

# Digital Natives in Artificial Intelligence-Enhanced Marketplaces: Unraveling the Psychological Mechanisms Between Artificial Intelligence Adoption and Purchase Behavior Among Generation Z

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**Abstract.** This research investigated how artificial intelligence (AI) adoption influences online purchase intention among Generation Z customers through the Theory of Planned Behavior framework. The study addressed a significant research gap at the intersection of technology adoption, consumer behavior, and generational studies. Digital commerce has evolved substantially with AI integration, yet limited research examined how Generation Z—as digital natives—respond to these technologies through established psychological frameworks. The study developed and empirically tested an integrated theoretical model that positioned AI adoption as an antecedent to TPB constructs (attitude, subjective norms, and perceived behavioral control). Using structural equation modeling on data collected from Generation Z consumers, the research examined both direct and indirect pathways through which AI adoption influenced purchase intention. The findings revealed that AI adoption significantly influenced all TPB constructs, with the strongest relationship observed between AI adoption and perceived behavioral control. Attitude demonstrated the strongest direct effect on purchase intention, while perceived behavioral control exhibited significant influence on both attitude and subjective norms, extending traditional TPB relationships. The integrated model explained a substantial portion of variance in online purchase intention, confirming its explanatory power. The research contributed to theory by extending TPB to incorporate technological adoption factors and provided practical insights for businesses regarding effective AI implementation strategies for Generation Z consumers.

**Keywords:** Artificial Intelligence Adoption; Generation Z; Theory of Planned Behavior; Online Purchase Intention; E-commerce Psychology

## 1. Introduction

The rapid digitalization of commerce has fundamentally transformed consumer behavior, with online shopping becoming increasingly prevalent across demographic segments (Khoa, 2023a). Within this evolving landscape, Generation Z—individuals born between 1997 and 2012—has emerged as a particularly influential consumer cohort, characterized by their digital nativity, technological fluency, and distinct consumption patterns (Syamsudin *et al.*, 2025; Tran & Khoa, 2025b). As the first generation to have grown up entirely in the digital era, Generation Z's shopping behaviors reflect a seamless integration of technology into their decision-making processes, distinguishing them from preceding generations (H.-T. Tseng *et al.*, 2025).

Concurrently, artificial intelligence (AI) has become increasingly embedded in e-commerce platforms, revolutionizing how consumers discover, evaluate, and purchase products online (Dat *et al.*, 2025). AI technologies—including recommendation systems, virtual assistants, chatbots, and visual search tools—have transformed the online shopping experience by enabling personalization, enhancing decision support, and streamlining the purchase process (Jayasingh *et al.*, 2025). These technologies are particularly relevant for Generation Z consumers, who demonstrate high receptivity to technological innovations and expect digital experiences that are seamless, personalized, and efficient.

The convergence of Generation Z's rising economic influence and the proliferation of AI technologies in e-commerce creates an imperative for understanding how AI adoption influences this cohort's online purchase behavior. As noted by Knoth *et al.* (2024), AI technologies are reshaping the e-commerce landscape at an unprecedented pace, yet our understanding of how these technologies influence consumer psychology and behavior remains limited. This knowledge gap is particularly pronounced for Generation Z, whose unique characteristics as digital natives may shape their responses to AI technologies in ways that differ from other consumer segments (Giedrius & Jolanta, 2024).

The Theory of Planned Behavior (TPB), developed by Ajzen (1991), provides a robust framework for understanding the psychological determinants of consumer behavior, positing that behavioral intentions are influenced by attitudes, subjective norms, and perceived behavioral control. Numerous studies have applied TPB to online consumer behavior across various contexts (Khoa, 2023b; Liao *et al.*, 2007), demonstrating its explanatory power and theoretical relevance. However, as noted by A. Sharma *et al.* (2025), the original TPB framework does not explicitly account for the influence of technological factors, creating a need for theoretical extensions that integrate technological adoption with psychological determinants of behavior.

The integration of AI technologies into e-commerce has significant implications for businesses targeting Generation Z consumers, who represent substantial purchasing power and will constitute a dominant market segment in the coming decades (Tran & Khoa, 2025a). Understanding how AI adoption influences Generation Z's online purchase intentions can inform strategic decisions regarding technological investments, marketing communications, and user experience design (Abaddi, 2024; Duong & Nguyen, 2024). Moreover, this understanding contributes to theoretical knowledge at the intersection of consumer behavior, technology adoption, and generational studies, addressing calls for research that bridges technological and psychological perspectives on digital behavior.

Existing literature on online purchase behavior has established the relevance of TPB in explaining consumers' intentions to shop online. Al-Mamary and Alraja (2022) found that attitude, subjective norms, and perceived behavioral control collectively explained 51% of the variance in mobile shopping intentions, with attitude exerting the strongest influence. Similarly, A.-V. Huynh and Khoa (2025) reported that attitude was the primary determinant of online purchase intentions, followed by perceived behavioral control and subjective norms. These findings confirm the applicability of TPB to online shopping contexts and highlight the importance of understanding the psychological factors that shape digital purchase behaviors.

Research on Generation Z's online shopping behavior has identified distinctive characteristics that differentiate this cohort from previous generations. Priporas *et al.* (2024) noted that Generation Z

consumers are simultaneously independent thinkers and highly attuned to social influences, creating a complex interplay between personal attitudes and perceived social norms. Aloulou *et al.* (2024) found that Generation Z consumers "prioritize their personal evaluations and judgments when making online purchase decisions", suggesting a particularly strong attitude-intention relationship for this cohort.

