

An Extended Technology Acceptance Model of Generation Z's Behavioral Intention to Adopt Online Food Delivery Services in Vietnam: A PLS-SEM Approach

Nguyen Ngoc Nuo¹, Ha Minh Hieu^{2*}

^{1,2}Vietnam Aviation Academy

*Corresponding author

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ABSTRACT

This study investigates the antecedents of Generation Z's behavioral intention to adopt online food delivery (OFD) services through e-commerce platforms in Vietnam. Drawing on the Technology Acceptance Model (TAM) extended with elements of the Theory of Planned Behavior (TPB), the study examines how three contextual factors time-saving orientation, easy payment method, and social influence shape perceived ease of use and perceived usefulness and, in turn, attitude and intention to use OFD applications. A quantitative, exploratory design was adopted. Of 300 questionnaires distributed, 287 valid responses were retained and analyzed using partial least squares structural equation modeling (PLS-SEM) in SmartPLS. The results indicate that all nine hypothesized paths are statistically significant. Easy payment method exerts the strongest effect on perceived ease of use, whereas time-saving orientation and social influence exhibit comparatively weaker, though significant, effects on the two perception constructs. The extended model explains a moderate share of the variance in perceived ease of use, perceived usefulness, attitude, and intention. The findings suggest that food-and-beverage (F&B) firms should prioritize simplified payment systems, reinforce time-saving features, and leverage social-influence marketing to accelerate the adoption of OFD services, particularly in the post-COVID-19 environment.

Keywords: Food delivery services; Generation Z; behavioral intention; consumer behavior; Technology Acceptance Model; PLS-SEM

INTRODUCTION

Online food delivery (OFD) is a service through which customers order food from their preferred restaurants and cuisines via a website or an intermediary e-commerce application on a mobile device, choosing when and where the order is delivered. What once seemed impractical has become routine amid rapid technological advancement. The outbreak of the COVID-19 pandemic further accelerated the growth of OFD, making the service more prevalent than ever. To capitalize on this momentum, firms in the F&B industry must capture the interest of potential customers and understand their decision journey in order to secure a competitive advantage.

A key driver of OFD expansion in Vietnam is rising smartphone penetration. Approximately 93% of the adult population owns a mobile phone, and 75% of internet users have made an online purchase, with total e-commerce spending reaching USD 2.96 billion—a 24% year-on-year increase (Kemp, 2020). As smartphone adoption grows, consumers can shop anywhere and at any time. The more conveniently consumers can access OFD services through their smartphones, the more readily they shift from traditional offline food purchasing to modern digital channels (Leung et al., 2025).

The OFD market is characterized by a rapid shift toward digitalized transactions and mobile purchasing. The global industry is valued at more than USD 97 billion, with an average growth rate of about 3.5% over five years (Zhao et al., 2024). Representing the third-largest market in ASEAN, Vietnam's food-service industry

grew at an annual rate of 15.4% and was valued at USD 21.3 million in 2015. Workplace culture in Vietnam also favors online F&B services: firms commonly allocate daily lunch budgets and monthly after-work allowances, and nine out of ten Vietnamese employees report ordering food and drink through internet-based applications. In the hospitality sector, online ordering accounts for more than half of F&B orders in major cities (An et al., 2023).

During the 22-day nationwide social-distancing period in April, 75% of Vietnamese citizens reported using OFD services to limit the spread of the novel coronavirus. Of these, 61% cited time savings on travel, 51% cited a wider range of choices suited to personal taste, 50% cited savings from promotional coupons, and 42% cited convenient payment solutions (Tran, 2021).

LITERATURE REVIEW AND RESEARCH MODEL

Literature review

Anita, Richa, and Seena (2019) examined the factors that attract consumers when ordering food through mobile applications, focusing on consumer expectations during the ordering process. Their results showed that most respondents were aware of such applications and used them frequently for convenience. Easy payment methods, a wide variety of food and restaurant choices, delivery time, and customer service were also found to relate positively to sales growth.

