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Determinants of Generation Z customers' intention to use mobile banking applications in joint-stock commercial banks in Ho Chi Minh City

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ABSTRACT

This study investigates the factors influencing Generation Z customers' intention to use mobile banking applications in joint-stock commercial banks in Ho Chi Minh City, with particular attention to the mediating role of green awareness. A mixed-methods approach was applied. First, qualitative methods, including expert consultation and scale refinement, were conducted. This was followed by a quantitative survey, yielding 353 valid responses, which were analyzed using variance-based structural equation modeling. The results show that trust, subjective norms, social influence, and brand have positive effects on green awareness, which in turn increases the intention to use mobile banking applications. Among these factors, brand has the strongest indirect effect through green awareness. Based on these findings, several managerial implications are suggested to help banks better attract Generation Z customers. These include maintaining consistent green brand positioning, developing community-based social influence programs, improving transparency and security to enhance trust, and introducing in-app features that clearly show individual environmental benefits.

1. Introduction

Digital transformation has become an imperative trend in Vietnam's financial–banking sector, reshaping consumer habits, particularly among Generation Z. In this context, mobile banking applications, an emblematic form of electronic banking, are playing an increasingly important role, reportedly serving nearly 16 million retail customers, integrating more than 260 functions, and connecting to over 1,700 service providers (Ha and Nguyen, 2022).

Despite the growing importance of mobile banking applications, encouraging Generation Z to adopt and continuously use these services remains a major challenge. Their behavior is influenced not only by rational decision-making but also by emotional and psychological factors. Among these factors, green awareness plays an important role in shaping users' attitudes and intentions toward sustainable digital services. It serves as a key mechanism that connects personal values with behavioral intention. Therefore, this study aims to examine the factors affecting Generation Z's intention to use mobile banking applications offered by joint-stock commercial banks in Ho Chi Minh City. In particular, the study focuses on the mediating role of green awareness in explaining how different factors influence users' intentions to adopt and continue using mobile banking services.

Green awareness refers to the degree of consumers' concern about and consciousness of environmental issues, reflecting their recognition of—and sensitivity to—negative impacts on natural ecosystems (Chen and Chai, 2010). It extends the broader notion of environmental awareness by stressing personal responsibility in choosing products, services, and consumption behaviors that are environmentally friendly. In the era of digital transformation and sustainability, this construct increasingly shapes consumer behavior, including choices related to mobile banking applications. Distinguishing related constructs are as follows:

- Green awareness: The extent to which individuals recognize and understand the environmental consequences of digital consumption (e.g., reducing paper use, lowering emissions by minimizing travel) and the associated "green" solutions (Akehurst et al., 2012). This is a cognitive component, what users know and understand.

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- Green attitude: A valenced evaluation (favorable/unfavorable) toward environmentally friendly behavior, an attitudinal component (Ajzen, 1991). Green consumer values: Relatively enduring beliefs about the importance of environmental protection that shape general preferences and priorities (Haws et al., 2014). Green trust: The expectation that a product/service fulfills its environmental commitments (credibility, benevolence, ability)—a form of institutional/brand-based trust (Chen, 2010).

Accordingly, green awareness is selected as the main mediating variable because it is consistent with the stimulus–organism–response framework, in which external stimuli influence cognitive processes and then shape behavior. In addition, green awareness is appropriate for the digital service context because information about the environmental advantages of digital transactions can increase users' understanding and concern for environmental issues. This awareness may encourage users to develop stronger intentions to adopt and use mobile banking applications as an environmentally friendly alternative to traditional banking services.

A mobile banking application is a banking application delivered via electronic channels such as the internet, computers, or smartphones, allowing customers to conduct financial transactions without visiting physical branches. Within this domain, mobile banking constitutes a key subset, especially in the form of bank-developed mobile apps (Ha and Nguyen, 2022). In Vietnam, mobile banking applications—integrating internet banking and mobile banking on a unified platform at joint-stock commercial banks—both substitute for traditional counter services and align with ongoing trends in digitalization and green consumption.

Intention to use a mobile banking application refers to an individual's readiness and willingness to access and continue using banking services through digital platforms. According to the Technology Acceptance Model (Davis, 1989), usage intention is a predictor of actual behavior and is shaped by users' perceived usefulness and perceived ease of use of the system. Subsequent studies (Venkatesh et al., 2003; Ajzen, 1991) further indicate that intention to use is also influenced by multiple factors such as trust, past experience, attitude, and social norms, particularly salient in the current context of digital transformation.

