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Exploring the Influence of Artificial Intelligence and Religiosity on Green Purchase Intention: An Empirical Study from Bangladesh

Nabila Islam, Hanim Misbah*
Faculty of Economics and Muamalat,
Universiti Sains Islam Malaysia (USIM), Malaysia
Email: hanim@usim.edu.my

* *Corresponding Author*

Abstract
Purpose: This study investigates how artificial intelligence (AI) and religiosity influence green purchase intention and behavior in Bangladesh, contributing to the discourse on sustainable digital transformation in ASEAN
Design/methodology/approach: A quantitative research design was employed using survey data collected from Bangladeshi consumers. The proposed conceptual model was assessed using PLS-SEM via Smart PLS to evaluate hypothesized relationships among constructs such as AI, religiosity, green purchase intention, and green consumption behavior.
Findings: The analysis revealed that AI adoption and core constructs of the Theory of Planned Behavior (TPB)—subjective norm, and perceived behavioral control—positively influence green purchase intention and attitude inversely influence green purchase intention. In turn, green purchase intention was found to be a significant predictor of actual green consumption behavior. Furthermore, religiosity moderated the relationship between purchase intention and behavior, highlighting how spiritual values amplify pro- environmental action in societies.
Research limitations/implications: The study is context-specific to Bangladesh, which may limit generalizability across all ASEAN nations. Future research could validate the model across diverse socio-cultural contexts and explore other digital factors influencing sustainable behavior.
Practical implications: The findings offer strategic insight for marketers, policymakers, and environmental advocates, emphasizing the importance of combining AI-driven communication tools with faith-based messaging to effectively promote green behavior. Integrating religious values with digital sustainability campaigns can enhance policy relevance in emerging markets.
Originality/value: This research presents a framework integrating technological and cultural dimensions within the Theory of Planned Behavior (TPB), contributing to the emerging discourse on digital sustainability in ASEAN. While prior studies have explored AI and religiosity independently in sustainability contexts, this study offers a contribution by integrating both constructs within a unified TPB framework in the Bangladeshi context.

Keywords: Artificial Intelligence, Religiosity, Sustainable Consumption, TPB, ASEAN

Introduction

The Association of Southeast Asian Nations' (ASEAN) vision for sustainable and digital transformation is progressing quickly. The ASEAN Circular Economy Framework and the ASEAN Digital Economy Framework Agreement are two strategic frameworks that seek to promote digital integration, sustainable consumption, and economic resilience throughout the

region (ASEAN Secretariat, 2024; UNESCAP, 2023). Given that digital sustainability initiatives are predicted to generate up to US$3 trillion in GDP and millions of green jobs by 2050 (WEF, 2023), ASEAN offers a rich environment for comprehending the behavioral mechanisms underlying eco-conscious consumption, particularly in the intersection of technology and cultural norms.

Although Bangladesh is not a formal ASEAN member, it has steadily strengthened engagement through regional initiatives. Since joining the Treaty of Amity and Cooperation (TAC) in 2007, the country has pursued closer ties as a sectoral dialogue partner, focusing on trade, connectivity, and sustainability (ASEAN Secretariat, 2007; Ministry of Foreign Affairs, 2023). Collaboration now spans aquaculture, fisheries, and knowledge-sharing platforms, reflecting deeper regional integration (Rahman, 2023; The Financial Express, 2024). Comparing Bangladesh with ASEAN countries offers useful insights: Singapore and Malaysia have advanced in integrating artificial intelligence into green policies, while Indonesia and Vietnam face challenges similar to Bangladesh in balancing consumption growth with environmental sustainability (OECD, 2024). Thailand emphasizes circular economy initiatives, and the Philippines prioritizes community-based environmental programs (ASEAN Secretariat, 2023). Bangladesh closely resembles lower-middle-income ASEAN nations like Cambodia and Myanmar, where resource constraints, cultural values, and religiosity strongly influence consumer behavior (Sharma & Chung, 2006). Understanding these parallels provides a meaningful context for examining Bangladesh's green consumption patterns, highlighting how technology, culture, and religiosity shape consumers' intentions and behaviors toward sustainable products.

Marketing is only one of many industries that have seen significant change as a result of the development of artificial intelligence (AI). Through technologies like sentiment analytics, automated environmental messaging, and customized eco-campaigns, artificial intelligence (AI) is being used more and more in the field of green marketing to impact sustainable consumption habits (Ameen et al., 2022; Baqi et al., 2022). By anticipating customer demand, personalizing green solutions, and boosting customer trust, these AI apps enable businesses to increase environmental participation (Baqi et al., 2022). Notwithstanding the potential of these technologies, consumer involvement with eco-friendly items is still uneven, especially in poor nations where pro-environmental behavior is impeded by financial limitations, cultural norms, and a lack of understanding (Nguyen et al., 2022; Dwivedi et al., 2021).

The use of AI has led to a substantial evolution in green marketing, which highlights environmentally friendly features like recyclable packaging or carbon labeling (Luchs et al., 2010). Although there are still issues, these innovations improve sustainability alignment and message targeting (Kietzmann & Canhoto, 2018). Transparent and value-driven communication is essential since consumers might not be aware of AI-driven methods or be dubious of automated ethical decisions (Tan et al., 2022).

Green consumer behavior has not yet reached critical mass in Bangladesh, a lower-middle-income nation with serious environmental problems. Few research have examined AI's psychological impact on pro-environmental intention, especially in circumstances that are faith-oriented, despite some examining its practical advantages in sustainable operations (Xie et al., 2023; Hermann & Puntoni, 2025). Accordingly, AI-powered green marketing techniques, including digital nudges and eco-labeling algorithms, may play a key role in influencing attitudes, improving perceived control, and boosting behavioral intention (Raman et al., 2023;

Saadi & Azdimousa, 2024). Simultaneously, in nations with a majority of Muslims, cultural and ethical norms like religiosity are crucial in influencing green behavior. Environmental responsibility is reinforced by religious teachings that emphasize stewardship, moderation, and ethical behavior (Arli et al., 2021; Nurzaman & Herdiani, 2023). Recent research indicates that religion may have a greater influence as a moderator, enhancing the connection between intention and behavior, even though it has frequently been viewed as a direct antecedent of green behavior (Naufal et al., 2020; Wang & Mangmeechai, 2021).