Studies examining AI technologies in e-commerce have documented various consumer benefits, including enhanced personalization, improved decision support, and reduced search costs (Duong & Nguyen, 2024). Dhananjaya and Goudar (2024) found that AI-powered recommendation systems increased purchase intentions by enhancing perceived product fit and reducing decision complexity. Similarly, Marak *et al.* (2025) reported that AI chatbots positively influenced online purchase intentions by improving service quality perceptions and enhancing convenience. These studies establish the relevance of AI technologies in influencing consumer behavior but typically focus on specific AI applications rather than AI adoption as a broader construct. Recent research has begun to explore the psychological mechanisms through which technological factors influence behavioral intentions. Khanh *et al.* (2025) proposed an integrated framework where AI adoption influences digital entrepreneurial intentions through its effects on TPB constructs, finding that AI adoption enhances perceived behavioral control by building confidence through practical support. Similarly, Cuong *et al.* (2025) found that AI technologies enhance perceived control by providing decision support and reducing uncertainty in online shopping contexts. These studies suggest potential pathways through which AI adoption may influence online purchase intentions but have not fully explored these relationships in the context of Generation Z consumers.

Despite these valuable contributions, significant research gaps remain in understanding how AI adoption influences Generation Z's online purchase intentions. First, existing studies have typically focused on specific AI applications (e.g., recommendation systems, chatbots) rather than examining AI adoption as a broader construct that encompasses multiple technologies and features. This narrow focus limits understanding of how overall AI adoption influences consumer behavior and leaves opportunities for more comprehensive frameworks that integrate various AI technologies. Second, while TPB has been extensively applied to online shopping contexts, the traditional framework does not explicitly account for the influence of technological factors. Research examining the relationships between technological adoption and TPB constructs remains limited, particularly in the context of Generation Z consumers whose online behavior may be distinctly shaped by their digital nativity.

Based on the literature review, two critical research gaps emerge. First, there is a theoretical gap in integrating AI adoption with established behavioral theories such as TPB in the context of online shopping. While TPB has demonstrated robust explanatory power for online purchase intentions, the framework does not explicitly address how technological factors like AI adoption influence the core TPB constructs of attitude, subjective norms, and perceived behavioral control. This gap is particularly significant given the growing prevalence of AI technologies in e-commerce and their potential to reshape consumer decision-making processes in ways not captured by traditional behavioral theories. Second, there is a contextual gap in understanding how AI adoption influences Generation Z's online purchase behavior specifically. Despite Generation Z's growing economic importance and distinctive characteristics as digital natives, research examining how this cohort responds to AI technologies in online shopping contexts remains limited. This gap is significant because Generation Z's unique characteristics—including their digital fluency, value orientations, and consumption patterns—may shape their responses to AI technologies in ways that differ from other consumer segments. Addressing these research gaps, this study aims to develop and empirically test an integrated theoretical framework that explains how AI adoption influences online purchase intentions among Generation Z customers through the lens of TPB.

## 2. Literature Review

### 2.1. Theoretical framework

The Theory of Planned Behaviour (TPB) stands as a highly influential model in predicting specific human actions from attitudinal and control-related beliefs (Ajzen, 1991). The model postulates that an individual's Behavioural Intention—in this case, Online Purchase Intention (OPI)—is directly determined by three antecedent factors: Attitude towards the behaviour, Subjective Norms, and Perceived Behavioural Control (PBC). Empirical research has consistently validated TPB's efficacy in predicting intentions across digital contexts, including e-entrepreneurship and digital business creation (Al-Mamary & Alraja, 2022; Khoa & Huynh, 2025).

AI Adoption is operationalised as the intent to use AI tools or platforms—such as recommendation engines, chatbots, or personalised shopping assistants—within the online commerce environment (Hossain & Biswas, 2024). The utility of AI tools, which enhance data-driven decisions and streamline operations (Zhao & Liu, 2025), acts as a fundamental antecedent. The extant literature on digital entrepreneurial intention, which often precedes commercial behaviour, indicates that individuals who intend to use AI tools are more likely to develop a positive socio-cognitive framework towards the entire digital process (V. A. Huynh *et al.*, 2026). Therefore, AI Adoption is proposed to directly influence the three main TPB constructs, thus providing a technologically-driven context for Gen Z's online purchasing decisions. This research proposed the research framework as Figure 1.