This study is grounded in the Stimulus–Organism–Response (S–O–R) framework, wherein stimuli in the digital banking service context (stimuli: Trust in the provider, perceived security, bank image/brand, and subjective norms) influence an individual's cognitive state (organism/cognition: Green awareness), which in turn shapes a behavioral response (response: intention to use a mobile banking application) (Mehrabian and Russell, 1974). This positioning complements traditional technology-acceptance models such as the Technology Acceptance Model (Davis, 1989), the Theory of Planned Behavior (Ajzen, 1991), and the Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003; 2012) in two ways: It extends the psychological mechanism from trust–usefulness/ease toward sustainability-oriented cognition in digital environments; and it clarifies indirect pathways from service-context factors to intention via green awareness, a mechanism underemphasized in the TAM/TPB/UTAUT traditions (Davis, 1989; Ajzen, 1991; Venkatesh et al., 2012).

2. Literature review

In emerging-market contexts, most studies on intention to use electronic or mobile banking draw on TAM/TPB/UTAUT and are tested using structural equation modeling or multivariate regression. Findings typically underscore the roles of technology- and behavior-related factors such as trust, security, perceived usefulness, perceived ease of use, subjective norms, attitude, and infrastructural conditions. For example, in Jordan, Anouze and Alamro (2020) surveyed 328 customers and found that trust exerted the strongest influence on intention to use, whereas perceived ease of use had the weakest effect; the authors also documented effects of security, price/cost, internet/PC availability, digital self-efficacy, and attitude. From an integrated TPB–TAM–diffusion-of-innovation perspective in Vietnam, but to international standards, Pham and Anh (2014) showed that subjective norms, perceived ease of use, and trust affect intention to use e-banking both directly and indirectly via perceived benefits. Adding perceived risk, Dhaneswara (2016) reported a negative effect of risk and positive effects of perceived ease of use, subjective norms, and trust on intention. Collectively, these findings suggest a consistent set of stimuli comprising trust, security, brand, and social norms—factors that can activate cognitive mechanisms leading to intention in line with the S–O–R logic (Mehrabian and Russell, 1974).

The present research retains trust (TRU), information security (SEC), bank brand (BRD), and subjective norms (SNO) as the main stimulus variables, while behavioral intention (BI) is considered the response variable. However, the mediating cognitive mechanism has not yet been clearly explained in previous studies.

A prominent gap is the absence of a "green" mediating mechanism in the mobile-application context: Existing international and domestic studies emphasize direct effects of stimuli on intention from technological or individual-behavior perspectives but have not tested the role of green awareness—the cognitive appraisal of the environmental benefits of digital transactions (paper reduction, fewer branch visits, lower emissions)—as a mediator within the S–O–R framework (Akehurst et al., 2012). Moreover, most domestic work is situated at a few

banks/branches (e.g., BIDV, Sacombank) and has yet to examine the mobile banking application as a digital touchpoint capable of cultivating green awareness; nor has it delved into Generation Z in Ho Chi Minh City—a cohort with high digital competence and sensitivity to sustainability. To address these gaps, the present study proposes an S–O–R model in which trust, security, brand, and subjective norms serve as stimuli; green awareness functions as the organism/cognition mediator; and intention to use a mobile banking application is the response.

3. Research method

3.1. Research hypotheses

This study employs the Stimulus-Organism-Response (S-O-R) framework to elucidate the "black box" of consumer psychology in the digital banking context. Rather than focusing solely on functional attributes, the S-O-R model allows for an exploration of how service-environment Stimuli (Trust, Security, Norms, and Brand) influence the consumer's internal state—the Organism (Green Awareness)—which subsequently drives the behavioral Response (Usage Intention). For Generation Z, Green Awareness acts as a vital cognitive filter, translating service value into sustainable behavioral intentions.

Trust: Trust is a pivotal determinant of customers' acceptance of electronic banking services. Evidence from prior work in Ho Chi Minh City shows that trust exerts the strongest influence on intention to use e-banking. More recent findings also indicate that trust shapes cognition and is linked to green-related perceptions in digital banking contexts (Kabakuş and Küçükoğlu, 2022). Theoretically, trust functions as a mechanism to reduce perceived risk and psychological complexity in digital transactions. When Gen Z consumers trust the integrity of a financial institution, they are less likely to experience "greenwashing skepticism," making them more receptive to the bank's environmental claims. Consequently, trust serves as a prerequisite for users to internalize and form a deep awareness of the ecological values associated with the application.

H1: Trust has a positive effect on customers' green awareness.

