Original Article

Factors affecting the intention to adopt food delivery apps: Value-based adoption model framework

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Abstract: This research investigates the factors affecting the intention to adopt food delivery apps in Ho Chi Minh City based on the Value-based adoption Model (VAM). The study was conducted using a structural equation model (SEM) to examine data collected from 344 responders. The research results show that benefit values including convenience and perceived enjoyment have a positive impact on perceived value. Sacrifice values include perceived complexity and perceived cost. Perceived value is negatively impacted by both perceived cost and perceived complexity. Perceived value has a strong and positive impact on the intention to adopt food delivery apps. Furthermore, the study results also indicate that perceived privacy risk negatively affects intention. This is one of the first studies applying VAM to investigate factors affecting consumer behavior in the context of Ho Chi Minh City.

Keywords: Online food, intention, food delivery apps (FDA), VAM, food delivery.

1. Introduction

Nowadays, the advancement of technology and the emergence of smartphones - one of the most widely used devices worldwide - has driven significant changes in the lifestyle of society, particularly in online shopping (Shroff et al., 2022). The development of internet service providers and the increasing penetration of smartphones has facilitated the growth of online

food delivery services (Kapoor & Vij, 2018; Ray et al., 2019). According to Statista (2021), globally, Vietnam is one of the countries with the highest internet usage rates. With a high number of smartphone users, Vietnam has experienced rapid growth in the use of mobile applications over the past decade. These applications have transformed smartphones into multifunctional devices and become an essential part of daily life for many people. In Vietnam, the number of

people using the Internet via mobile phones is increasing rapidly; from 57% in 2021 to 88% in 2022 (Department of E-commerce and Digital Economy, 2022). Vietnam's digital economy is expected to rank second in Southeast Asia by 2030. In particular, the frequency of using digital services is mainly increasing, and online food delivery services are predicted to be the fastest-growing sector (e-Conomy SEA, 2021). Research on the intention to accept online food delivery services has gained attention in academic circles. Previous studies have explored online food purchasing behavior primarily based on theories that are suitable for technology acceptance, such as the TAM model (Choe et al., 2021; Hong et al., 2021; Nguyet et al., 2022; Song et al., 2021), TBP theory (Troise et al., 2021), UTAUT2 (Thao & Long, 2021; Zanetta et al., 2021), and e-Service quality (Thuy et al., 2021).

Therefore, despite Food Delivery Apps (FDA) receiving a lot of attention from researchers, the issues related to FDA have not been fully explored. The majority of studies have been conducted based on technology acceptance theories. The main limitation of technology acceptance theories is that they only address positive variables and do not consider negative variables. A literature review shows that there are very few studies based on the value-based adoption model (VAM) to investigate consumer reactions when ordering food through mobile applications.

Furthermore, according to Shankar et al. (2022), VAM is one of the most suitable models for analyzing consumer acceptance. It is a well-established theoretical framework and widely used to study nuances in consumer purchasing behavior when using online food delivery services. Therefore, this study was conducted to investigate the factors influencing the intention to use FDA based on the VAM proposed by Kim et al. (2007).
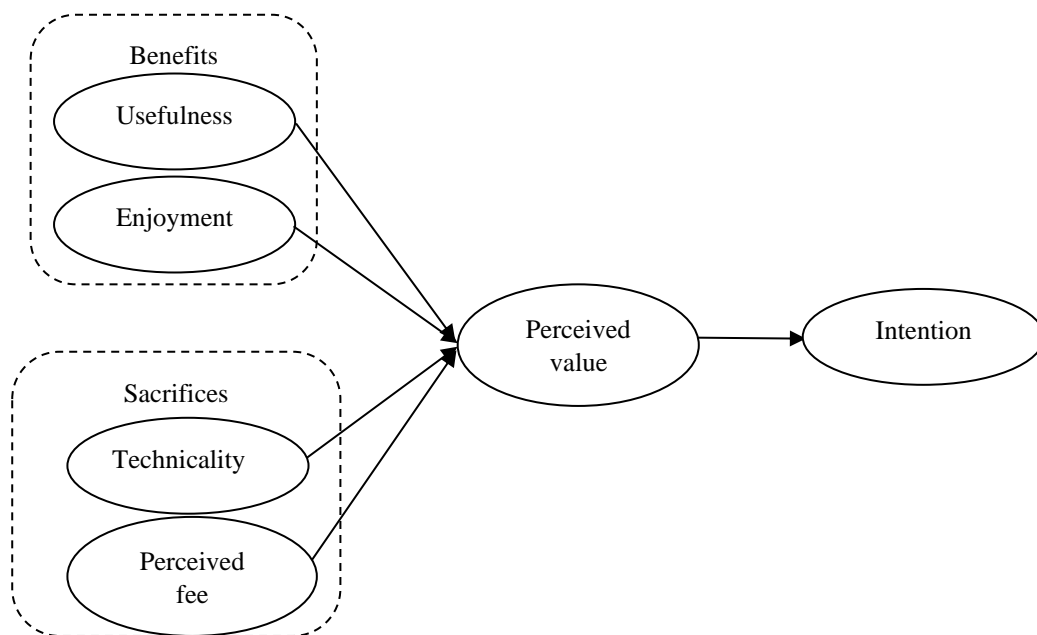