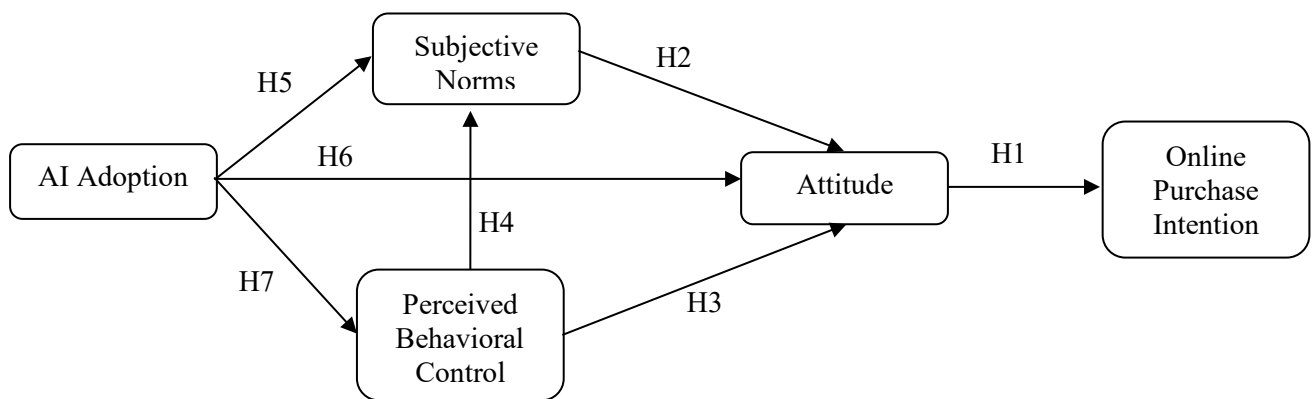


Fig. 1: The research model

### 2.2. Hypotheses development

Attitude is one of the most powerful and consistent predictors of behavioural intention within the TPB framework (Ajzen, 1991). A Generation Z customer's decision to purchase online is contingent upon their overall evaluation of the activity. If they perceive online shopping as attractive, advantageous, and a desirable option compared to physical retail (Liñán *et al.*, 2024), their intention to transact online will be significantly stronger. Studies have repeatedly shown the positive effect of attitude on digital intention, a proxy for sophisticated digital behaviours, thereby strongly supporting its effect on the more general behaviour (Aloulou *et al.*, 2024; Uyen *et al.*, 2025). Therefore, a positive evaluation of the online shopping experience is expected to directly enhance Online purchase intention as hypothesis H1.

*H1: Attitude has a positive impact on the Online Purchase Intention of Generation Z customer.*

Social influence plays a profound role in shaping individual attitudes, especially in novel or non-traditional behavioural domains (Ajzen, 1991). The literature supports that social encouragement can help individuals in developing a positive attitude towards digital engagement (V. M. Sharma & Klein, 2020). In the context of online shopping, if a Gen Z individual's close circle—peers, family, or online communities—is supportive of or frequently engages in online purchasing, this perceived social desirability (SN) increases the individual's positive evaluation (Attitude) of the behaviour itself. Khoa (2023b) report a positive and significant impact of subjective norms on attitude towards digital

entrepreneurship, signifying that social pressure influences the perceived desirability of digital activities.

*H2: Subjective Norms have a positive impact on the Attitude of Generation Z customer.*

An individual's perception of control over a behaviour directly shapes their affective response to it. If a Gen Z customer believes the online purchasing process is easy for them and they can control the creation process (Liñán & Chen, 2009), they are more likely to develop a favourable Attitude (ATT) towards it, as the perceived difficulty is low. Conversely, lack of control can generate negative attitudes (Fan & Ye, 2024). The positive and significant impact of perceived behavioural control on attitude suggests that confidence in one's digital capabilities translates directly into a more positive outlook on the online purchasing activity.

*H3: Perceived Behavioural Control has a positive impact on the Attitude of Generation Z customer.*

The interrelationship between PBC and SN suggests a feedback loop: an individual's confidence can influence their perception of social expectation. The literature explains that if an individual believes they are capable of performing a certain task, they tend to believe that their social environment also expects them to perform it because of their innate capabilities (A. Sharma *et al.*, 2025). In the online context, a Gen Z individual who is highly competent may project this confidence, leading them to perceive that their social circle expects them to easily engage in online shopping activities. Ajzen (2002) confirmed this link, finding a positive and significant impact of perceived behavioural control on subjective norms.

*H4: Perceived Behavioural Control has a positive impact on the Subjective Norms of Generation Z customer.*

The adoption of cutting-edge technology such as AI signals adherence to industry trends and peer expectations, thereby influencing subjective norms (Zhao & Liu, 2025). When Gen Z customers adopt AI tools for online shopping (e.g., personalised recommendations), they are aligning themselves with the behaviour of tech-savvy individuals and the digitally modern consumer (Duong & Nguyen, 2024). The significant impact of AI Adoption Intention on Subjective Norms highlights that this adoption makes the customer feel more receptive towards industry trends and fulfilling peer expectations, thus reinforcing the social pressure to engage in the associated behaviour.

*H5: AI Adoption has a positive impact on the Subjective Norms of Generation Z customer.*

AI tools, when used in an online purchasing environment, enhance the process by enabling rapid content generation, facilitating better decision-making, and streamlining operations (Davidsson & Sufyan, 2023). For Gen Z, using an AI-powered platform improves the perceived quality of the work and productivity (Abaddi, 2024), which in turn fosters psychological commitment and a positive disposition (Attitude) towards the overall online shopping experience (Liu *et al.*, 2024). The positive impact on attitude reinforces that technology innovation intention can foster a favourable evaluation of the digital activity (Sharma *et al.*, 2026). This relationship is highly significant.

*H6: AI Adoption has a positive impact on the Attitude of Generation Z customer.*

AI adoption enhances the individual's sense of capability and resourcefulness in managing digital tasks. AI tools provide practical support such as access to information and guidance in decision-making (Duong & Nguyen, 2024; Khoa & Huynh, 2025). By using AI features (AIA), Gen Z customers feel more confident in their ability to manage complex online purchasing scenarios, verify product authenticity, and feel generally more prepared (PBC) for the transaction. This confidence stemming from being more resourceful and ready for digital entrepreneurship (Satar *et al.*, 2025) through AI alignment directly boosts PBC. This link is supported by the significant impact of AI adoption intention on perceived behavioural control.