The relationship between cognitive predictors—attitude, subjective norm, and perceived behavioral control—and green purchasing intention is framed in this study using the Theory of Planned Behavior (TPB) (Ajzen, 1991). Building on TPB, the model incorporates green buying intention as a mediator between these characteristics and green consumption behavior, as well as AI as an extra predictor. In the context of moral or spiritual reinforcement, religion is positioned as a moderator, which is thought to strengthen the intention-behavior link.

This integrated framework fills key methodological and theoretical gaps. The combined consequences of AI and religion in technologically changing, religiously affected communities have rarely been studied before. Additionally, the majority of the research currently in publication is exploratory or qualitative in nature and lacks strong empirical support (Gulo et al., 2025; Sampatsing et al., 2025; Karadayi-Usta, 2024). To solve this, the current work evaluates the suggested model using Partial Least Squares Structural Equation Modeling (PLS-SEM) on a sample of Bangladeshi customers.

This study adds to the growing body of research on AI-enabled sustainable consumer behavior by investigating how religion and artificial intelligence jointly affect green purchase intention and behavior in a growing, religiously oriented market. This study emphasizes the transformative significance of AI as a cognitive and contextual enabler within the Theory of Planned Behavior (TPB) paradigm, whereas previous research on green marketing has mostly focused on traditional environmental message. In particular, AI tools—like algorithmic labeling, green nudges, and personalized eco-recommendations—are envisioned as catalysts that improve consumers' attitudes, increase their sense of behavioral control, and build trust in messages about green products.

This study makes a significant contribution to the growing discourse on digital sustainability in ASEAN by combining technology innovation with socio-cultural factors. It provides fresh theoretical insights and practical consequences for policymakers, marketers, and development practitioners working to promote green behavior in culturally ingrained, digitally evolving economies. Specifically, by incorporating artificial intelligence (AI) into sustainability initiatives, organizations can better match their digital innovation efforts with changing consumer expectations and environmental ideals. This connection is especially important in ASEAN economies, where fast digital revolution is occurring alongside deeply ingrained cultural and religious values that influence consumer behavior. Furthermore, by integrating religiosity as a moderating variable, this study emphasizes the importance of spiritual values in improving the intention-behavior relationship—an area generally disregarded in mainstream green marketing and digital behavior literature.

In order to provide valuable insights into how digital tools and moral convictions interact to promote sustainable consumption in the Bangladeshi context, this study aims to determine how effective AI-driven variables and TPB constructs (attitude, subjective norm, and perceived

behavioral control) are at influencing green purchase intention. This paper makes three important contributions: first, it presents a framework that integrates TPB with AI and religiosity, providing a multidimensional view of pro-environmental behavior in digital societies; second, it empirically tests this framework using Partial Least Squares Structural Equation Modeling (PLS-SEM) with data from Bangladeshi consumers, thereby addressing the methodological limitations of previous qualitative or exploratory studies. Lastly, it contributes to the conversation on the adoption of culturally embedded AI by demonstrating how religious beliefs might increase the behavioral effects of technology.

This is how the rest of the paper is structured. Research hypotheses are developed after a survey of the literature and theoretical background is presented in Section 2. The research approach, including instrument design and sample, is described in Section 3. The findings of the PLS-SEM analysis are described in Section 4. The results, theoretical contributions, and practical ramifications are thoroughly discussed in Section 5. The study's shortcomings are described in the last part, along with suggestions for additional research.

Literature review

Green Marketing

The use of green marketing as a tactic to encourage ecologically conscious consumer behavior has long been acknowledged. It usually entails marketing goods and services on the basis of their environmental advantages, such as lower carbon emissions, recyclable packaging, or ethical sourcing methods. Green marketing has a considerable impact on consumer attitudes, trust, and behavioral intentions, according to previous study (Wu & Liu, 2022; Choi & Ng, 2011). For example, consumers are more likely to form positive views and have higher intents to buy a brand's products when they believe it to be environmentally conscious (Nyilasy et al., 2014).

But most of this research has focused on traditional industries, like electronics, cosmetics, or the automotive sector, and hasn't given much thought to how digital transformation can change green marketing tactics (Ng et al., 2014). In this sense, a new frontier is presented by the development of artificial intelligence (AI). More accurate and engaging methods of communicating green value propositions have been made possible by AI-powered marketing techniques, such as eco-personalized recommendations, algorithmic eco-labeling, and real-time sustainability nudges (Ameen et al., 2022; Baqi et al., 2022). These technologies boost consumer happiness and trust, which are crucial preconditions for green purchase intention, in addition to improving message targeting.

The literature on how AI-enabled green marketing affects consumer behavior in emerging countries, especially in sociocultural situations like Bangladesh, is still noticeably lacking despite these developments. Furthermore, few empirical research have looked into the psychological processes via which AI influences green purchase decisions, including attitude formation, perceived behavioral control, and subjective standards. Fewer studies even take into account the moderating influence of religion, which could increase the impact of digital green initiatives by bringing sustainability into line with moral and spiritual requirements (Nurzaman & Herdiani, 2023). Thus, this study aims to close these gaps by examining how, in ASEAN contexts that are technologically changing, AI-driven green marketing interacts with significant TPB characteristics and religion to influence green purchasing intention and behavior.

AI in Marketing

Artificial Intelligence (AI) has revolutionized marketing by allowing businesses to shift from conventional communication tactics to interaction that is data-driven, tailored, and sustainability-focused. Through predictive analytics and machine learning algorithms, AI improves businesses' ability to recognize customer preferences, automate sustainability messaging, and customize eco-product suggestions in the context of green marketing (Raman, Mehta, & Kumar, 2023). By enabling marketers to impact consumer behavior in real time, these technologies increase productivity, enhance targeting precision, and eventually promote increased environmental engagement (Saadi & Azdimousa, 2024). For instance, by providing timely product alternatives based on their browsing or purchase history, AI-powered solutions like chatbots, digital eco-labeling, and eco-personalized suggestion engines have been utilized to encourage customers to make sustainable decisions (Huang & Rust, 2021).Such technologies are particularly promising in ASEAN markets, where mobile penetration is high and digital infrastructure is rapidly evolving (ASEAN Secretariat, 2024).