Figure 1: Value-based adoption model (VAM)
Source: Kim et al. (2007).

2. Theoretical framework and research hypothesis

2.1. Value-based adoption model

The VAM model proposed by Kim et al. (2007) is based on the perceived value of the benefits and trade-offs of using new technology. The perceived value here refers to the total benefit that a consumer receives from a product or service and the cost of using it. VAM divides the perceived value of priority variables into benefits and sacrifices.

Perceived benefits have a significant impact on value perception, whereas perceived sacrifices have a negative effect on value perception of the user of the service. The variables related to benefits are usefulness and enjoyment, while the variables related to sacrifices are technicality and perceived fee. The VAM theory acknowledges that before deciding to adopt technology, consumers evaluate that decision based on the trade-off between the costs incurred and the expected benefits of applying the technology.

2.3. Intention to use FDA

Ajzen (1991) stated that "intention" is an indication of the level to which a person tries, makes an effort, and is willing to perform a behavior, and is influenced by attitude, subjective norms, and perceived behavioral control. Intention is one of the strongest predictors of individual behavior.

In the online shopping environment, intention is understood as the level of the consumer's ability to purchase a product or service based on their initial decision to accept or reject the product or service. It refers to the level of the customer's intention to purchase and recommend FDA to others, including members of their social group and family members (Dhir et al., 2021), and is a strong predictor for the behavior of technology users (Davis, 1989; Kim et al., 2007).

2.4. Perceived value

According to Kim et al. (2007), the overall assessment of the comparative benefits and sacrifices associated with a product or service results in "perceived value". Perceived benefits are a combination of utilitarian and hedonic benefits related to a specific usage situation. From the consumer's choice perspective, the consumer estimates the value of the chosen object by considering all relevant benefits and sacrifices. Both perceived benefits and perceived sacrifices are of paramount importance to consumer' perception of value.

In the VAM framework, value perception plays an important role in determining the new technology adoption intention (Kim et al., 2007). Some researchers suggest that value perception

is a key factor to predict purchasing intention (Wang et al., 2013). Several related empirical studies show that perceived value has a positive impact on service acceptance intention. For example, Wang et al. (2018) indicated that value perception is a strong predictor of intention to accept global positioning system (GPS) applications on mobile devices. Another study by Wang and Wang (2010) demonstrated that perceived value is a predictive factor in explaining customers' acceptance of mobile booking applications. Thus, we propose the following hypothesis:

H1: Perceived value has a positive impact on the intention to use FDA.

2.5. Perceived benefits

According to the theory of cognitive evaluation, actions are driven by internal and external motivators (Deci, 1971). External motivators refer to the performance of an activity in order to achieve a specific goal (e.g., reward), while internal motivators refer to the performance of an activity without any other explicit reinforcement besides the process of performing the activity itself. Both external and internal factors have been found to influence perceived value and behavioral intention (Kim et al., 2007). External and internal attributes are similar to utilitarian and hedonic benefits that lead to perceived value (Rogers, 2010). In the context of online shopping, perceived convenience is considered an external attribute, while enjoyment is an internal attribute as a component of the benefits in perceived value.

2.5.1. Perceived convenience

Based on the theory of economic utility, Brown (1990) proposed that convenience has five dimensions in service marketing; namely: time, location, purchase, use, and execution. Researchers have redefined the concept of convenience to adapt to the context of FDA. Perceived convenience has a positive correlation with the intention to use FDA. Convenience refers to the ability to use something without difficulty, while usability refers to the extent to which something can be used to improve the service. FDA can provide comfort for food buyers by offering options to compare food prices from different restaurants, allowing customers to avoid

waiting times at restaurants and also avoid traffic-related situations (Ray et al., 2019).

Some relevant studies indicated that convenience has a significant and positive factor affecting customers' perceived value. Cho et al. (2019) indicated that convenience is a significant and positive factor affecting customers' perceived value of FDA. Therefore, we propose the following hypothesis:

H2: Perceived convenience has a positive impact on perceived value.