Information security: Information security refers to the protection of customer data and transactions against unauthorized access and fraud. A high level of perceived security not only reinforces trust and usage but may also elevate green awareness by making customers more receptive to "green-by-default" digital processes. From a behavioral psychology perspective, security is a "hygiene factor"; if unfulfilled, it creates anxiety that consumes the user's cognitive resources. When the system ensures robust security, customers free their mental capacity from financial risk concerns to focus on higher-order values, such as recognizing the environmental benefits of paperless, "green-by-default" digital processes.

H2: Information security has a positive effect on customers' green awareness.

Subjective norms: Subjective norms capture the extent to which individuals perceive expectations from important referents regarding their behavior (Ajzen, 1991). Prior research shows that such norms shape consumer cognition and attitudes toward sustainable consumption; in pro-environmental social climates, they can foster green awareness (Paul et al., 2016). According to Social Identity Theory, Gen Z tends to define themselves through the recognition of their peer groups. In an era where sustainability is increasingly viewed as "cultural capital," social pressure and community encouragement activate an environmental self-awareness. When influencers or social networks value digitalization as a means to protect nature, Gen Z individuals internalize these values, leading to a stronger green awareness.

H3: Subjective norms have a positive effect on customers' green awareness.

Bank brand: A bank's brand comprises the values, images, and impressions formed from customers' experiences, perceived credibility, service quality, and institutional commitments (Keller, 1993). When the brand clearly signals social responsibility and environmental stewardship, customers are more likely to develop stronger green awareness (Chen, 2010). Based on Signaling Theory, a brand serves as an essential signal that reduces information asymmetry regarding corporate ethics. A "green" brand identity allows Gen Z to link the use of the application with their own identity as responsible citizens. This resonance between brand signaling and personal values is a powerful catalyst for enhancing the user's awareness of environmental benefits (Chen, 2010).

H4: Bank brand has a positive effect on customers' green awareness.

Green awareness: Green awareness promotes sustainable consumption behaviors, including the shift to electronic banking services (Paul et al., 2016). When customers recognize that using mobile banking applications reduces paper use and supports environmental protection, their intention to use is strengthened. Within the S-O-R logic, this represents the "Organism" state responsible for transforming perception into action. When customers recognize that digital transactions contribute to paper reduction and travel emission savings, they experience Perceived Consumer Effectiveness, which directly reinforces the intention to adopt the application as a tool for a sustainable lifestyle.

H5: Green awareness has a positive effect on intention to use mobile banking applications.

Indirect effect relationships: Based on the S–O–R framework, Green Awareness is proposed as a mediating factor that links service-environment stimuli (Trust, Information Security, Subjective Norms, and Bank Brand) to Usage Intention. According to S–O–R theory, external stimuli drive behavioral responses indirectly through internal psychological states. Previous research in sustainable consumption also suggests that environmental awareness mediates the effects of credibility, social influence, and perceived risk on pro-environmental intentions (Paul et al., 2016; Chen, 2010). For Generation Z, Green Awareness functions as a cognitive bridge that connects institutional trust, security assurance, social expectations, and green brand signaling with a more intense intention to use digital banking services.

H5: Green awareness mediates the relationships between trust, information security, subjective norms, bank brand, and intention to use digital banking services.

3.2. Proposed research model

Grounded in the Stimulus–Cognition–Effect (SCE) framework (a cognition-centric formulation aligned with the stimulus–organism–response logic), the model specifies four stimuli—trust, information security, bank brand, and subjective norms—each posited to enhance green awareness (the cognitive mediator). The effect is conceptualized as intention to use mobile banking applications. In formal terms, the model tests the indirect pathways from each stimulus to intention via green awareness (S → Cognition → Effect), alongside the direct effect of green awareness on intention (H5). This structure enables an assessment of whether green awareness serves as an indirect-only or complementary mediator between service-context stimuli and Gen Z customers' usage intention. The proposed research model is illustrated in Fig. 1.