*H7: AI Adoption has a positive impact on the Perceived Behavioral Control of Generation Z customer.*

### 3. Research Method

#### 3.1. Measurement scales

This study employs a quantitative approach to empirically test and validate the relationships between AI adoption, Theory of Planned Behavior constructs, and online purchase intention among Generation Z customers. This methodological approach aligns with prior literature on digital behavior intention (Gupta et al., 2023; Pillai et al., 2020; Raut et al., 2024; Wibowo et al., 2024) and is particularly suited to examining the predictive relationships proposed in our theoretical framework.

The current research has adapted validated and reliable scales from extant literature to measure the impact of various constructs on the dependent variable, online purchase intention. All constructs were measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), following established practice in behavioral intention studies (Sharma et al., 2025).

The attitude (ATT) scale measures Generation Z customers' overall evaluation of online shopping. Following Liñán and Chen (2009); T. H. Tseng *et al.* (2022), three items were adapted to the context of online shopping. The items assess the perceived attractiveness, advantages, and preference for online shopping. Sample items include: "Online shopping is attractive to me" and "Online shopping implies more advantages than disadvantages to me."

Table 1: Measurement Items

Construct	Items	Source
Attitude (ATT)	ATT1: Online shopping is attractive to me. ATT2: Online shopping implies more advantages than disadvantages to me. ATT3: Among various options, I would rather shop online than in physical stores.	Adapted from Liñán and Chen (2009); T. H. Tseng <i>et al.</i> (2022)
Subjective Norms (SUN)	SUN1: My friends support my decision to shop online. SUN2: My family supports my decision to shop online. SUN3: The important persons close to me support my decision to shop online.	Adapted from Fan and Ye (2024); Liñán and Chen (2009)
Perceived Behavioral Control (PBC)	PBC1: To shop online would be easy for me. PBC2: I can control the online shopping process. PBC3: I know how to make effective purchasing decisions online.	Adapted from Aloulou <i>et al.</i> (2024)
AI Adoption (AIA)	AIA1: I intend to use AI to enhance my online shopping experience. AIA2: I intend to obtain product recommendations through AI. AIA3: I consider AI an excellent tool to help me make online purchasing decisions.	Adapted from Abdelfattah <i>et al.</i> (2022); Duong and Nguyen (2024)
Online Purchase Intention (OPI)	OPI1: I will make every effort to shop online when possible. OPI2: I am determined to make online purchases in the future. OPI3: I have a strong intention to make online purchases in the future.	Adapted from Li <i>et al.</i> (2025)

Subjective norms (SUN) measure the perceived social pressure to engage in online shopping. The three-item scale was adapted from Fan and Ye (2024); Liñán and Chen (2009), focusing on the perceived support from significant others for online shopping. Sample items include: "My friends support my decision to shop online" and "The important persons close to me support my decision to shop online."

The perceived behavioral control (PBC) scale assesses Generation Z customers' perception of their ability to successfully engage in online shopping. Following Aloulou *et al.* (2024), three items were

adapted to measure confidence, control, and self-efficacy in online shopping contexts. Sample items include: "I can control the online shopping process" and "I know how to make effective purchasing decisions online."

The AI adoption (AIA) scale measures Generation Z customers' willingness to use AI-powered tools in their online shopping experiences. The three-item scale was adapted from Abdelfattah *et al.* (2022); Duong and Nguyen (2024). Sample items include: "I intend to use AI to enhance my online shopping experience" and "I consider AI an excellent tool to help me make online purchasing decisions." T

The online purchase intention (OPI) scale measures Generation Z customers' intention to engage in online shopping. The three-item scale was adapted from Li *et al.* (2025), focusing on the strength and determination of intention. Sample items include: "I will make every effort to shop online when possible" and "I have a strong intention to make online purchases in the future."

### 3.2. Sample and Data Collection

This study employed a purposive sampling approach to select Generation Z customers (born between 1997 and 2012), following established practices in digital behavior research. The purposive sampling technique was chosen for its efficiency in reaching the target demographic and its appropriateness for theory testing. The study targeted individuals within the age range of 18-25 years, as this segment represents the early adult portion of Generation Z who possess independent purchasing power and are active digital consumers. The sample size of 251 respondents was determined based on the recommendations for structural equation modeling analysis. According to Hair *et al.* (2019), a sample size of 200 or more is considered adequate for models with five to seven constructs.

Data was collected using both online and offline modes to ensure comprehensive coverage of the target demographic. For online collection, the questionnaire was distributed through various digital platforms frequently used by Generation Z, including social media channels and university communication networks. The offline collection involved distributing physical questionnaires at universities, shopping malls, and youth-focused events. The data collection process spanned a period of three months, from June to August 2025. This timeframe was chosen to capture both regular shopping periods and seasonal sales, providing a more representative sample of online shopping behaviors. Participation was voluntary, and all respondents were informed about the academic nature of the study and assured of data confidentiality, following ethical research practices. A total of 283 responses were initially received. Following rigorous data cleaning through SPSS v.28, 32 responses were excluded due to incomplete information, straight-lining (selecting the same response for all items), or inconsistent response patterns.