Nguyen (2019) studied the factors shaping the decisions of Millennials and Generation Z toward food delivery services in Vietnam. The results indicated that applications offering fast, high-quality delivery, attractive promotions, social influence, and an easy-to-use system provide the value needed to persuade target customers. To strengthen the relationship with these cohorts, food delivery companies should focus on social media, through which potential customers can communicate, connect, and become aware of the brand's personality.

Using the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2)—an extension of TAM—Lee et al. (2019) found that habit, performance expectancy, and social influence are the strongest determinants of the continued intention to use food delivery applications. They also identified an indirect effect of information quality on performance expectancy, which in turn encourages repurchase through online-to-offline (O2O) F&B services.

Ayhün et al. (2024) investigated the relationship between price orientation, time-saving orientation, and consumer behavioral intention toward food delivery applications. Time-saving orientation had a strong effect on behavioral intention, whereas price-saving orientation showed no significant relationship, making time-saving orientation the dominant factor influencing online purchasing among working consumers.

Kajandren et al. (2023) likewise identified time-saving orientation as an important factor in the behavioral intention of Malaysian consumers to use OFD. Together with hedonic motivation and price-saving orientation, it related positively to consumer attitude, implying that greater time convenience improves attitudes toward OFD services.

In a similar vein, Tan et al. (2024) examined the relationship between antecedent factors and behavioral intention toward OFD services via e-commerce platforms among urban Malaysian consumers. Time-saving orientation, convenience motivation, and security/privacy all had positive effects on behavioral intention, and convenience emerged as a leading driver of the perceived usefulness of OFD applications.

Hypothesis development

Building on the reviewed literature, this study integrates three contextual antecedents—time-saving orientation, easy payment method, and social influence—into the TAM to explain Generation Z's intention to use OFD services.

Time-saving orientation. In Vietnam, time is a scarce resource that consumers are reluctant to waste. Consumers tend to “buy time” when selecting an e-commerce platform for OFD or online shopping (Arli et al.,

2024; Kurniawan et al., 2024). Mahpour et al. (2024) note that changing lifestyles and time scarcity have made in-store shopping less appealing; as long as online shopping saves time, consumers continue to use it. Dazmin and Ho (2019) similarly confirm that when OFD services embed time-saving and convenience features, consumer attitudes improve.

H1a: Time-saving orientation positively influences perceived usefulness.

H1b: Time-saving orientation positively influences perceived ease of use.

Social influence. Consumers' adoption decisions are shaped by the opinions and behaviors of peers, family, and reference groups, especially among younger cohorts who are highly connected through social networks. Social influence therefore is expected to enhance the perceived usefulness and perceived ease of use of OFD applications.

H2a: Social influence positively influences perceived usefulness.

H2b: Social influence positively influences perceived ease of use.

Easy payment method. Vietnamese consumers have traditionally relied on cash and expressed limited trust in financial institutions for transferring and holding money, often viewing card and online-banking fees as unnecessary costs (Network, 2018). The larger the online transaction, the greater the discouragement consumers feel, which impedes e-commerce growth. Customer trust rises when a service provides an efficient payment system (Islam, 2024), and payment quality embedded in website quality is central to building trust and satisfaction (Kedah, 2023). Al-Fahim et al. (2024) further show that perceived usefulness and information quality are key drivers of online-banking acceptance.

H3: Easy payment method positively influences perceived ease of use.

Perceived ease of use. In TAM, perceived ease of use denotes the degree to which a person believes that using an innovation is free of effort (Foroughi et al., 2024). Establishing this belief is essential to shifting consumer attitudes and intentions (Lee et al., 2023), and perceived ease of use positively affects continued intention to use online services (Teo et al., 2024).

H4a: Perceived ease of use positively influences perceived usefulness.

H4b: Perceived ease of use positively influences attitude toward OFD.

Perceived usefulness and attitude. Beyond perceived ease of use, perceived usefulness shapes consumer attitudes toward e-commerce adoption; Bahari et al. (2024) find that perceived usefulness is the key factor influencing the intention to purchase online. Attitude, in turn, is a proximal determinant of behavioral intention.