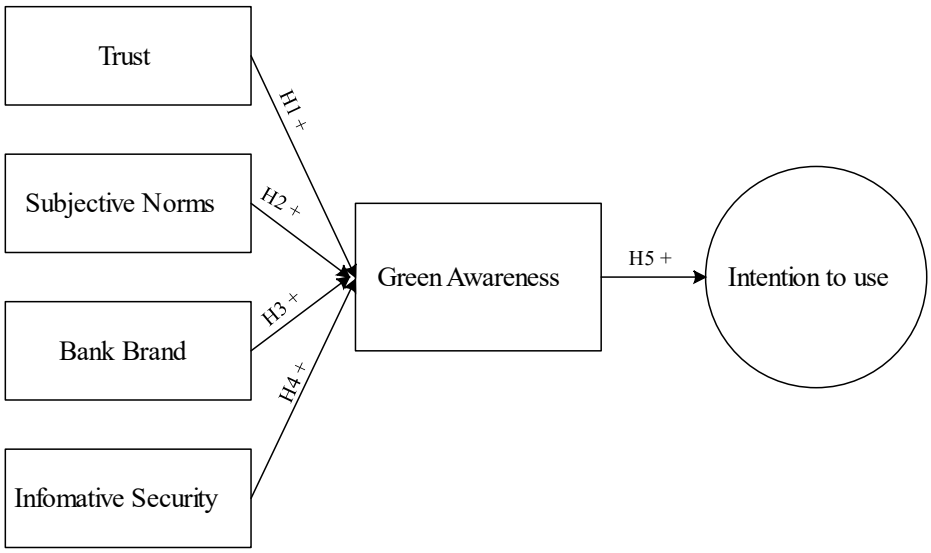

Fig. 1: Proposed research model

3.3. Research methodology and data collection

This study was conducted in two phases: a qualitative phase and a quantitative phase. The qualitative phase aimed to refine the measurement scales and develop the survey instrument based on expert interviews and a synthesis of prior research. The quantitative phase was implemented via an online survey of 353 valid responses from Generation Z in Ho Chi Minh City; this sample size satisfies common adequacy rules for exploratory and confirmatory factor analyses in variance-based structural equation modeling. A convenience sampling approach was used. Data were analyzed with variance-based SEM, following the standard sequence: Assessment of the measurement model (reliability, convergent validity, discriminant validity), estimation of the structural model, hypothesis testing, and mediation analysis for green awareness. (Ajzen, 1991; Davis, 1989; Hair et al., 2010).

3.4. Scale development and items

A five-point Likert scale was used, where 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree.

A. Trust (TRU)

- TRU1. I believe the mobile banking application keeps the promises it makes.
- TRU2. I consider the mobile banking application to be reliable.
- TRU3. I believe the mobile banking application prioritizes customers' interests.
- TRU4. I trust the technologies underpinning the mobile banking application.

B. Subjective norms (SNO)

- SNO1. People in my social community encourage and support me in using mobile banking applications.
- SNO2. Regulatory authorities encourage and support the use of mobile banking applications.
- SNO3. My colleagues think I should use mobile banking applications rather than traditional methods.
- SNO4. My family members support my use of mobile banking applications.

C. Bank brand (BRD)

- BRD1. I believe the bank's brand is reputable and trustworthy in electronic banking.
- BRD2. The mobile banking application presents a professional and modern image to me.
- BRD3. The bank is known for adopting the latest technologies, which gives me an impression of modernity and advancement.
- BRD4. The bank has a good reputation and receives positive evaluations from many customers.

D. Information security (SEC)

- SEC1. Using mobile banking applications is financially safe for me.
- SEC2. I believe my transactions are protected.
- SEC3. I am aware of my privacy rights and access controls.
- SEC4. I trust the technological management of the mobile banking application.

E. Intention to use (BI)

- BI1. I am willing to use mobile banking applications to conduct transactions in the near future.
- BI2. I will recommend mobile banking applications to my family and friends.
- BI3. I will continue using mobile banking applications in the near future.
- BI4. I use the mobile banking application as my primary method of checking banking information.

F. Green awareness (GA)

- GA1. I am aware that using mobile banking reduces printed statements and bills, thereby helping to protect the environment.
- GA2. I believe that transacting via mobile banking reduces emissions from travel to bank branches.
- GA3. I feel that using mobile banking helps me live a "greener," more sustainable lifestyle.
- GA4. I consider using mobile banking to be an action that reduces carbon dioxide emissions.

Items were adapted and localized from prior studies on trust, security, brand image, subjective norms, intention, and pro-environmental cognition, then refined via expert review and a pilot to ensure clarity and content validity (Ajzen, 1991; Chen, 2010; Keller, 1993; Paul et al., 2016).

4. Results

4.1. Sample description

A total of 370 questionnaires were collected; after screening, 353 were retained as valid responses from Generation Z in Ho Chi Minh City. This sample exceeds the minimum size commonly recommended for variance-based SEM with the present model complexity. The study, therefore, proceeds to analyze and test the hypotheses on this dataset. Summary characteristics of the sample (e.g., gender, age groups within Generation Z, occupation, frequency of app use) are reported in Table 1.