The demographic profile of the respondents is presented in Table 2. The sample comprised 48.21% males and 51.79% females, providing a relatively balanced gender distribution. The majority of respondents (64.1%) were aged between 21 and 25 years, with the remaining 35.86% falling between 18 and 20 years. This age distribution appropriately represents the young adult segment of Generation Z who actively engage in online shopping activities. In terms of occupation, students constituted the largest group (58.57%), followed by employed professionals (21.91%), self-employed individuals (12.75%), and others (6.77%). This occupational distribution reflects the transitional nature of Generation Z, with many still in education while others have entered the workforce. The sample's educational background is diverse, with 55.78% pursuing or having completed undergraduate education, 28.29% at the postgraduate level, and 15.94% with high school education or equivalent. Monthly online spending patterns reveal that most respondents (42.63%) spend between \$50 and \$100 per month on online purchases, followed by those spending less than \$50 (31.47%) and those spending between \$101 and \$200 (18.72%). Only 7.17% reported spending more than \$200 monthly on online shopping. This spending pattern aligns with the typical purchasing power of young adults in Generation Z.

Table 2: Demographic Profile of Respondents

Characteristic	Category	Frequency	Percentage
Gender	Male	121	48.21%
	Female	130	51.79%
Age Group	18-20 years	90	35.86%
	21-25 years	161	64.14%
Occupation	Student	147	58.57%
	Employed	55	21.91%
	Self-employed	32	12.75%
	Other	17	6.77%
Education	High School	40	15.94%
	Undergraduate	140	55.78%
	Postgraduate	71	28.29%
Monthly Online Spending	Less than \$50	79	31.47%
	\$50-\$100	107	42.63%
	\$101-\$200	47	18.73%
	More than \$200	18	7.17%

This study employs Structural Equation Modeling (SEM) through Partial Least Squares (PLS) using SmartPLS 4.0 for data analysis. This analytical approach was chosen for its suitability in testing complex theoretical models with multiple relationships between constructs. PLS-SEM is particularly appropriate for this study given its prediction-oriented nature and effectiveness in theory testing.

#### 4. Result

The measurement model evaluates the reliability and validity of the constructs used in this study. Following established guidelines for Partial Least Squares Structural Equation Modeling (PLS-SEM) analysis (Hair *et al.*, 2019), this section presents the assessment of the measurement model through tests of reliability, convergent validity, and discriminant validity.

Before proceeding with the measurement model assessment, we evaluated the potential presence of common method bias (CMB). As recommended by Podsakoff *et al.* (2003), Harman's single factor test was performed using SPSS v.28. The analysis revealed that the single factor accounted for 29.17% of the total variance, which is below the threshold of 50%, indicating that common method bias is not a significant concern in this study. This approach to CMB assessment aligns with similar studies in digital behavior research (Podsakoff *et al.*, 2003).

To establish the reliability and convergent validity of the constructs, we examined the factor loadings, Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE) values. As shown in Table 3, all constructs demonstrated strong internal consistency reliability with Cronbach's alpha values ranging from 0.842 to 0.924, well above the recommended threshold of 0.70. Similarly, the composite reliability values, which ranged from 0.843 to 0.925, exceeded the recommended threshold of 0.70, further confirming the reliability of the measurement scales.

Convergent validity was assessed through factor loadings and AVE values. All items exhibited factor loadings above the threshold of 0.70, with ranges reported for each construct in Table 3. These high loadings indicate that the items effectively represent their respective constructs. Additionally, all AVE values exceeded the recommended threshold of 0.50, ranging from 0.671 to 0.825, demonstrating that each construct explains more than 50% of the variance in its indicators (Fornell & Larcker, 1981). These results collectively establish the convergent validity of the constructs, indicating that the items within each construct are highly correlated and measure the same underlying concept.

Table 3: Reliability and Convergent Validity Results

Construct	Outer Loading (min-max)	Cronbach's Alpha	Composite Reliability	AVE
Attitude (ATT)	0.875 - 0.904	0.893	0.894	0.783
Subjective Norms (SUN)	0.818 - 0.852	0.842	0.843	0.671
Perceived Behavioral Control (PBC)	0.837 - 0.878	0.879	0.88	0.722
AI Adoption (AIA)	0.858 - 0.895	0.889	0.89	0.769
Online Purchase Intention (OPI)	0.891 - 0.912	0.924	0.925	0.825

The high reliability and convergent validity values observed in this study are consistent with those reported in similar research examining technological adoption and behavioral intentions. For instance, Cronbach's alpha values ranging from 0.842 to 0.924 and AVE values from 0.671 to 0.825 in their study of AI adoption and digital entrepreneurial intentions.

Discriminant validity assesses the extent to which each construct is distinct from other constructs in the model. Following recent methodological recommendations (Henseler *et al.*, 2014), we employed the Heterotrait-Monotrait (HTMT) ratio to evaluate discriminant validity. As shown in Table 4, all HTMT values were below the conservative threshold of 0.85, indicating that each construct captures phenomena not represented by other constructs in the model.

Table 4: Discriminant Validity - Heterotrait-Monotrait (HTMT) Ratio Results

Construct	ATT	SUN	PBC	AIA
Attitude (ATT)				
Subjective Norms (SUN)	0.543			
Perceived Behavioral Control (PBC)	0.572	0.549		
AI Adoption (AIA)	0.567	0.425	0.392	
Online Purchase Intention (OPI)	0.702	0.548	0.664	0.463

The measurement model assessment confirms the reliability and validity of the constructs used in this study. The high Cronbach's alpha and composite reliability values indicate strong internal consistency within each construct, while the AVE values above 0.5 and HTMT ratios below 0.85 confirm convergent and discriminant validity, respectively. These results provide a solid foundation for proceeding with the structural model analysis, as they establish that the measurement instruments effectively capture the intended constructs and distinguish between different theoretical concepts in the research model.