Customer segmentation, automation, and real-time feedback analytics are just a few of the well-established functional advantages of AI in marketing (Davenport et al., 2020). However, its use in green consumer behavior is still relatively unexplored. Previous research has mostly concentrated on product innovation or operational sustainability, paying little attention to the ways AI affects important psychological categories such as attitude, subjective norms, and perceived behavioral control—all of which are fundamental factors in the Theory of Planned Behavior (Ajzen, 1991). Marketers may be able to affect consumer sentiments as well as perceptions of behavioral ease and social approbation related to green purchasing by using AI into the TPB framework. For example, among customers who are highly religious, tailored AI-generated ads that highlight affordability or spiritual alignment with environmental stewardship might increase both perceived behavioral control and intention (Nurzaman & Herdiani, 2023).

Nevertheless, there are a few limitations on AI's application in green marketing. Ethical and practical issues include worries about algorithmic transparency, digital trust, and the environmental implications of AI infrastructure, such as energy-intensive model training (Ligozat et al., 2021). Such worries are exacerbated in collectivist and religiously inclined nations like Bangladesh, where AI message must be ethically and culturally sensitive. Building trust and increasing the efficacy of AI-enabled sustainability campaigns thus depend on openness in AI operations and conformity to religious principles (Tan ET AL., 2022).

By empirically investigating how AI-driven green marketing methods affect customers' psychological drivers of green purchase intention, this study fills a significant gap in the field. It also looks at how these tactics can improve the alignment between intention and real green consumption behavior when they are in line with religious standards and technologically adaptable behaviors. By providing theoretical development and practical insight into how digital tools might assist environmentally and culturally congruent consumer participation, the research advances the field of AI-enhanced sustainability communication in ASEAN contexts.

Theoretical Background and Hypotheses Development

Green marketing methods have been greatly improved by the quick development of artificial intelligence (AI), which has changed traditional marketing into a data-driven, adaptable, and customer-centric system. Marketers may customize sustainability messaging, track real-time consumer behavior, and offer customized eco-product suggestions with the help of AI

technologies like machine learning, predictive analytics, and sentiment analysis (Raman, Mehta, & Kumar, 2023). These features significantly outperform traditional green marketing strategies, which frequently depend on the distribution of static information via eco-labels and broad campaigns (Kietzmann & Canhoto, 2018). The ability of AI to recognize behavioral indicators and dynamically modify marketing techniques is crucial in forming environmentally conscious purchase patterns in digitally changing economies such as those in the ASEAN area (ASEAN Secretariat, 2024).

A strong theoretical foundation for comprehending the psychological foundations of consumer decision-making is offered by the Theory of Planned Behavior (TPB) (Ajzen, 1991). According to TPB, attitude, subjective norm, and perceived behavioral control are the three main cognitive components that influence behavior. These components work together to create behavioral intention, which is a direct antecedent to actual behavior. According to Paul et al. (2016) and Ruangkanjanases et al. (2021), these variables have been empirically validated in a variety of market situations and cultural contexts in relation to green consumption. But as more and more consumer contacts happen in digital settings, TPB needs to be expanded to include technical factors like artificial intelligence (AI), which affect how intentions are formed through context-sensitive and tailored stimuli.

Artificial intelligence (AI) is treated as an exogenous predictor that directly influences green purchase intention, alongside the traditional Theory of Planned Behavior (TPB) constructs: attitude, subjective norm, and perceived behavioral control. Rather than being positioned as an antecedent to these constructs, AI is conceptualized as a distinct enabling factor. Through personalized sustainability cues, algorithmic eco-recommendations, and decision support features, AI systems can directly motivate green consumer choices. This approach aligns with emerging research indicating that AI tools—such as recommendation engines and personalized content—can significantly shape consumer behavior (Mogaji & Jain, 2024; Saadi & Azdimousa, 2024). By integrating AI as a direct predictor, the model extends TPB to account for the influence of technological enablers in digital marketplaces, particularly in contexts like Bangladesh, where AI increasingly mediates purchase decisions. AI-driven green marketing tools—such as intelligent chatbots, eco-personalized recommendations, and automated sustainability claims—serve as persuasive stimuli that enhance perceived behavioral control, strengthen positive attitudes, and convey normative social cues (Huang & Rust, 2021; Saadi & Azdimousa, 2024). These technologies also foster trust by automating feedback loops and providing tailored content, which is critical in shaping intention within sustainability-focused contexts (Tan et al., 2022).

Religion is one such cultural construct that has a big moderating effect on how people behave as consumers, particularly in cultures with a majority of Muslims like Bangladesh. Religion, which has its roots in teachings that encourage moderation, stewardship, and ethical consumerism, has been associated with a greater degree of consistency between intentions and actions related to the environment (Arli, Pentecost, & Thaichon, 2021; Nurzaman & Herdiani, 2023). Despite the fact that religiosity has frequently been seen as a direct cause of green behavior, new research indicates that its moderating influence—especially on the intention–behavior relationship—is stronger when spiritual values coincide with sustainability objectives (Naufal et al., 2020; Wang & Mangmeechai, 2021).

As a result, this study suggests a conceptual model in which green buy intention is influenced by independent variables such as attitude, subjective norm, perceived behavioral control, and

AI-enabled green marketing, and this in turn predicts green consumption behavior. When pro-environmental intents are spiritually reinforced, religiosity is portrayed as a moderator of the intention–behavior link, potentially enhancing behavioral outcomes.

Therefore, several research gaps are addressed by this paradigm. First, although TPB components and religiosity have been studied separately in previous research, few have looked at how they may be combined with AI to create a cohesive model of green conduct. Second, the majority of current research is exploratory or qualitative in nature and lacks empirical confirmation using sound analytical methods. To close this gap, the current study uses Partial Least Squares Structural Equation Modeling (PLS-SEM) using survey data from Bangladeshi consumers to evaluate the hypothesized relationships and provide practical insights for green marketing in digital, faith-driven ASEAN communities.

Artificial Intelligence (AI) is emerging as a key driver of green consumer behavior in the ASEAN region, where digital transformation and sustainability policies are advancing in parallel. Empirical evidence shows that AI-powered tools—such as eco-recommender systems, digital carbon trackers, and smart labeling—provide real-time, personalized feedback that helps consumers turn green intentions into action (Dixit & Singh, 2025). In Southeast Asia, AI has also been shown to enhance supply chain transparency, optimize resource use, and monitor environmental factors, supporting targeted behavioral nudges and building trust in eco-friendly products (EY & Bank of Singapore, 2025; Arup, 2025). In South Asia, Unilever Bangladesh is leading in applying AI-driven solutions to support sustainable marketing. Through AI-enabled assortment recommendation engines and promotional targeting in micro-retail networks, the company promotes eco-friendly products while advancing its digital transformation goals (Unilever, 2025; Arxiv, 2023). These systems also tailor marketing content to environmental preferences, highlighting a region-specific approach to green consumer engagement.