2.5.2. Perceived enjoyment

Perceived enjoyment is a key construct in the field of psychology and is widely studied in the context of video games, sports, and other recreational activities. Additionally, perception of enjoyment is an intrinsic motivator that pertains to the extent to which using a specific product (or service) is considered fun or pleasurable, beyond any expected performance outcomes (Wang et al., 2018).

In the VAM model, perceived enjoyment is an internal driving force and a decisive factor for emotional experiences in perceived value (Kim et al., 2007). Several prior studies showed that perceived enjoyment is an important factor significantly influencing perceived value (Kim et al., 2007; Liu et al., 2015; Wang et al., 2018). Thus, we propose the following hypothesis:

H3: Perceived enjoyment has a positive impact on perceived value.

2.6. Perceived sacrifices

Zeithaml (1988) argued that perceived sacrifice includes both financial aspects (the cost of the product) and non-financial facets (such as time, effort, and energy). In the VAM model, perceived sacrifice includes technical and perceived costs for customers.

Monetary sacrifice, or perceived cost, typically refers to the real price of a product and how consumers perceive it. Non-monetary sacrifices, on the other hand, refer to how consumers perceive the purchase and consumption of the product, including factors like time, effort, and any other negative costs associated with it, according to Kim et al. (2007). It is important to note that these non-monetary sacrifices can also impact consumers' perception of the value of the product and their

willingness to purchase it. Some empirical studies have shown that perceived sacrifice has a negative impact on customers' perceived value (Wang et al., 2018). Therefore, we consider perceived cost as a monetary sacrifice and perceived complexity as a non-monetary sacrifice.

2.6.1. Perceived cost

Perceived cost in the current study refers to the transaction cost when customers purchase food through the food delivery application on their smartphones. Within the VAM framework, perceived cost is regarded as a financial sacrifice, encompassing both the cost of the food and the delivery service (Kim et al., 2007). Several studies have indicated that perceived cost (or fees) has an adverse effect on customers' perceived value. Wang et al. (2018) investigation of how perceived value influences the intention to use GPS location-based services discovered a negative correlation between perceived cost and perceived value when using such services. Perceived fees or perceived costs have been found to be negatively related to technology adoption (Nikou, 2019). Thus, we propose the following hypothesis:

H4: Perceived cost has a negative impact on perceived value.

2.6.2. Perceived complexity

Complexity is inversely correlated with the concept of "ease of use". The perception of ease of use refers to whether the use of a system requires physical or mental effort (Davis, 1989). According to Kim et al. (2007), the perception of "ease of use" has been known as a technical factor. As a non-monetary sacrifice, technicality is perceived to influence the overall value measurement and plays an important role in innovation adoption. In this study, the perception of complexity is defined as the extent to which consumers believe that online food ordering applications are difficult to understand and use. Several prior studies showed that perceived complexity has a negative effect on the value perception of customers (Vishwakarma et al., 2020; Wang et al., 2018). Therefore, the following hypothesis is proposed:

H5: Perceived complexity has a negative impact on perceived value.

2.7. Perceived privacy risk

The perception of risk is crucial when evaluating factors related to online shopping. Perceived privacy risk encompasses concerns about privacy violations when customers adopt the new technology (Jun et al., 2018).

In the context of online shopping, perceived risk is one of the crucial factors that influence consumer purchasing decisions (Bianchi & Andrews, 2012; Ariffin et al., 2018). Privacy risk perception is a major concern for consumers when using the internet environment (Thaichon et al., 2014).

According to the report from the Department of E-commerce and Digital Economy (2022), 55% of non-online shoppers were concerned about personal information disclosure, indicating the importance of privacy in online shopping. Several experimental studies have shown that privacy risk perception has a negative impact on the decision to use new technology. For example, the study by Wang and Lin (2017) found that privacy risk perception had a negative impact on mobile application adoption intention. The study by Ariffin et al. (2018) showed that among risk factors, information security was the strongest negative factor affecting consumers' intention to shop online.