Table 1: Statistics describe the demographics of the study

Characteristic	Category	Amount	Weight (%)
Gender	Male	167	47.3
	Female	186	52.7
Age	18–22 years	277	78.5
	22–28 years	76	21.5
Education	High school	45	12.7
	College/university	234	66.3
	Postgraduate	54	15.3
	Other	20	5.7
Occupation	Student	240	68.0
	Office employee	52	14.7
	Self-employed	24	6.8
	Other	37	10.5
Monthly income (VND)	< 5 million	219	62.0
	5–10 million	74	21.0
	10–20 million	41	11.6
	> 20 million	19	5.4

4.2. Measurement model assessment

To evaluate the measurement model, we examine reliability and validity. Reliability is assessed using Cronbach's alpha and composite reliability; validity is assessed via convergent validity—captured by average variance extracted (AVE)—and discriminant validity—evaluated using the Fornell–Larcker criterion and the Heterotrait–Monotrait ratio of correlations (HTMT) (Hair et al., 2010; Fornell and Larcker, 1981; Henseler et al., 2015).

All outer loadings exceed 0.50; therefore, all indicators are retained for subsequent analyses. Consistent with best practice, indicators with loadings between 0.50 and 0.70 may be kept if the construct's composite reliability and AVE remain acceptable, and the item is conceptually important (Hair et al., 2010). Final decisions are thus based on the joint evidence from reliability (alpha, composite reliability) and convergent validity (AVE).

Convergent validity: For each construct, we report AVE and require AVE ≥ 0.50, indicating that, on average, the construct explains at least half of the variance in its indicators (Fornell and Larcker, 1981). Given that all retained indicators load ≥ 0.50 and the scale development followed expert review, AVE is subsequently evaluated to confirm

convergent validity. Discriminant validity: We assess discriminant validity using:

(i) Fornell–Larcker: The square root of AVE for each construct should exceed its correlations with other constructs; and
(ii) HTMT: Values should be < 0.85 (stringent) or < 0.90 (lenient), preferably with bootstrap confidence intervals not crossing 1.00 (Henseler et al., 2015). Meeting both criteria provides robust evidence that constructs are empirically distinct.

4.3. Reliability and discriminant validity of the scales

To evaluate the measurement model, the standard approach involves examining the reliability and validity of the measurement scales. Reliability is typically assessed using indices such as Cronbach's Alpha and Composite Reliability (CR). Meanwhile, the validity of the model is determined based on the Average Variance Extracted (AVE), the Heterotrait-Monotrait (HTMT) ratio, and the Fornell-Larcker criterion, which collectively reflect convergent and discriminant validity. Indicator reliability results are presented in Table 2.

The results indicate that all outer loadings exceed the threshold of 0.50. Consequently, all indicators are retained, confirming that the scales achieve satisfactory convergent and discriminant validity, thereby meeting the necessary conditions for subsequent structural model analysis.

Table 3 reports Cronbach's alpha, composite reliability, and AVE for all constructs. Following conventional thresholds, we interpret: Alpha ≥ 0.70 (acceptable internal consistency), composite reliability ≥ 0.70 (adequate construct reliability), and AVE ≥ 0.50 (convergent validity) (Hair et al., 2010). Where any indicator shows a relatively modest loading (0.50–0.70), we verify that removing it would not substantially improve reliability or AVE and consider its theoretical relevance before making deletion decisions.

In terms of the standard for reliability testing using Cronbach's Alpha, Hair et al. (2010) recommend that a good measurement table should have a Cronbach's Alpha reliability of 0.7 or higher. However, the Cronbach's Alpha threshold of 0.6 is still acceptable for the nature of some preliminary exploratory studies. The results of the study showed that all variables met the >0.7 requirement, so they should be retained for further testing.

According to Hair et al. (2010), an AVE index of 0.5 or more will represent a model with a convergence value; the threshold of 0.5 means that the average maternal latent variable has a maximum of 50% of the variable of each child observation.

Distinctive value is understood as the degree to which a concept is clearly distinguished from other research concepts based on empirical standards. Although the acceptance threshold of the HTMT index is still debated, this study chose the HTMT standard < 0.9 – the level commonly applied in previous studies. The results in Table 4 indicate that all constructs have HTMT values below 0.90, thereby confirming discriminant validity.