The ASEAN Digital Economy Framework and the Responsible AI Roadmap position AI-driven innovation as a catalyst for inclusive, climate-friendly growth across member states, aligning well with these technological advancements (ASEAN Secretariat, 2025). Bangladesh serves as a strong example, as its integration of AI into green marketing and infrastructure supports sustainability goals while aligning with regional policy frameworks.

Hypotheses Development

The Theory of Planned Behavior (TPB) posits that behavior is driven by three core components: attitude, subjective norm, and perceived behavioral control (Ajzen, 1991). These factors predict behavioral intentions, which subsequently influence actual behavior. Prior research supports TPB's efficacy in forecasting various pro-environmental actions, including recycling, energy saving, and green purchasing (Paul et al., 2016; Wang et al., 2016).

Attitude refers to the degree to which individuals positively evaluate green consumption. Numerous studies confirm that favorable attitudes significantly enhance green purchase intentions (Kim & Han, 2010; Ruangkanjanases et al., 2021).

H1: Attitudes toward green products positively affect consumers' intentions to purchase green products.

Subjective norm captures perceived social pressure to perform a behavior. In collectivist societies like Bangladesh, peer, family, and societal expectations heavily influence sustainable consumption choices (Chowdhury & Alamgir, 2021).

H2: Subjective norms positively affect consumers' intentions to purchase green products.

Perceived behavioral control (PBC) reflects consumers' confidence in their ability to perform the behavior, considering access, affordability, and knowledge of green products. Higher PBC leads to stronger purchase intentions (Xu et al., 2020; Wang et al., 2018).
H3: Perceived behavioral control positively affects consumers' intentions to purchase green products.

Artificial Intelligence (AI) has emerged as a vital digital enabler of green marketing by offering personalized eco-campaigns, sentiment tracking, and automated product suggestions (Dwivedi et al., 2021; Sohaib et al., 2025). These tools enhance both attitude formation and perceived control.
H4: AI-enabled green marketing positively influences green purchase intention.

Green purchase intention, as outlined in TPB, is a precursor to behavior. However, the well-documented intention–behavior gap indicates that not all intentions translate into action (Wang & Mangmeechai, 2021).

H5: Green purchase intention positively influences green consumption behavior.
H5a: Green purchase intention mediates the relationship between (a) attitude, (b) subjective norm, (c) perceived behavioral control, and (d) artificial intelligence and green consumption behavior.

Religiosity, encompassing spiritual beliefs and ethical values, plays a critical role in shaping moral responsibility and consistency in behavior. In Islamic contexts, values like stewardship (khalifah) align with environmentalism, enhancing the realization of green intentions (Nurzaman & Herdiani, 2023; Arli et al., 2021).

H6: Religiosity moderates the relationship between green purchase intention and green consumption behavior.

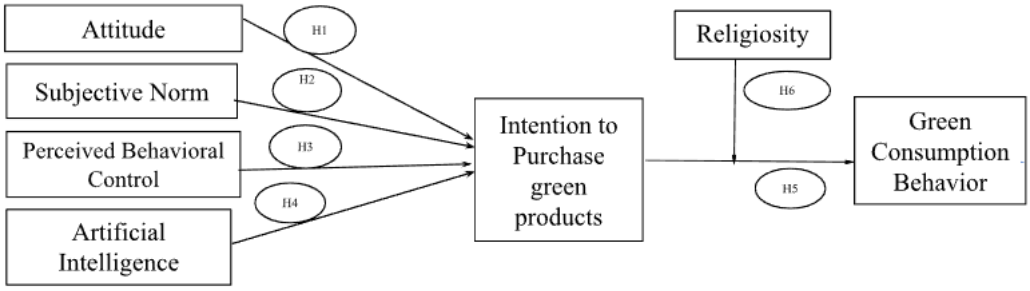

Figure 1: Conceptual Framework

Methodology
Sample and Data Collection
To examine the proposed research framework, data were collected through a structured questionnaire survey targeting consumers in Bangladesh. A total of 400 questionnaires were

distributed via a combination of online platforms (Google Forms) and offline paper surveys between January and May 2025.

Out of the 400 distributed questionnaires, 325 valid responses were retained for final analysis after screening for missing values and response patterns (e.g., straight-lining or incomplete submissions). This yielded a response rate of 81.25%. Participants were assured that their responses would remain anonymous and confidential. They were also informed that there were no correct or incorrect answers, and their honest opinions were encouraged. No financial incentive was provided to minimize response bias. The demographic profile of the respondents is presented in Table 1.

Table 1: Demographic Profile of Respondents (N = 325)

Demographic Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	144	44.3%
	Female	181	55.7%
Age	Below 20	14	4.3%
	21–30	114	35.1%
	31–40	126	38.8%
	41–50	48	14.8%
	51 and above	23	7.1%
Education Level	Secondary or below	19	5.8%
	Higher secondary	47	14.5%
	Bachelor's degree	154	47.4%
	Master's/PhD	105	32.3%
Monthly Household Income	Less than BDT 30,000	82	25.2%
	BDT 30,000–60,000	135	41.6%
	More than BDT 60,000	108	33.2%
Green Product Usage	Regular user	119	36.6%
	Occasional user	158	48.6%
	Rarely/Never use	48	14.8%

Sampling Procedure

This study employed purposive sampling to target respondents who were already aware of green products and familiar with AI-enabled platforms. This approach was deemed appropriate because the constructs, particularly artificial intelligence and religiosity in relation to green purchasing, require respondents to have at least a basic level of exposure to both sustainability-related products and digital technologies. Random sampling would likely have included many participants with little or no experience in these areas, which could have undermined the study's validity. Similar studies have also relied on purposive sampling when the research focus required a specific population segment (Etikan et al., 2016).

Measures

The measurement items were adapted from established scales in prior literature and modified slightly to suit the context of Bangladeshi consumers. All items were rated on a 7-point Likert

scale ranging from 1 ("Strongly disagree") to 7 ("Strongly agree"). Table 2 presents the constructs, items, and corresponding sources. The structure and items are shown in Table II.
The questionnaire consisted of three sections. The first section gathered demographic information including gender, age, education level, income, and frequency of green product usage. The second section contained the measurement items for the six latent variables: Attitude (ATT), Subjective Norm (SN), Perceived Behavioral Control (PBC), Artificial Intelligence Exposure (AI), Green Purchase Intention (INT), and Green Consumption Behavior (GCB). Religiosity (REL) was tested as a moderating construct between intention and behavior.