H5: Perceived usefulness positively influences attitude toward OFD.

H6: Attitude toward OFD positively influences intention to use OFD.

Proposed research model (structural specification)

Rather than depicting the hypothesized relationships as a path diagram, the research model is specified formally as a system of structural (inner-model) equations. Let the exogenous latent constructs be time-saving orientation (ξ_1), easy payment method (ξ_2), and social influence (ξ_3), and let the endogenous constructs be perceived ease of use (η_1), perceived usefulness (η_2), attitude (η_3), and intention to use (η_4). The hypothesized dependence among constructs is given by Eqs. (1)–(4):

$$\eta_1 = \gamma_{11}\xi_1 + \gamma_{12}\xi_2 + \gamma_{13}\xi_3 + \zeta_1 \quad (1)$$

$$\eta_2 = \gamma_{21}\xi_1 + \gamma_{23}\xi_3 + \beta_{21}\eta_1 + \zeta_2 \quad (2)$$

$$\eta_3 = \beta_{31}\eta_1 + \beta_{32}\eta_2 + \zeta_3 \quad (3)$$

$$\eta_4 = \beta_{43}\eta_3 + \zeta_4 \quad (4)$$

where γ_{ij} are the path coefficients from exogenous to endogenous constructs, β_{ij} are the path coefficients among endogenous constructs, and ζ_i are the structural (disturbance) terms. Equations (1)–(4) jointly encode hypotheses H1a–H6.

RESEARCH METHODOLOGY

Measurement of constructs

The survey instrument comprised two parts: Part 1 measured the theoretical constructs, and Part 2 collected respondent demographics. Part 1 contained 24 reflective items rated on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree): time-saving orientation (4 items), easy payment method (3 items; coded EP1, EP2, EP4), social influence (3 items), perceived usefulness (4 items), perceived ease of use (4 items), attitude toward OFD (3 items), and intention to use (3 items). Detailed items and their sources are presented in Appendix A.

Procedure and data collection

The study combined qualitative and quantitative methods. The qualitative phase consisted of two focus groups of five students each, aged 18–22, used to assess respondents' comprehension of the constructs, refine the items, and finalize the measurement scales. The quantitative phase evaluated scale reliability and tested the research model and hypotheses. A pilot questionnaire was administered to 30 respondents to verify comprehension prior to full data collection (Churchill, 1979). The final questionnaire was created in Google Forms and distributed to young individuals via email, Zalo, and Facebook Messenger (Evans & Mathur, 2018). A screening statement restricted participation to respondents aged 18–28 who had used food delivery applications. Of 300 questionnaires distributed, 13 were unusable, yielding 287 valid responses—sufficient for PLS analysis (Hair et al., 2016).

Statistical method

Partial least squares structural equation modeling (PLS-SEM) was performed in SmartPLS 3.0 (Hair et al., 2013), following the two-stage approach of Anderson and Gerbing (1988). Stage one evaluates the measurement model in terms of internal consistency reliability, convergent validity, and discriminant validity, assessed through composite reliability (CR), outer loadings, average variance extracted (AVE), cross-loadings, and the Fornell–Larcker criterion (Hair et al., 2016), ensuring the reliability and validity of the measures before the structural model is examined. Stage two assesses the structural model: the coefficient of determination (R^2) evaluates explanatory power (Cohen, 1988); a blindfolding procedure yields cross-validated redundancy (Q^2) to establish predictive relevance; and non-parametric bootstrapping tests the structural paths, retaining coefficients significant at $p \leq 0.05$ (Chin, 1998).