Table 2: Outer loadings and indicator reliability of measurement items

Measurement items	SEC	SNO	TRU	GA	BRD	BI
SEC1	882					
SEC2	871					
SEC3	883					
SEC4	922					
SNO1		925				
SNO2		926				
SNO3		864				
SNO4		922				
TRU1			936			
TRU2			936			
TRU3			938			
TRU4			924			
GA1				885		

Table 3: Internal consistency reliability and convergent validity results

Constructs	Cronbach's alpha (> 0.7)	rho_A	CR (> 0.7)	AVE (> 0.5)
SEC	0.912	0.914	0.938	0.791
SNO	0.93	0.931	0.95	0.827
TRU	0.951	0.952	0.965	0.872
GA	0.931	0.932	0.951	0.829
BRD	0.935	0.937	0.954	0.839
BI	0.941	0.943	0.957	0.849

Table 4: HTMT discriminant validity assessment

Constructs	SEC	SNO	TRU	GA	BRD	BI
SEC						
SNO	0.604					
TRU	0.498	0.584				
GA	0.623	0.664	0.62			
BRD	0.617	0.606	0.572	0.731		
BI	0.661	0.672	0.568	0.645	0.642	

In addition, the author has considered the Fornell-Larcker index in the analysis. From Table 5, the results show that the square root of the AVE of each concept is greater than the correlation coefficients between the underlying variables. This proves that the concepts in the model achieve the desired distinction.

Table 5: Fornell–Larcker discriminant validity assessment

Constructs	SEC	SNO	TRU	GA	BRD	BI
SEC	0.89					
SNO	0.557	0.91				
TRU	0.465	0.55	0.934			
GA	0.575	0.618	0.583	0.91		
BRD	0.569	0.565	0.541	0.682	0.916	
BI	0.614	0.629	0.539	0.605	0.602	0.921

4.4. Evaluation of the structural model

All variance inflation factors (VIFs) range from 1.000 to 1.845, which are below the conservative threshold of 3.0. This indicates that multicollinearity is not a concern and the estimates are stable and interpretable (Hair et al., 2010). Hence, the study's results are consistent with recommended PLS-SEM criteria. VIF results are reported in Table 6.

As shown in Table 7, the R^2 values for 58.1% of the variance in Green Awareness (GA) and 36.4% of the variance in Intent to use e-banking (BI) are explained by the model.

Table 6: Collinearity assessment using variance inflation factors (VIF)

Predictor constructs	GA (VIF)	BI (VIF)
SEC	1.706	
SNO	1.836	
TRU	1.637	
BRD	1.845	
GA		1.000

Table 7: Coefficient of determination (R^2) results

Endogenous constructs	R-squared	R-squared adjusted
GA	0.586	0.581
BI	0.366	0.364

To assess the predictive capacity of the independent variables for the subvariable in the study model, the Q^2 index is used as an important measure that reflects the overall quality of the model. According to Hair et al. (2010), the Q^2 value was in the range of $0.25 \leq Q^2 \leq 0.5$, reflecting the average forecast of the study. The Q^2 values are shown in Table 8. According to Hair et al. (2010), the f^2 index is used to evaluate the effect size of independent variables on the dependent variable. The threshold values for interpretation are 0.02, 0.15, and 0.35, which represent small, medium, and large effects, respectively. More specifically, an f^2 value below 0.02 indicates a negligible effect, values between 0.02 and 0.15 indicate a small effect, values between 0.15 and 0.35 indicate a medium effect, and values equal to or greater than 0.35 indicate a large effect. The overall model fit was evaluated using the standardized root mean square residual (SRMR) and the normed fit index (NFI). The SRMR value was 0.054, which is lower than the recommended threshold of 0.08, indicating a good model fit. In addition, the NFI value was 0.921, which is higher than the recommended minimum value of 0.90. These results confirm that the PLS-SEM model has an acceptable overall fit.

Table 8: Predictive relevance (Q^2) assessment results

Endogenous constructs	Q^2
GA	0.478
BI	0.308

Furthermore, the p-values of all variables in the research model were below 0.05, and all relationships showed positive effects, supporting the proposed hypotheses. The hypothesis testing results are presented in Table 9.

Table 9: Structural model hypothesis testing results

Hypothesis	Normalized regression coefficient	P-value	Sample mean (M)	Standard deviation (STDEV)	T-statistics (|O/STDEV|)	Result
SEC -> GA	0.155	0.000	0.157	0.046	3.365	Accept
SNO -> GA	0.219	0.000	0.220	0.050	4.394	Accept
TRU -> GA	0.193	0.000	0.192	0.054	3.557	Accept
BRD -> GA	0.365	0.000	0.605	0.041	14.699	Accept
GA -> BI	0.605	0.000	0.365	0.052	6.968	Accept

From the results of the study, all the initial hypotheses satisfied the research conditions ($P < 0.05$) with the corresponding impact coefficients as follows: H1 = 0.193; H2 = 0.155; H3 = 0.219; H4 = 0.365; H5 = 0.605. To assess the stability of the coefficients in the model, the team conducted bootstrapping with 5,000 resamples (two-tailed, 95% CI). The results show that all p-values are less than 0.05, indicating that the relationships in the model are statistically significant and exhibit high reliability. The results of the intermediary role test showed that the results of the study accepted the pseudo-impact satisfactorily, with a strong impact coefficient on the intention to use the e-banking application of Gen Z through the intermediary of receiving the Green awareness, respectively: BRD (0.221); SNO (0.132); TRU (0.117); SEC (0.094).