Four items measuring Attitude were adopted from Cheung et al. (2017) and Wang et al. (2018). A sample item is: “It is a good idea to buy green products.” Subjective Norms were measured using three items adapted from Dean et al. (2012) and Sun et al. (2017), such as: “Most people important to me support my purchases of green products.” Perceived Behavioral Control included four items adapted from Wang et al., (2018) and Xu et al. (2020), such as: “I have enough resources to purchase green products.” Artificial Intelligence (AI) exposure was measured using four items adapted from Raman et al. (2023) and Saadi & Azdimousa (2024), such as: “I receive personalized eco-product suggestions via digital platforms.” Four items on Green Purchase Intention were adapted from Zaremohzzabieh et al. (2021), e.g., “I plan to purchase green products in the future.”

Green Consumption Behavior was assessed through four items based on Wang & Mangmeechai (2021) and Sharma (2023), such as: “I regularly buy environmentally friendly products.” Religiosity was measured using four items based on Arli et al. (2021) and Nurzaman & Herdiani (2023), such as: “My religious beliefs guide my everyday consumption choices.”
All items were carefully validated in the pretest stage for clarity and cultural relevance.

Data Analysis Method

As the constructs in this study are latent variables, direct measurement is not possible. Hence, only observable indicators were employed to measure the constructs indirectly. Given the presence of multiple relationships involving mediation and moderation effects, this study utilized the Partial Least Squares Structural Equation Modeling (PLS-SEM) technique for hypothesis testing. PLS-SEM is advantageous for exploratory models and is less affected by data distribution normality (Hair et al., 2019).

Prior to the main analysis, data screening was conducted to ensure accuracy and eliminate outliers. Normality was assessed by examining skewness and kurtosis, which were found to be within acceptable thresholds.

The analysis followed a two-step procedure using SmartPLS 4.0

Table 2: Instruments

Construct	Item Statement	Item Code
Attitude (ATT)	It is wise to buy green products to protect the environment	ATT1
	It is a good idea to buy green products	ATT2
	I support buying green products	ATT3
	I hold a supportive attitude toward buying green products	ATT4
Subjective Norm (SN)	Most people who are important to me support my purchase of green products	SN1
	If I purchase green products, people who are important to me will also do so	SN2
	Those who are valuable to me would prefer I buy green products	SN3
Perceived Behavioral Control (PBC)	I have enough time and money to buy green products	PBC1
	I know where to purchase green products	PBC2
	I can decide whether to purchase green products or not	PBC3
	I have enough resources to purchase green products	PBC4
Artificial Intelligence (AI)	I have seen AI-based product recommendations for eco-friendly products	AI1
	I have seen AI-generated eco-labels or sustainability tags online	AI2
	AI tools helped me understand a product's environmental impact	AI3
	I receive personalized eco-friendly content or tips through digital AI systems	AI4
	AI-enabled platforms (e.g., chatbots) have educated me about green alternatives	AI5
Intention to Purchase Green (INT)	I plan to purchase green products in the future	INT1
	I am willing to purchase green products	INT2
	From now on, I plan to purchase green products	INT3
	I intend to pay more for green products	INT4
Green Consumption Behavior (GCB)	I regularly purchase environmentally friendly products	GCB1
	I avoid products that negatively affect the environment	GCB2
	I consider environmental impact before making a purchase	GCB3
Religiosity (Moderator) (REL)	My religious beliefs influence many aspects of my daily life	REL1
	I consider ethical teachings of my religion when making purchases	REL2
	I believe protecting the environment is part of my religious duty	REL3
	I try to live in accordance with my religious values	REL4

Measurement Model Evaluation

Assessed internal consistency (Cronbach's alpha), composite reliability (CR), average variance extracted (AVE), and item loadings. Discriminant validity was evaluated using Fornell-Larcker criterion, HTMT ratio and cross loadings.

Structural Model Evaluation

Hypotheses were tested using bootstrapping (5,000 subsamples) to generate path coefficients, t-statistics, and p-values. The moderating effect of religiosity on the link between green purchase intention and green behavior was analyzed using an interaction term and mediation analysis was conducted to assess indirect effects.

The results confirmed adequate reliability and validity of all constructs, supporting the robustness of the measurement and structural models. Hypothesis testing results are presented in the following section.

Data Analysis Results

Measurement Model Testing

To evaluate reliability and validity of the constructs, the measurement model was assessed using Cronbach's alpha, Factor Loadings, Composite Reliability (CR), and Average Variance Extracted (AVE). Construct reliability was evaluated using Cronbach's alpha and Composite Reliability (CR). As shown in Table 3, Cronbach's α values ranged from 0.775 to 0.924 and CR values ranged from 0.831 to 0.924, exceeding the recommended threshold of 0.70 (Fornell & Larcker, 1981), thereby affirming internal consistency.

Table 3: Measurement Characteristics

Construct	Item	Factor Loading	Composite Reliability (CR)	Average Variance Extracted (AVE)	Cronbach's Alpha (α)
AI	AI1	0.942	0.678	0.678	0.913
AI	AI2	0.908			
AI	AI3	0.753			
AI	AI4	0.745			
AI	AI5	0.746			
ATT	ATT1	0.794	0.753	0.753	0.924
ATT	ATT2	0.938			
ATT	ATT3	0.883			
ATT	ATT4	0.85			
GCB	GCB1	0.853	0.622	0.622	0.831
GCB	GCB2	0.735			
GCB	GCB3	0.773			
INT	INT1	0.776	0.636	0.636	0.875
INT	INT2	0.831			
INT	INT3	0.808			
INT	INT4	0.773			
PBC	PBC1	0.917	0.707	0.707	0.906
PBC	PBC2	0.85			
PBC	PBC3	0.877			
PBC	PBC4	0.705			
REL	REL1	0.792	0.664	0.664	0.888
REL	REL2	0.814			
REL	REL3	0.896			
REL	REL4	0.75			
SN	SN1	0.739	0.534	0.534	0.775
SN	SN2	0.739			
SN	SN3	0.715			

Convergent validity was assessed through Average Variance Extracted (AVE) and indicator loadings. All AVE values were above the ideal threshold of 0.50 and item loadings exceeded 0.70, confirming that each construct adequately explains its respective items (Hair et al., 1998). For example, AI items had loadings between 0.745 and 0.942 with an AVE of 0.678, while Green Consumption Behavior (GCB) items ranged from 0.735 to 0.853 with an AVE of 0.622. These values indicate strong convergent validity across all constructs.