Measurement and structural model specification

The measurement (outer) model is reflective: each observed indicator is expressed as a linear function of its underlying latent construct plus measurement error, as in Eq. (5).

$$x_{ij} = \lambda_{ij} \zeta_j + \varepsilon_{ij} \quad (5)$$

where x_{ij} is indicator i of construct ζ_j (or η_j for endogenous constructs), λ_{ij} is the standardized outer loading, and ε_{ij} is the measurement error. This form applies to all 24 indicators; the estimated loadings λ_{ij} are reported in Table 1. The structural (inner) model is specified by Eqs. (1)–(4); its estimated coefficients are reported in Section 4.2, Eqs. (6)–(9).

DATA ANALYSIS AND RESULTS

Model assessment followed the two-stage procedure. First, the reflective measurement model was evaluated

for indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. Second, the structural model was assessed through collinearity (VIF), the significance and relevance of the path coefficients, the explanatory power (R^2), predictive relevance (Q^2), and the effect sizes f^2 and q^2 .

Evaluation of the measurement model

Internal consistency reliability and convergent validity. Composite reliability values between 0.60 and 0.70 are acceptable in exploratory research, and values between 0.70 and 0.95 are satisfactory to good (Hair et al., 2017). As shown in Table 1, all constructs report CR above 0.84, indicating satisfactory internal consistency. Convergent validity is supported because every construct records an AVE above the 0.50 threshold (Hair et al., 2017), and all outer loadings exceed 0.70.

Table 1. Construct reliability and validity

Construct	Items	Outer loading range	CR	AVE
Time-saving orientation	4	0.729–0.842	0.855	0.597
Easy payment method	3	0.754–0.847	0.841	0.638
Social influence	3	0.796–0.865	0.869	0.689
Perceived usefulness	4	0.769–0.802	0.870	0.626
Perceived ease of use	4	0.754–0.843	0.866	0.619
Attitude toward OFD	3	0.766–0.875	0.853	0.659
Intention to use	3	0.815–0.856	0.873	0.696

Note: CR = composite reliability; AVE = average variance extracted.

Discriminant validity. Discriminant validity was confirmed using two criteria. First, in the cross-loading analysis, every indicator loaded most strongly on its intended construct (outer loadings above), exceeding its loadings on all other constructs; for example, TSO1 loaded 0.842 on time-saving orientation, higher than on any other construct. Second, the Fornell–Larcker criterion holds: as reported in Table 2, the square root of each construct’s AVE (diagonal, in bold) exceeds its correlations with all other constructs.

Table 2. Discriminant validity (Fornell–Larcker criterion)

	TSO	EP	SI	PU	PEU	ATT	IU
TSO	0.773						
EP	0.699	0.799					
SI	0.507	0.538	0.830				
PU	0.650	0.645	0.622	0.791			
PEU	0.630	0.748	0.573	0.683	0.787		
ATT	0.649	0.717	0.536	0.643	0.684	0.813	
IU	0.634	0.704	0.578	0.656	0.661	0.694	0.834

Note: Diagonal values are the square root of AVE; off-diagonal values are inter-construct correlations. TSO = time-saving orientation; EP = easy payment method; SI = social influence; PU = perceived usefulness; PEU = perceived ease of use; ATT = attitude; IU = intention to use.

Evaluation of the structural model

Collinearity. All inner-model variance inflation factors (VIF) ranged from 1.48 to 2.14—well below the threshold of 5—indicating no multicollinearity among the predictor constructs (Hair et al., 2017; Sarstedt et al., 2017).

Path coefficients and hypothesis testing. Statistical significance was assessed by bootstrapping with 5,000

subsamples and replacement (Sarstedt et al., 2017). The p-value indicates significance, while the standardized coefficient (original sample, O) indicates the strength of influence; an exploratory threshold of 10% was applied. As reported in Table 3, all nine hypotheses are supported. For instance, a one-unit change in time-saving orientation is associated with a 0.296-unit change in perceived usefulness (H1a). Easy payment method has the largest effect on perceived ease of use ($\beta = 0.526$, $f^2 = 0.333$), and attitude has the strongest effect overall, on intention to use ($\beta = 0.694$, $f^2 = 0.928$).