Regarding the mediation analysis, this study employed the Variance Accounted for (VAF) index to determine the strength and type of the mediating role of green awareness. According to the established thresholds, a VAF value between 20% and 80% characterizes partial mediation, while a value exceeding 80% indicates full mediation. As reported in Table 10, the VAF values for the indirect pathways range from 27.4% to 64.4%—specifically 27.4% for Brand, 45.8% for Subjective Norms, 51.7% for Trust, and 64.4% for Information Security. Since the empirical results confirm that both the indirect effects via green awareness and the direct effects of the stimulus variables on usage intention remain statistically significant, and all VAF values fall within the 20–80% range, it is concluded that green awareness functions as a complementary partial mediator. This indicates that while green awareness is a critical psychological bridge, the service-context stimuli also maintain a significant direct influence on Gen Z's intention to use mobile banking applications.

Table 10: Path coefficient and intermediary role verification

Hypothesis	Normalized regression coefficient	P-value	Result	VAF (%)	Result
SEC -> GA -> BI	0.094	0.001	Accept	64.4	Partial mediation
SNO -> GA -> BI	0.132	0.000	Accept	45.8	Partial mediation
TRU -> GA -> BI	0.117	0.001	Accept	51.7	Partial mediation
BRD -> GA -> BI	0.221	0.000	Accept	27.4	Partial mediation

5. Discussion

The results of the intermediary role test show that green awareness significantly transmits the influence of stimulus variables on the intention to use e-banking applications of young people of Generation Z in Ho Chi Minh City. The level of indirect impact in descending order includes: brand

(0.221), subjective standards (0.132), trust (0.117), and information security (0.094). This order shows that the bank's image and message are the most important fulcrum for users to realize the environmental value of digital transactions, thereby increasing the intention to use it.

In terms of branding, the strongest indirect influence suggests that when banks clearly portray a "green" identity, users are more likely to form awareness about the environmental benefits of paperless transactions, receive electronic statements, and limit movement to the counter. This explanation is consistent with the argument for the strength of brand capital in services and the belief in the environmental commitment of the supply organization (Keller, 1993; Chen, 2010).

For subjective norms, the results reflect the dominant role of social influence among young people: when family, friends, school communities or influencers encourage the use of digital channels for environmental benefits, users are more likely to "see" green values and transform that perception into intention to use them. This is consistent with behavioral theory. vi plans to emphasize legitimate social pressure on behavioral choice (Ajzen, 1991) and previous evidence in the context of e-banking.

For trust and information security, the positive but lower indirect impact shows that these two factors are foundational conditions: when users feel that the system is safe, transparent, and stable, they are more willing to receive messages about environmental benefits, thereby increasing the intention to use digital channels. As such, safety and transparency not only reduce perceived risk but also "open the door" for environmental information to come into play (Anouze and Alamro, 2020).

Despite the adequacy of the sample size for structural equation modeling, several limitations regarding the sampling process must be acknowledged. This study employed a convenience sampling method, which may inherently limit the representativeness of the data compared to probability-based techniques. Furthermore, the sample demographic is heavily skewed toward students, who comprise 68% of the total respondents. Consequently, these findings may not fully capture the perspectives of the broader Gen Z population in Ho Chi Minh City, particularly those currently in the workforce. Therefore, caution should be exercised when generalizing the results of this study to the entire Generation Z cohort in various professional and economic contexts.

In terms of methodology, the results support the intermediate mechanism according to the framework of "stimulation – expression – response." To determine the type of intermediate (fully intermediate or partially intermediate), the paper should supplement the confidence interval by the random iteration method and report the intermediate variance ratio, thereby classifying it according to the current guidelines on intermediary testing in consumer behavior research (Chen, 2010). The empirical results reveal a distinct hierarchical order in how stimulus variables influence usage intention through green awareness. Specifically, Bank Brand (0.221) exerts the most substantial indirect influence, followed by Subjective Norms (0.132), Trust (0.117), and Information Security (0.094). This hierarchy suggests that while technical foundations like security and trust are essential, the symbolic value of the brand and social validation are the primary drivers that activate green consciousness in Gen Z consumers.