Therefore, we propose the following hypothesis:

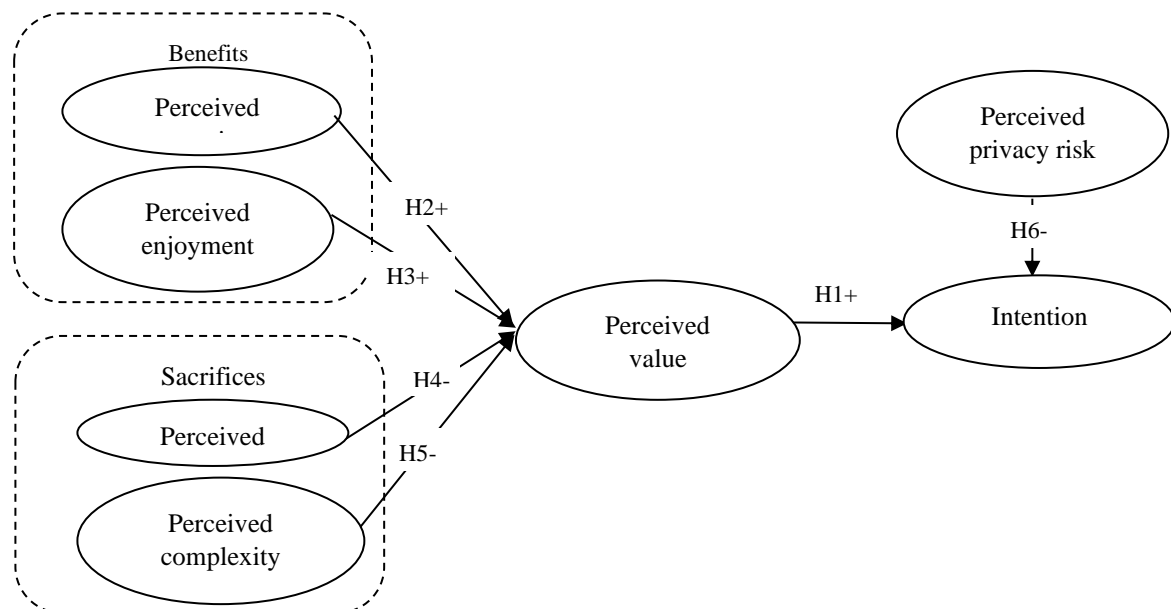*H6: Perceived privacy risk has a negative impact on intention FDA.*

Figure 2: Proposed research model
Source: Kim et al. (2007).

3. Methodology

3.1. Measurement

This study used an online survey questionnaire consisting of three parts. The first part was a categorical question "Have you used a food delivery app?" to select respondents who had used a food delivery app to collect research data.

The second part contained questions about the respondents' demographic information, including age, education, gender, and income.

The third part consisted of 22 observed variables which were evaluated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). These variables were adapted from previous studies and measured 7 constructs. Three observed variables measuring the intention to use FDA were adopted from Kim et al. (2007), 4 observed variables measuring perceived value were adopted from Kim et al. (2007), 3 observed variables measuring perceived cost were adopted from Wang et al. (2018), 3 observed variables measuring perceived complexity were adopted from Wang et al. (2018), 3 observed variables measuring perceived convenience were adopted from Cho et al. (2019), 3 observed variables measuring

perceived enjoyment were adopted from Wang et al. (2018), and 3 observed variables measuring privacy risk perception were adopted from Liu et al. (2015). The questionnaire was translated from English to Vietnamese with the assistance of two language experts.

3.2. Data collection process

Before collecting survey data, a group discussion with 10 experts who use FDA was conducted to ensure clarity and relevance of the survey scales. Qualitative research results showed that the survey questions were clear, concise, and easy to understand. To test the research hypotheses, a formal survey was conducted with individuals living and working in Ho Chi Minh City. Ho Chi Minh City was selected for this study because it is the economic center of the country, and a large number of online food delivery service providers and smartphone shopping customers are concentrated in this area (Thuy et al., 2021).

Using Google Forms, data were collected through personal relationships with individuals who used FDA in Ho Chi Minh City, aged 18 years and above. The survey was conducted from November to December 2022 using non-probability sampling. Participants in the online survey were clearly informed about the purpose of the survey and their voluntary participation. A total of 398 responses were collected, of which 344 valid responses (86.4% response rate) were included in the formal study.

Table 1: Demographic characteristics of the sample

Measure	Item	N	Percentage (%)
Gender	Male	194	56.4
	Female	150	43.6
Age	18 – under 25 years old	64	18.6
	25 – under 40 years old	193	56.1
	≥ 40 years old	87	25.3
Income	Below 10 million VND	58	16.9
	From 10 to below 15 million VND	111	32.3
	From 15 to below 20 million VND	103	29.9
	From 20 million VND and above	72	20.9
Education	High school	59	17.2
	College or university	172	50
	Master	113	32.8

Source: Authors.