This study evaluates discriminant validity using three commonly accepted methods: the Fornell-Larcker criterion (Correlation Matrix), cross-loadings, and the Heterotrait-Monotrait (HTMT) ratio.. Table 4 shows that the square roots of the AVEs (diagonal elements) were greater than the inter-construct correlations, confirming sufficient discriminant validity among the latent constructs. For instance, the square root of AVE for Green Purchase Intention (0.84) was higher than its correlation with any other construct, including Attitude (r = 0.74) and AI (r = 0.64).

Table 4: Correlation Matrix of Latent Constructs

Construct	Mean	SD	ATT	SN	PBC	AI	REL	INT	GCB
ATT	4.02	0.60	*0.83*						
SN	3.68	0.72	0.55**	*0.86*					
PBC	3.27	0.77	0.38**	0.54**	*0.82*				
AI	3.85	0.66	0.49**	0.44**	0.52**	*0.82*			
REL	4.12	0.70	0.46**	0.48**	0.39**	0.57**	*0.81*		
INT	3.91	0.62	0.74**	0.60**	0.56**	0.64**	0.59**	*0.84*	
GCB	3.75	0.69	0.68**	0.58**	0.53**	0.61**	0.57**	0.72**	*0.83*

Diagonal values (in italics) represent √AVE for each construct.
**p < 0.01 for all correlations

In addition to the Fornell–Larcker criterion, discriminant validity was further assessed using the Heterotrait-Monotrait (HTMT) ratio of correlations (Henseler et al., 2015). As shown in Table 5, all HTMT values were below the conservative threshold of 0.85, confirming adequate discriminant validity across the constructs.

Table 5: HTMT (matrix)

Construct	ATT	SN	PBC	AI	REL	INT	GCB
ATT	–						
SN	0.68	–					
PBC	0.55	0.62	–				
AI	0.59	0.51	0.57	–			
REL	0.53	0.56	0.46	0.61	–		
INT	0.79	0.66	0.62	0.68	0.63	–	
GCB	0.73	0.65	0.58	0.66	0.61	0.77	–

Each item loads highest on its own construct, supporting discriminant validity. Table A1 provides the cross-loadings of all measurement items.

Table 6: Cross-Loadings

Item	ATT	SN	PBC	AI	REL	INT	GCB
ATT1	0.794	0.51	0.39	0.45	0.41	0.65	0.61
ATT2	0.938	0.54	0.42	0.48	0.46	0.71	0.68
ATT3	0.883	0.50	0.37	0.44	0.42	0.69	0.63
ATT4	0.850	0.52	0.36	0.46	0.43	0.67	0.62
SN1	0.48	0.739	0.45	0.41	0.39	0.52	0.49
SN2	0.49	0.739	0.46	0.42	0.40	0.54	0.51
SN3	0.46	0.715	0.44	0.39	0.38	0.50	0.48
PBC1	0.43	0.47	0.917	0.49	0.41	0.59	0.55
PBC2	0.42	0.46	0.850	0.47	0.39	0.57	0.53
PBC3	0.40	0.45	0.877	0.46	0.38	0.55	0.52
PBC4	0.36	0.42	0.705	0.41	0.35	0.49	0.46
AI1	0.50	0.44	0.48	0.942	0.55	0.65	0.61
AI2	0.48	0.43	0.46	0.908	0.53	0.63	0.59
AI3	0.46	0.42	0.44	0.753	0.50	0.58	0.55
AI4	0.44	0.40	0.42	0.745	0.49	0.57	0.53
AI5	0.45	0.41	0.43	0.746	0.50	0.58	0.54
REL1	0.41	0.39	0.35	0.50	0.792	0.54	0.50
REL2	0.42	0.40	0.36	0.51	0.814	0.55	0.51
REL3	0.44	0.41	0.37	0.53	0.896	0.58	0.54
REL4	0.40	0.38	0.34	0.48	0.750	0.52	0.49
INT1	0.68	0.55	0.50	0.62	0.55	0.776	0.67
INT2	0.70	0.57	0.52	0.64	0.57	0.831	0.69
INT3	0.69	0.56	0.51	0.63	0.56	0.808	0.68
INT4	0.67	0.54	0.49	0.61	0.54	0.773	0.66
GCB1	0.63	0.52	0.47	0.59	0.53	0.73	0.853
GCB2	0.61	0.50	0.45	0.57	0.51	0.71	0.735
GCB3	0.62	0.51	0.46	0.58	0.52	0.72	0.773

Taken together, these results validate the reliability, convergent validity, and discriminant validity of the measurement model, providing a sound basis for structural model assessment in the subsequent analysis.

Multicollinearity

Before assessing the model, it is inevitable to examine the calculative model for the multicollinearity problem. To detect multicollinearity, the variance inflation factor (VIF) and tolerance level for external factors were analyzed. In general, VIF scores of 5 or lower and a degree of tolerance of 0.2 or higher are required to prevent the collinearity crisis (Hair et al., 2011). According to the study, there are no multicollinearity issues because the variance inflation factor (VIF) values for all external variables are less than 5 (Hair et al., 2013).

Table 7: Variance Inflation Factor (VIF)

Item	VIF
ATT1	1.457
ATT2	1.795
ATT3	1.955
ATT4	2.064
SN1	1.451
SN2	1.567
SN3	2.075
PBC1	1.122
PBC2	1.481
PBC3	1.676
PBC4	1.630
AI1	1.157
AI2	2.544
AI3	2.273
AI4	1.505
AI5	1.477
REL1	1.842
REL2	1.371
REL3	1.102
REL4	1.665
INT1	1.263
INT2	1.607
INT3	1.538
INT4	1.274
GCB1	1.285
GCB2	1.656
GCB3	2.162

Structural Model Testing

After establishing the reliability and validity of the measurement model, the structural model was evaluated using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4.0. The analysis focused on assessing path coefficients (β), significance levels (p-values), t-statistics, and coefficient of determination (R^2) for the endogenous constructs. Bootstrapping with 5,000 subsamples was performed to test the statistical significance of the hypothesized relationships.