The supremacy of the Brand effect aligns with the psychological profile of Generation Z in Ho Chi Minh City—a cohort characterized by high digital competence and a strong affinity for Corporate Social Responsibility (CSR). For this generation, a bank is not just a financial utility but a reflection of their personal values. When a brand signals a commitment to environmental stewardship, it resonates with Gen Z's desire for "authentic" consumption, thereby transforming a routine banking choice into a pro-environmental action.

Furthermore, the significant role of Subjective Norms reflects the "hyper-connected" nature of Gen Z. In a pro-environmental social climate, peer influence and social media discourse act as powerful catalysts that internalize green values, making digital banking a socially desirable behavior.

This study contributes to the literature by extending the Stimulus-Organism-Response (S-O-R) framework within the "green digital" context. Traditional applications of S-O-R in technology adoption often focus on utilitarian organisms like perceived usefulness. By positioning Green Awareness as the central cognitive "Organism," this research highlights a psychological shift from "efficiency-seeking" to "sustainability-seeking" in digital environments. This extension proves that in the modern era, environmental cognition is a critical mediator that complements traditional service-context stimuli to drive behavioral responses.

6. Conclusion

The research paper shows that green awareness is an important mechanism linking factors in the banking service context with the intention of young people to use applications. The diminishing order of indirect impact of brands, subjective norms, trust, and information security affirms that to promote sustainable digital behavior, banks not only need to be safe and transparent, but also make the environmental value of digital transactions tangible and proud. This result adds a new perspective to the frameworks that explain behavioral acceptance of technology by placing environmental factors at the center of the intent formation process.

In terms of branding, joint-stock commercial banks should consistently position the image of "green banking – responsible digital services" in all touchpoints, especially right in the application. It is necessary to integrate functions that demonstrate environmental benefits at the individual level, such as the number of pages saved, estimates of emissions

reduced by digital transactions, and the number of paperless transactions by month. This "green evidence" needs to be verified and transparently published to reinforce confidence in environmental commitments (Chen, 2010).

In terms of subjective standards, banks should exploit the mechanism of recommendations from the community by referring friends associated with environmentally oriented rewards, such as exchanging points for crops or contributing to the afforestation fund. At the same time, it is necessary to coordinate with universities. The business has many young workers and influencers in a sustainable lifestyle to spread the message of "going to the bank in a green and smart way, thereby amplifying positive social pressure on the behavior of using the application.

In terms of trust, banks need to increase transparency in operation by providing service status information boards, announcing stable operating times, brief and timely explanations when incidents occur, as well as clearly stating the reimbursement mechanism in case of technical risks. This transparency enhances the sense of trust and creates a platform for users to receive messages about environmental benefits.

In terms of information security, banks need to maintain a "high default" level of security with multi-layer authentication, biometric technology, and abnormal transaction alerts based on the level of risk. Along with that, it is recommended to design concise instructions right in the application on personal data protection and privacy, helping users understand how the system protects them, thereby feeling more secure when moving to digital channels.

In terms of activating green awareness, it is necessary to make environmental benefits a natural part of the experience. Banks can set the digital channel as the default choice for tasks that are easy to digitize, encourage electronic statements instead of paper printing, and provide instant feedback after each transaction on the environmental benefits that users have just contributed. When green awareness is reinforced with personalized information and visual evidence, the likelihood of conversion into use intent increases.

List of abbreviations

AVE	Average variance extracted
BI	Behavioral intention
BRD	Bank brand
CR	Composite reliability
CSR	Corporate social responsibility
EFA	Exploratory factor analysis
GA	Green awareness
Gen Z	Generation Z
HTMT	Heterotrait-monotrait ratio
M	Sample mean
NFI	Normed fit index
PC	Personal computer
PLS-SEM	Partial least squares structural equation modeling
Q^2	Predictive relevance coefficient
R^2	Coefficient of determination
S–O–R	Stimulus–Organism–Response
SCE	Stimulus–Cognition–Effect
SEC	Information security
SEM	Structural equation modeling
SNO	Subjective norms
SPSS	Statistical Package for the Social Sciences
SRMR	Standardized root mean square residual
STDEV	Standard deviation
TAM	Technology Acceptance Model
TPB	Theory of Planned Behavior
TRU	Trust
TRU1–TRU4	Trust item indicators
UTAUT	Unified Theory of Acceptance and Use of Technology
VAF	Variance accounted for
VIF	Variance inflation factor
VND	Vietnamese dong

Compliance with ethical standards

Ethical considerations

This study was conducted in compliance with ethical standards for research involving human participants. All respondents provided informed consent prior to participation. Data were collected anonymously and used solely for academic research purposes. No personally identifiable information was retained.

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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