After establishing the reliability and validity of the measurement model, we proceeded to evaluate the structural model to test the hypothesized relationships. Following established guidelines for PLS-SEM analysis, this section presents the assessment of the structural model through tests of collinearity, path coefficients, explanatory power, effect sizes, and predictive relevance.

Multicollinearity can distort the results of structural model analysis by inflating standard errors and making it difficult to assess the relative importance of predictor variables. To ensure that multicollinearity did not affect our results, we examined the Variance Inflation Factor (VIF) values for all predictor relationships in the model. As shown in Table 5, all VIF values were below the conservative threshold of 3.3, with values ranging from 1.183 to 2.651, indicating that multicollinearity is not a concern in this study. The VIF values for relationships involving attitude (ATT) as a predictor of online purchase intention (OPI) and perceived behavioral control (PBC) as a predictor of online purchase intention were higher (2.542 and 2.651, respectively) than other relationships, suggesting some correlation between these predictors. However, these values remain well below the threshold of 3.3, indicating that multicollinearity is not a significant concern. The lower VIF values for other relationships, particularly those involving AI adoption (AIA) as a predictor, indicate minimal correlation among these predictors.

Table 5: Multicollinearity Assessment (VIF) and Effect Size ( $f^2$ )

Relationship	VIF	$f^2$	Effect Size Interpretation
ATT → OPI	2.542	0.231	Medium
SUN → ATT	1.693	0.052	Small
SUN → OPI	2.138	0.028	Small
PBC → ATT	2.217	0.148	Medium
PBC → SUN	1.183	0.207	Medium
PBC → OPI	2.651	0.114	Small-Medium
AIA → ATT	1.645	0.043	Small
AIA → SUN	1.342	0.079	Small
AIA → PBC	1.000	0.07	Small

The effect size ( $f^2$ ) measures the strength of each predictor's contribution to the explained variance in endogenous constructs. Following Cohen's (1988) guidelines of Cohen (2013),  $f^2$  values of 0.02, 0.15, and 0.35 represent small, medium, and large effect sizes, respectively. As shown in Table 5, the effect sizes varied across the different relationships in the model. The relationship between attitude and online purchase intention exhibited the largest effect size ( $f^2 = 0.231$ ), indicating a medium effect and highlighting the importance of attitude in shaping Generation Z customers' online purchase intentions. This finding aligns with the central role of attitude in the TPB framework and is consistent with previous research on digital behavioral intentions. Perceived behavioral control demonstrated medium effects on both subjective norms ( $f^2 = 0.207$ ) and attitude ( $f^2 = 0.148$ ), along with a small-to-medium effect on online purchase intention ( $f^2 = 0.114$ ). These results underscore the significant role of perceived control in shaping Generation Z customers' perceptions and intentions regarding online shopping. Subjective norms showed small effects on both attitude ( $f^2 = 0.052$ ) and online purchase intention ( $f^2 = 0.028$ ), suggesting that while social influence plays a role in shaping Generation Z customers' attitudes and intentions toward online shopping, its impact is less pronounced compared to other factors in the model. AI adoption exhibited small effects on attitude ( $f^2 = 0.043$ ), subjective norms ( $f^2 = 0.079$ ), and perceived behavioral control ( $f^2 = 0.070$ ), indicating that while AI adoption influences these TPB constructs, its effects are subtle rather than dominant. This finding suggests that AI adoption serves as a foundation that indirectly shapes online purchase intentions through its influence on the TPB constructs.

The explanatory power of the model was assessed through the coefficient of determination ( $R^2$ ), which indicates the amount of variance explained in endogenous constructs. The predictive relevance of the model was evaluated using the blindfolding procedure to calculate Stone-Geisser's  $Q^2$  values, with values greater than zero indicating predictive relevance. Table 6 presents the  $R^2$  and  $Q^2$  values for all endogenous constructs in the model.

The model explained 55.2% of the variance in online purchase intention ( $R^2 = 0.552$ ), indicating substantial explanatory power. This level of explanation is noteworthy for behavioral intention research and suggests that the integrated TPB-AI adoption framework effectively captures the key factors influencing Generation Z customers' online purchase intentions. The adjusted  $R^2$  value of 0.543 accounts for the number of predictors and sample size, providing a more conservative estimate of explanatory power.

Table 6: Explanatory Power ( $R^2$ ) and Predictive Relevance ( $Q^2$ )

Endogenous Construct	$R^2$	$R^2$ Adjusted	$Q^2$
Attitude (ATT)	0.447	0.439	0.238
Subjective Norms (SUN)	0.292	0.286	0.161
Perceived Behavioral Control (PBC)	0.182	0.179	0.155
Online Purchase Intention (OPI)	0.552	0.543	0.228

The model also explained 44.7% of the variance in attitude ( $R^2 = 0.447$ ), suggesting that subjective

norms, perceived behavioral control, and AI adoption collectively account for a significant portion of Generation Z customers' attitudes toward online shopping. The explanatory power for subjective norms ( $R^2 = 0.292$ ) and perceived behavioral control ( $R^2 = 0.182$ ) was more moderate but still substantive. The  $Q^2$  values for all endogenous constructs were well above zero, ranging from 0.155 to 0.238, indicating that the model has good predictive relevance. The highest  $Q^2$  value was observed for attitude ( $Q^2 = 0.238$ ), followed closely by online purchase intention ( $Q^2 = 0.228$ ), suggesting that the model particularly excels at predicting these two constructs.