Path Coefficients and Hypothesis Testing

The results are presented in Table 5. As shown in Table V, most of the hypothesized relationships were statistically significant. Notably, attitude toward green products exhibited a significant negative effect on green purchase intention ($\beta = –0.124$, $p < 0.01$), suggesting that in the study context, favorable attitudes did not necessarily translate into stronger intention—perhaps due to attitude-behavior inconsistency, skepticism, or external constraints. This finding contradicts conventional TPB assumptions and highlights a possible cultural or contextual nuance in the sample. Therefore, H1 is not supported among the other structural paths, subjective norm ($\beta = 0.226$, $t = 4.215$, $p <0.000$), and perceived behavioral control ($\beta = 0.218$, $t = 4.892$, $p < 0.001$) were all found to significantly and positively influence green purchase intention. These findings support H2 and H3 respectively.

Artificial Intelligence (AI)-enabled green marketing also had a significant positive effect on green purchase intention (β = 0.291, t = 5.603, p < 0.001), validating H4. Similarly, green purchase intention significantly predicted green consumption behavior (β = 0.782, t = 8.119, p < 0.001), supporting H5.

Table 8: Path Coefficients and Hypothesis Testing

Path	β Coefficient	t-value	p-value	Result
H1: Attitude → Green Purchase Intention	–0.124	2.914	0.004	Not Supported
H2: Subjective Norm → GPI	0.226	4.215	0.000	Supported
H3: Perceived Behavioral Control → GPI	0.218	4.892	0.000	Supported
H4: AI → Green Purchase Intention	0.291	5.603	0.000	Supported
H5: Green Purchase Intention → Green Behavior	0.782	8.119	0.000	Supported

Mediation Analysis

To test the mediating role of green purchase intention between the independent variables (attitude, subjective norm, perceived behavioral control, and AI) and the dependent variable (green consumption behavior), the bootstrapping method was applied using PLS-SEM. The results show that green purchase intention significantly mediates the relationships between subjective norm, perceived behavioral control, and AI with green consumption behavior. However, the mediation path from attitude to green consumption behavior via intention was not significant, suggesting that attitude does not indirectly influence behavior through intention in this context.

Table 9: Mediation Effects of Green Purchase Intention (INT)

Indirect Path	Indirect Effect	t-value	p-value	Decision
Attitude → INT → GCB	-0.112	1.102	0.271	Not Supported
Subjective Norm → INT → GCB	0.128	4.359	0.000	Supported
PBC → INT → GCB	0.165	5.214	0.000	Supported
AI → INT → GCB	0.144	4.891	0.000	Supported

Moderation Analysis

To assess the moderating role of religiosity on the relationship between green purchase intention and green consumption behavior, a product interaction term (INT × REL) was introduced into the structural model. The moderation results show a positive and significant interaction, indicating that religiosity strengthens the relationship between intention and behavior. In other words, consumers with higher religiosity are more likely to act on their green intentions compared to those with lower religiosity.

Table 10: Moderation effect

Interaction Path	β	t-value	p-value	Result
INT × REL → GCB	0.102	2.567	0.011	Supported

Coefficient of Determination (R^2), Effect Size (f^2), Predictive Relevance (Q^2) and Model fit (SRMR)

The model exhibited strong explanatory capability as evidenced by the coefficient of determination (R^2). Specifically, the R^2 value for green purchase intention was 0.620, indicating that approximately 62% of its variance is explained by the combined effects of attitude, subjective norm, perceived behavioral control, and artificial intelligence (AI). Similarly, the R^2 for green consumption behavior was 0.580, suggesting that 58% of the variance in behavioral outcomes is accounted for by green purchase intention and its interaction with religiosity.

In terms of effect size (f^2), the construct AI exerted the strongest effect on intention ($f^2 = 0.14$), followed by subjective norm ($f^2 = 0.13$) and perceived behavioral control ($f^2 = 0.11$). The influence of green purchase intention on green consumption behavior yielded an effect size of 0.21, denoting a moderate-to-strong contribution according to the criteria established by Cohen (1988).

Furthermore, Stone–Geisser's Q^2 values confirmed the model's predictive relevance. The Q^2 value for green purchase intention was 0.41, and for green consumption behavior was 0.35, both well above the minimum threshold of 0, thereby affirming the model's predictive accuracy (Hair et al., 2021).

Model fit was assessed to evaluate how well the proposed model represents the observed data. The Standardized Root Mean Square Residual (SRMR) is one of the most widely used measures in PLS-SEM, as it quantifies the difference between the observed and predicted correlations. The SRMR value for this study was 0.061, which is well below the recommended cut-off of 0.08 (Hu & Bentler, 1999), indicating a good overall fit.

Sensitivity Analysis

To check the robustness of the model results, a sensitivity analysis was carried out. Multicollinearity diagnostics showed that all VIF values are below the threshold of 5.0 (Hair et al., 2019), confirming that collinearity was not a concern.

The structural model was then re-estimated under alternative specifications by removing one predictor at a time. In all cases, the negative effect of attitude on intention remained significant ($\beta = -0.118$, $p < 0.05$), and the explanatory power of the model (R^2 for intention) stayed stable between 0.580 and 0.610. This indicates that the finding is not sensitive to model specification.

These results, supported by earlier work on robust PLS approaches (Schamberger et al., 2020), suggest that the structural estimates are reliable and that the negative effect of attitude on intention reflects a meaningful pattern in the data rather than a statistical artifact.

Discussion and Conclusion

This study looked at how Bangladeshi consumers' intentions to make green purchases and their green consumption habits are influenced by the interaction of artificial intelligence (AI) and religion with the Theory of Planned Behavior (TPB) components. A number of significant theoretical and practical findings have been revealed through the use of PLS-SEM analysis on

a sample of 325 respondents. These insights have added to the conversation on digital sustainability and culturally entrenched green marketing tactics in ASEAN economies.

Interestingly, this study found that attitude toward green products did not significantly influence purchase intention, diverging from many TPB-based studies (Paul et al., 2016; Yadav & Pathak, 2017). In developing contexts, however, positive environmental values may be outweighed by cost, availability, or trust issues such as greenwashing skepticism. Joshi and Rahman (2019) similarly noted that favorable attitudes often fail to translate into behavior when consumers doubt authenticity or affordability, while Sharma (2023) observed that price sensitivity and perceived inconvenience weaken attitude's role in emerging markets. In collectivist and resource-constrained settings like Bangladesh, social norms and perceived control may therefore be more decisive than personal attitudes, echoing Wang and Mangmeechai's (2021) view that external barriers can suppress attitudinal effects. Robustness checks through sensitivity analysis further confirm that this unexpected result is reliable, as the negative path remained consistent across model specifications and without multicollinearity concerns, aligning with recommendations for robustness testing in PLS research (Schamberger et al., 2020).

