identified by [9], [10], who observed that digital campaign exposure among youth in developing countries often does not translate into actual pro-environmental behavior. Our findings refine this narrative by highlighting green awareness as the key mediator. Moreover, this adds to the empirical foundation for designing campaigns that emphasize content-driven engagement rather than merely increasing visibility while also providing new insights into their applicability in a Southeast Asian, digitally connected youth demographic. The prominence of platforms like Instagram, TikTok, and YouTube, used by more than 75% of the sample, suggests that campaign visibility is high, but its impact depends on cognitive engagement. Hence, digital green messages should be viewed as tools for cultivating internal values rather than just short-term behavior nudges.

Nevertheless, several limitations must be acknowledged. The sample was limited to university students aged 18–25, a demographic likely more responsive to digital environmental campaigns than the general public. While this strengthens internal validity for the Gen Z population, external validity may be limited. Future research should extend these findings to broader age groups and include longitudinal designs to observe whether awareness and willingness to pay persist over time.

From a practical perspective, this study recommends that marketers, educators, and environmental advocates design digital campaigns that emphasize content-driven,

informative messaging to promote low-carbon choices. Sustainability education can be synergized with digital engagement strategies in higher education settings. For organizations and policymakers, investing in consistent, awareness-focused campaigns across high-engagement platforms offers an evidence-based path toward fostering responsible consumer behavior. Significantly, evaluation frameworks should shift their focus from mere conversion metrics to indicators of awareness and value alignment, acknowledging that changes in sustainability behavior often emerge from sustained internalization rather than an immediate reaction.

5 Conclusion

This study confirms that digital green campaigns play a pivotal role in shaping university students' willingness to support carbon accounting financially, primarily by enhancing their green awareness. Drawing on the Elaboration Likelihood Model, our findings demonstrate that frequent exposure to persuasive environmental content on platforms such as Instagram, TikTok, and YouTube increases cognitive engagement, which, in turn, fosters deeper environmental consciousness among Generation Z.

Significantly, green awareness fully mediates the relationship between digital campaign exposure and willingness to pay for carbon accountability initiatives. This result suggests that digital content alone does not directly lead to pro-environmental behavior; rather, its effectiveness depends on its ability to activate internal awareness and a sense of responsibility. In this regard, awareness functions as the psychological mechanism that transforms digital exposure into meaningful behavioral intentions, such as financial support for carbon disclosure practices.

By conceptualizing willingness to pay specifically in the context of carbon accounting rather than general eco-friendly consumption, this study offers new insights into the literature on sustainable behavior and climate communication. It highlights that Gen Z consumers are not just responsive to environmental branding but are also willing to support systemic transparency in greenhouse gas reporting when adequately informed and engaged.

Future research should expand this inquiry by examining WTP for carbon accounting across different policy settings and demographics, including older age groups and rural populations. Moreover, longitudinal and experimental designs may offer more profound insight into whether digital campaigns create lasting behavioral change or only temporary awareness spikes. As carbon markets and sustainability regulations continue to evolve in Indonesia and globally, understanding the motivational pathways behind individual support for carbon reporting will be critical for building inclusive, bottom-up accountability frameworks.

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