Table 3. Structural path coefficients and hypothesis testing

Hyp.	Path	β (O)	p-value	f^2	Decision
H1a	TSO $\rightarrow$ PU	0.296	0.001	0.124	Supported
H1b	TSO $\rightarrow$ PEU	0.155	0.026	0.030	Supported
H2a	SI $\rightarrow$ PU	0.278	< 0.001	0.122	Supported
H2b	SI $\rightarrow$ PEU	0.212	0.001	0.079	Supported
H3	EP $\rightarrow$ PEU	0.526	< 0.001	0.333	Supported
H4a	PEU $\rightarrow$ PU	0.337	0.001	0.145	Supported
H4b	PEU $\rightarrow$ ATT	0.459	< 0.001	0.237	Supported
H5	PU $\rightarrow$ ATT	0.330	< 0.001	0.122	Supported
H6	ATT $\rightarrow$ IU	0.694	< 0.001	0.928	Supported

Note: β (O) = standardized path coefficient (original sample); f^2 = effect size (0.02 small, 0.15 medium, 0.35 large; Cohen, 1992). Construct abbreviations as in Table 2.

Explanatory and predictive power. Values of R^2 of 0.75, 0.50, and 0.25 denote substantial, moderate, and weak explanatory power, respectively (Hair et al., 2011; Henseler et al., 2009); in consumer research an R^2 of 0.20 is already considered high. A Q^2 greater than zero, obtained via blindfolding, establishes predictive relevance. As Table 4 shows, the four endogenous constructs display moderate explanatory power ($R^2 = 0.481$ – 0.612) and positive predictive relevance ($Q^2 = 0.328$ – 0.373).

Table 4. Explanatory power (R^2) and predictive relevance (Q^2)

Endogenous construct	R^2	Q^2
Perceived usefulness	0.596	0.365
Perceived ease of use	0.612	0.373
Attitude toward OFD	0.526	0.341
Intention to use	0.481	0.328

Note: $Q^2 = 1 - SSE/SSO$ from the blindfolding procedure.

Predictive relevance of individual predictors (q^2) largely mirrors the f^2 pattern. Easy payment method shows medium predictive relevance for perceived ease of use ($q^2 = 0.128$), whereas the remaining antecedents show small values ($q^2 \leq 0.05$), confirming easy payment method as the dominant contextual driver.

Estimated structural model. Substituting the standardized coefficients into Eqs. (1)–(4) yields the estimated inner model, Eqs. (6)–(9):

$$PEU = 0.155 \cdot TSO + 0.526 \cdot EP + 0.212 \cdot SI + \zeta_1 \quad (6)$$

$$PU = 0.296 \cdot TSO + 0.278 \cdot SI + 0.337 \cdot PEU + \zeta_2 \quad (7)$$

$$ATT = 0.459 \cdot PEU + 0.330 \cdot PU + \zeta_3 \quad (8)$$

$$IU = 0.694 \cdot ATT + \zeta_4$$

(9)

Note: All coefficients are standardized path coefficients significant at $p \leq 0.05$.

DISCUSSION

The results confirm that time-saving orientation, easy payment method, and social influence are meaningful antecedents of the intention to use OFD, operating through the two core TAM perceptions—perceived ease of use and perceived usefulness—which act as the primary determinants of why one platform is preferred over another. The findings thus support an extended TAM in which three contextual variables shape the two central perceptions.

Consistent with Davis (1989), perceived ease of use and perceived usefulness both influence attitude toward the technology, reaffirming the core theory. Easy payment method emerged as an essential variable with a moderate-to-strong positive relationship with perceived ease of use: flexible, easy-to-use payment solutions improve consumer attitudes by directly enhancing perceived ease of use, because users can order without worrying about the amount of cash on hand. Hence H2b (payment-related effects on perceived ease of use) and the broader payment hypotheses are supported.

Time-saving orientation influences intention indirectly, through perceived usefulness and perceived ease of use. Because OFD platforms offer a wide variety of nearby restaurants at affordable prices and with attractive promotions, anytime and anywhere (Paudel et al., 2024; Sultan & Uddin, 2011), consumers who value time perceive greater usefulness and ease, which improves their attitudes; thus H1a and H1b are supported.