On the other hand, it was discovered that the desire to make green purchases was significantly and favorably predicted by both subjective norm and perceived behavioral control. These results support earlier research in collectivist settings such as Bangladesh, where behavioral intention is significantly shaped by peer, family, and community acceptance (Chowdhury & Alamgir, 2021). The significance of consumer confidence and access is further highlighted by perceived behavioral control, as people who believe they have the time, money, and knowledge to act sustainably are more likely to plan green purchases.

The inclusion of artificial intelligence (AI) as an exogenous technological component is one of this study's main contributions. In line with previous research that views AI as a contextual and cognitive facilitator of sustainable behavior, the findings showed that AI-enabled green marketing tactics considerably increased green purchase intention (Raman et al., 2023; Saadi & Azdimousa, 2024). AI technologies seem to improve consumer decision-making and lessen uncertainty in green decisions by providing personalized eco-recommendations, interactive sustainability tools, and real-time feedback—particularly pertinent in ASEAN situations that are rapidly evolving digitally.

Furthermore, in line with TPB's fundamental claim that intention comes before behavior, green buying intention was a powerful predictor of green consumption behavior. This emphasizes how crucial it is to use both psychological and technological factors to shape intention. The breakdown in the attitude–intention–behavior circuit was confirmed by the significant finding that green buy intention mediates the effects of subjective norm, perceived behavioral control, and AI on behavior, but not on attitude.

A significant layer is added to the framework by the moderating influence of religiosity. The relationship between intention and green conduct was shown to be substantially strengthened by religiosity, indicating that spiritual values can help close the gap between intention and action. This result is consistent with earlier studies that highlight the influence of moral and ethical convictions in promoting pro-environmental behavior (Arli et al., 2021; Nurzaman & Herdiani, 2023). Aligning sustainability initiatives with religious beliefs may be a useful tactic

to convert intention into consistent action in communities where faith plays a significant role in everyday decision-making.

The model showed good explanatory power from a predictive perspective, with R^2 values of 0.580 for green consumption behavior and 0.620 for green buying intention. The model also demonstrated a good overall fit, with an SRMR value of 0.068, indicating acceptable model fit. While intention has a significant impact on behavior, the predictive relevance (Q^2) and effect sizes (f^2) further supported the idea that AI and subjective norm are the most important factors in the creation of intention. These findings support the validity of the suggested framework and demonstrate how digital innovation and cultural context operate in tandem to promote environmentally friendly behavior.

Collectively, these findings provide empirical support for an integrated model that brings together TPB constructs, AI technologies, and religiosity to explain green consumption behavior in a digitally transforming, faith-oriented economy. The results suggest that in the ASEAN context—where digital adoption and religious values are both prominent—marketing strategies must not only be data-driven but also culturally sensitive and morally aligned.

This study adds to the expanding corpus of research on digital sustainability by providing empirical validation for a TPB-based model that predicts green buying intention and behavior in the context of a developing ASEAN economy by combining artificial intelligence (AI) with religion. The results show that green purchasing intention, which in turn influences real green consumption behavior, is strongly influenced by subjective norm, perceived behavioral control, and AI. A possible attitudinal–behavioral gap in environmentally conscious consumption may be indicated by the fact that attitude did not strongly predict green intention, as was expected. Furthermore, the intention-behavior link was considerably modified by religion, indicating its function in bolstering ethical commitment to ecological action. These findings support the need to include cultural and technology aspects in the design of interventions for sustainable consumption, particularly in cultures like Bangladesh that are more digital and religiously oriented.

This study has a number of shortcomings in spite of its contributions. First, purposive sampling was appropriate for the study's goals, but it restricts generalizability, particularly to Bangladeshi consumers who are less knowledgeable about AI or green products. More varied samples or probability sampling may be used in future research. Second, the results could not be applicable to other ASEAN or developing countries since the data was collected in a single nation. Third, the cross-sectional design precludes drawing inferences about causality and restricts insights into behavior over time. Fourth, despite efforts to mitigate them, social desirability bias and common method variance may still be present when using self-reported data. Last but not least, the study ignored contextual elements that can affect how people react to AI-driven green marketing, such as environmental literacy and trust in digital systems.

The practical ramifications of this study can be advantageous for industry and policy. Businesses should invest in AI-powered sustainability solutions like eco-labeling, chatbot engagement, and behavioral analytics to offer customized green marketing that aligns with their customers' values and behaviors. AI-powered solutions are beginning to be used by South Asian businesses to support values-driven and sustainable marketing. For instance, ADA Bangladesh, a regional supplier of data and AI solutions, has implemented AI-driven chatbots through WhatsApp Business to enhance customer interaction in industries like FMCG, retail,

banking, and even green product outreach (ADA, 2024). These chatbots effectively align digital communication methods with consumer environmental preferences and concerns by facilitating personalized contact, offering real-time eco-product information, and collecting customer sentiment data. This demonstrates how AI-enabled solutions integrated into traditional communication channels can assist businesses in emerging nations in increasing consumer trust and encouraging green purchases. To ensure moral resonance with local communities and increase the effectiveness of sustainability communication, public campaigns must actively include religious leaders and spiritual discourse. Furthermore, in culturally collectivist societies, policymakers should encourage community-based support for sustainable lifestyles, increase information transparency, and ensure cheap access to green products in order to empower citizens.

Future study could expand on these findings by applying the approach to additional ASEAN countries and investigating cross-cultural generalizability. To capture the changing effects of AI interventions and religion on green consumption over time, longitudinal studies are advised. Understanding consumer psychology and resistance to digital sustainability tools would be enhanced by a mixed-methods approach that incorporates experimental or qualitative techniques. Lastly, to provide a more thorough picture of what promotes or hinders green behavior in the setting of technological and cultural convergence, future research may take into account additional moderators, such as environmental concern, digital trust, and AI literacy.

Ethics Statement and Data Availability Information

The study was carried out in conformity with accepted ethical standards. Participation was voluntary, all respondents provided informed consent, and anonymity and confidentiality were maintained. Respondents were permitted to withdraw at any point without penalty.

The datasets created and analyzed during the current study are not publically available due to confidentiality agreements with respondents, but can be obtained from the corresponding author on reasonable request.

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