To test the hypothesized relationships, we employed the bias-corrected and accelerated (BCa) bootstrapping method with 10,000 subsamples. This approach provides robust estimates of standard errors and confidence intervals for the path coefficients. The results of the hypothesis testing are presented in Table 7. All hypothesized relationships were supported by the data, with all path coefficients showing statistical significance at  $p < 0.01$ . The strongest relationship was observed between AI adoption and perceived behavioral control ( $\beta = 0.426$ ,  $p < 0.001$ ), indicating that Generation Z customers who adopt AI technologies perceive greater control over their online shopping activities.

Table 7: Path Coefficients and Hypothesis Testing Results

Hypothesis	Relationship	$\beta$	t-value	p-value	Result
H1	ATT $\rightarrow$ OPI	0.392	7.319	0.000	Supported
H2	SUN $\rightarrow$ ATT	0.198	3.425	0.001	Supported
H3	PBC $\rightarrow$ ATT	0.286	5.048	0.000	Supported
H4	PBC $\rightarrow$ SUN	0.413	6.875	0.000	Supported
H5	AIA $\rightarrow$ SUN	0.239	3.967	0.000	Supported
H6	AIA $\rightarrow$ ATT	0.232	5.402	0.000	Supported
H7	AIA $\rightarrow$ PBC	0.426	3.249	0.001	Supported

## 5. Discussion

The results confirmed that attitude has the strongest direct effect on online purchase intention among Generation Z customers ( $\beta = 0.392$ ,  $p < 0.001$ ), supporting H1. This finding aligns with the core proposition of TPB that attitude is a primary determinant of behavioral intention (Ajzen, 1991) and is consistent with numerous studies on online consumer behavior. For instance, Al-Mamary and Alraja (2022) found that attitude was the strongest predictor of mobile shopping intention ( $\beta = 0.365$ ), while Alzamel (2021) reported a similar relationship between attitude and online purchase intention ( $\beta = 0.387$ ). The consistency of these findings across studies underscores the critical role of attitude in shaping digital purchase behaviors.

The strong attitude-intention relationship found in this study may be particularly relevant for Generation Z customers, who have been characterized as discerning digital consumers with well-defined preferences. As noted by Aloulou *et al.* (2024), Generation Z customers prioritize their personal evaluations and judgments when making online purchase decisions, which explains the substantial influence of attitude on intention observed in our study. Similarly, Al-Ayed (2024) argued that Generation Z customers rely heavily on their attitudes when making digital purchase decisions because they have extensive experience with online platforms and have developed clear preferences based on this experience.

Our findings revealed a significant positive relationship between subjective norms and attitude ( $\beta = 0.198$ ,  $p = 0.001$ ), supporting H2. This relationship, while modest in magnitude, suggests that social influence plays a role in shaping Generation Z customers' attitudes toward online shopping. This finding aligns with Fan and Ye (2024)'s proposition that social encouragement can help individuals in developing a positive attitude toward digital behaviors, and is consistent with studies by Al-Ayed (2024); Alzamel (2021), who found similar relationships in different contexts.

The results confirmed significant positive relationships between perceived behavioral control and

attitude ( $\beta = 0.286$ ,  $p < 0.001$ ) and between perceived behavioral control and subjective norms ( $\beta = 0.413$ ,  $p < 0.001$ ), supporting H3 and H4. These findings extend the traditional TPB framework by demonstrating that perceived control not only directly influences intention but also shapes attitudes and perceptions of social support. The relationship between perceived behavioral control and attitude aligns with findings by Khoa (2023b), who reported a similar relationship ( $\beta = 0.271$ ) and argued that "if an individual feels confident about performing a task, they are more likely to develop a positive attitude towards it" (p. 7). This relationship is particularly relevant for online shopping, where perceived ease of use and confidence in navigating digital platforms significantly influence attitudes (Al-Mamary & Alraja, 2022).

The strong relationship between perceived behavioral control and subjective norms ( $\beta = 0.413$ ) represents an important extension of TPB in the digital context. This finding aligns with Fan and Ye (2024) observation that individuals believe that because they have the right skillset or are capable of performing a certain task, their social circle also expects them to pursue [it] because of their innate capabilities. The effect size analysis revealed a medium effect of perceived behavioral control on subjective norms ( $f^2 = 0.207$ ), suggesting that this relationship is substantive and theoretically important. This relationship may be particularly relevant for Generation Z, who navigate complex digital environments with confidence and are often seen as digital experts within their social circles. As noted by Ponce *et al.* (2023), Generation Z's perceived digital expertise often translates into social expectations to engage with digital platforms, creating a reinforcing cycle between control perceptions and subjective norms.

One of the key contributions of this study is the integration of AI adoption with the TPB framework. The results confirmed significant positive relationships between AI adoption and subjective norms ( $\beta = 0.239$ ,  $p < 0.001$ ), attitude ( $\beta = 0.232$ ,  $p < 0.001$ ), and perceived behavioral control ( $\beta = 0.426$ ,  $p < 0.001$ ), supporting H5, H6, and H7. The strong relationship between AI adoption and perceived behavioral control ( $\beta = 0.426$ ) suggests that AI technologies enhance Generation Z customers' confidence in their ability to shop online effectively. This finding aligns with research by Duong and Nguyen (2024); A. Sharma *et al.* (2025), who found that AI adoption enhances perceived control by providing practical support, such as personalized recommendations, simplified search processes, and decision-making assistance. Similarly, Abaddi (2024) noted that AI tools empower users by reducing complexity and enhancing their sense of control over digital transactions. The moderate relationship between AI adoption and subjective norms ( $\beta = 0.239$ ) indicates that AI technologies influence perceptions of social support for online shopping. This finding is consistent with research by Ponce *et al.* (2023), who found that AI features with social components, such as review aggregators and social proof indicators, enhance perceptions of social endorsement for digital behaviors.