The results also show that peers influence app choice, and perceived ease of use has the strongest effect on perceived usefulness among the endogenous relationships, consistent with prior work (Katebi et al., 2022; Toros et al., 2024). Overall, the findings reinforce the joint logic of TAM and TPB: adopting a new technology platform requires satisfying both perceived ease of use and perceived usefulness. Advanced technology enables consumers to complete daily tasks more easily, reducing time and improving access to needed information.

CONCLUSIONS AND IMPLICATIONS

Conclusions

This study examined the factors influencing Generation Z's behavioral intention to use OFD services in Vietnam. Using an extended TAM incorporating TPB elements, it tested nine hypotheses with data from 287 respondents aged 18–28. All hypothesized paths were statistically supported ($p < 0.05$). Easy payment method was the most influential factor, showing a strong effect on perceived ease of use ($f^2 = 0.333$), which subsequently shapes behavioral intention. Time-saving orientation and social influence exerted moderate effects on both perceived usefulness and perceived ease of use, confirming their relevance in the Vietnamese context.

The extended model explained a substantial share of variance in the key constructs—perceived ease of use ($R^2 = 0.612$), perceived usefulness ($R^2 = 0.596$), attitude ($R^2 = 0.526$), and intention to use ($R^2 = 0.481$)—indicating moderate-to-good explanatory power. Generation Z consumers in Vietnam prioritize payment convenience, time efficiency, and social recommendations when adopting OFD applications. These findings advance the understanding of technology acceptance in emerging markets, illustrating how cultural factors such as cash preference and social influence shape digital-service adoption among young consumers.

Implications for business practice

The findings offer several recommendations for F&B managers seeking to understand the drivers of OFD adoption and to sustain competitiveness. In particular, they highlight the indirect factors that shape online purchasing, notably an easy-to-use payment platform.

First, easy payment method is the strongest determinant of perceived ease of use. An easy payment experience is fast and requires only a few steps and minimal effort—for example, automatic field completion based on purchase history. Overly complicated payment setups are abandoned before use, and applications that offer only cash payment or links to a limited set of banks discourage adoption. A payment system designed for simplicity, speed, and minimal steps signals ease of use, while offering a broad array of payment options enhances perceived usefulness.

Second, consumers are drawn to services that save time, effort, or both. Marketers at O2O F&B firms should ensure that the platform is user-friendly and responsive, enabling customers to complete each transaction quickly. Time saving is a key motivator of the intention to use OFD, as it provides a reasonable and shorter lead time than self-service purchasing.

Third, beyond digital advertising, providers should also leverage word-of-mouth (Peng et al., 2024). Because consumers aged 18–30 account for more than 86% of OFD users on social networks, firms should proactively target these groups as their core user base to strengthen purchasing power (Lin et al., 2024).

LIMITATIONS AND FUTURE RESEARCH

This study focused solely on the latent variables affecting attitudes toward OFD services via e-commerce platforms in Vietnam. Although similar topics have been studied elsewhere, the antecedents examined and the target cohort here differ. Owing to time and resource constraints, the sample was limited to 287 respondents; a larger sample would yield more representative results. Moreover, the sample was drawn mainly from young adults aged 18–30 in Vietnam and is not representative of the national population, and time constraints prevented a deeper investigation of the full TAM structure.

In addition, because data were collected exclusively through online surveys, selection bias cannot be ruled out; future research should employ diverse data-collection methods to mitigate such bias. Finally, as younger consumers increasingly pursue healthy lifestyles—potentially dampening demand for fast food—future work should explore additional latent factors that consumers expect from OFD services.

AI DECLARATION

The authors declare that AI-assisted tools (ChatGPT) were used only for minor language editing to improve clarity and readability. These tools were not used for research design, data analysis, model development, mathematical formulation, or interpretation of results. All scientific content, methodology, experiments, and conclusions in this manuscript were developed entirely by the authors.

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