## 6. Conclusion

### 6.1. Theoretical Contributions

This study makes several significant theoretical contributions to the fields of consumer behavior, technology adoption, and the Theory of Planned Behavior. First, it extends the TPB framework by integrating AI adoption as an antecedent variable that influences the core TPB constructs, thereby enhancing the explanatory power and theoretical richness of the model in the context of digital consumer behavior. This integration addresses calls by researchers for theoretical frameworks that bridge technological and psychological perspectives on digital behavior. Second, the study advances understanding of the relationships among TPB constructs by identifying and empirically validating the significant influence of perceived behavioral control on both attitude and subjective norms, extending beyond the traditional TPB pathways and revealing a more nuanced picture of how control perceptions shape behavioral intentions through multiple mechanisms. Third, the research contributes to Generation Z consumer behavior theory by empirically demonstrating the psychological processes through which AI adoption influences this cohort's online purchase intentions, addressing the theoretical gap regarding

how technological innovations shape digital native consumers' decision-making processes. Finally, the study provides a methodologically robust model with strong measurement properties and substantial explanatory power, offering a validated framework that future researchers can adapt and extend to investigate various aspects of digital consumer behavior across different contexts and populations.

## **6.2. Practical Contributions**

The findings of this research offer valuable insights for businesses and marketers targeting Generation Z consumers in the e-commerce sector. First, the strong relationship between attitude and online purchase intention suggests that businesses should prioritize strategies that enhance Generation Z's positive evaluations of online shopping experiences. These strategies could include developing user interfaces that align with Generation Z's aesthetic preferences, emphasizing values that resonate with this cohort such as authenticity and ethical business practices, and creating content that highlights the benefits of online shopping in ways that appeal to Generation Z's priorities. Second, the significant influence of AI adoption on all TPB constructs indicates that businesses should strategically implement AI technologies that enhance perceived control, social validation, and positive attitudes. Specifically, companies should consider implementing AI-driven personalization systems that provide tailored recommendations based on individual preferences, virtual try-on tools that reduce purchase uncertainty, conversational AI assistants that simplify the shopping process, and social proof indicators that leverage AI to highlight relevant reviews and endorsements from peers. Third, the substantial effect of perceived behavioral control on both attitude and subjective norms suggests that businesses should design e-commerce platforms that enhance Generation Z's confidence in navigating the online shopping process, potentially through intuitive interfaces, streamlined checkout processes, clear product information, and educational content that builds digital shopping competence.

The practical implications extend to AI implementation strategies for online retailers specifically targeting Generation Z customers. The strong relationship between AI adoption and perceived behavioral control suggests that retailers should prioritize AI features that enhance Generation Z's sense of mastery and control over the shopping process. These could include AI-powered search functionalities that understand natural language queries and return highly relevant results, virtual shopping assistants that provide guidance without being intrusive, and AI tools that simplify complex decisions such as size selection or product comparison. The significant relationship between AI adoption and subjective norms indicates that retailers should implement AI features with social components, such as AI-curated social proof, personalized recommendations that reference peer preferences, and AI-facilitated sharing options that enable Generation Z customers to easily seek validation from their social networks. Additionally, the relationship between AI adoption and attitude suggests that retailers should design AI experiences that are not only functional but also enjoyable and aligned with Generation Z's values, potentially through aesthetically pleasing visual AI interfaces, ethical AI that transparently explains its recommendations, and AI features that contribute to causes Generation Z cares about, such as sustainability or social justice. By strategically implementing AI technologies that address the psychological factors identified in this study, online retailers can create shopping experiences that resonate with Generation Z customers and drive purchase intentions.

## **6.3. Limitations and Future Research Directions**

While this study provides valuable insights into how AI adoption influences Generation Z's online purchase intentions, several limitations must be acknowledged, which simultaneously open avenues for future research. The cross-sectional nature of this study limits causal inferences about the relationships observed, suggesting that longitudinal research could provide more robust evidence of how AI adoption influences TPB constructs and purchase intentions over time, particularly as AI technologies evolve and Generation Z customers gain more experience with these technologies. The sample, while adequate in size, was drawn from a single country, potentially limiting the generalizability of findings to Generation Z customers in other cultural contexts with different levels of technological development

and cultural attitudes toward AI; future cross-cultural research could examine how these relationships vary across different national and cultural settings, particularly contrasting collectivistic and individualistic cultures where the role of subjective norms may differ substantially. The study treated AI adoption as a unidimensional construct, potentially obscuring nuances in how different types of AI technologies (e.g., recommendation systems, chatbots, visual search tools) influence different TPB constructs; future research could adopt a more granular approach, examining specific AI technologies and their unique effects on consumer psychology and behavior. The focus on Generation Z, while valuable, limits comparison with other generational cohorts; comparative studies examining how the integrated TPB-AI adoption framework applies across different age groups could reveal important insights about generational differences in digital consumer behavior. The measurement of online purchase intention as a general construct may obscure variations across different product categories and price points; future research could examine how the model applies to specific product categories where AI assistance may be particularly valuable, such as fashion, electronics, or experiential products. Additionally, the model could be expanded to include other relevant constructs such as trust in AI, privacy concerns, and ethical considerations, which may moderate the relationships observed in this study, particularly as AI technologies become more sophisticated and pervasive in the e-commerce landscape.

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