Most respondents were male (56.4%), 18.6% were between 18 and under 25 years old, 51.6% were between 25 and under 40 years old, and 25.3% were over 40 years old. In terms of monthly income, 16.9% had income below 10 million VND per month, 32.3% had income from 10 to below 15 million VND, 29.9% had income from 15 to below 20 million VND, and 20.9% had income from 20 million VND and above. In terms of education level, 17.2% had high school, 50% had college or university education, and 32.8% had a master's degree (see Table 1).

According to Hair et al. (2014), a suitable sample size for using structural equation modeling (SEM) ranges from 300 to 500 responses. Therefore, the sample size of 344 responses in this study meets the quantitative research standard requirement set by Hair et al. (2014).

3.3. Data analysis

This study used covariance-based structural equation modeling (CB-SEM) to analyze the data, and SPSS 20 and AMOS 24 software were used in this study. We used CB-SEM because it is a commonly used method in consumer behavior research (Dhir et al., 2021). Before conducting confirmatory factor analysis (CFA) and testing the hypothesis, we performed exploratory factor analysis (EFA) and Cronbach's Alpha coefficients to evaluate the reliability of the scale of the constructs.

Table 2: Standardized factor loadings, Cronbach's Alpha, Composite Reliability (C.R), and AVE values

Constructs	Standardized factor loading	Cronbach's Alpha	C.R	AVE
Intention (YD)		0.910	0.910	0.772
YD1	0.880			
YD2	0.884			
YD3	0.872			
Perceived value (GT)		0.881	0.913	0.724
GT1	0.868			
GT2	0.882			
GT3	0.872			
GT4	0.778			
Complexity (TT)		0.898	0.900	0.750
TT1	0.903			
TT2	0.852			
TT3	0.841			
Perceived enjoyment (TH)		0.910	0.913	0.778
TH1	0.907			
TH2	0.862			
TH3	0.876			
Perceived cost (CP)		0.908	0.909	0.769
CP1	0.872			
CP2	0.873			
CP3	0.885			
Complexity (PT)		0.952	0.953	0.871
PT1	0.923			
PT2	0.942			
PT3	0.935			
Perceived privacy risk (RR)		0.915	0.916	0.784
RR1	0.844			
RR2	0.882			
RR3	0.928			

Source: Authors.

4. Results

4.1. Measurement model

Before testing the research hypotheses, an analysis of the internal consistency among the observed variables of each construct was conducted through Cronbach's Alpha coefficient. The results showed that Cronbach's Alpha coefficients exceeded the threshold of 0.7, as recommended by Hair et al. (2014).

Next, an exploratory factor analysis (EFA) was performed to evaluate the convergent and discriminant validity of the measurement scales. The results showed that the eigenvalues of the seven factors ranged from 1.056 to 7.435, which were greater than 1. Additionally, the factor loadings of each item were all above 0.5. The total variance extracted was 78.331%, indicating that the seven factors accounted for 78.331% of the observed variance. The results of the EFA showed that the Kaiser-Meyer-Olkin (KMO) measure was 0.865, greater than the recommended value of 0.5, and Bartlett's test of sphericity was significant at 0.000, less than the level of significance of 0.05. Thus, the variables in the proposed model were suitable for factor analysis.

Then, we used confirmatory factor analysis (CFA) to examine the measurement model before testing the hypothesis. The results of the CFA showed that the model fit indices were $\chi 2/df = 1.537 < 3$, CFI = 0.983 > 0.95, SRMR = 0.034 < 0.08, RMSEA = 0.04 < 0.06, and PCLOSE = 0.975 > 0.05. The overall reliability coefficients exceeded the recommended value of 0.7.

The standardized factor loadings of the measurement items were all greater than 0.5. Furthermore, all average variance extracted (AVE) values exceeded 0.5 (see Table 2). This indicates that the measurement model is appropriate for the research data according to Hair et al. (2014) recommendation. Therefore, all latent variables are reliable and ensure convergence.

Moreover, to test the validity of distinctiveness, we compared the square root of AVE for each structure and its corresponding correlation coefficients with other structures as proposed by Fornell and Larcker (1981). The results in Table 3 show that the square root of AVE for each structure exceeds its correlation

with other structures. The results in Table 4 show that the heterotrait-monotrait (HTMT) ratio between the research variables is less than 0.85, following the recommendation of Henseler et al. (2015). Therefore, the distinctiveness of the structures is valid.

In addition, this study also used the single-factor test for common method variance (CMB) to identify the common method bias. According to Podsakoff et al. (2003), CMB is a potential issue in behavioral research, and it is one of the main causes of measurement errors. The test showed that the unrotated factor explained only 33.794% of the variance in the data (the total variance explained by one factor is less than 50%). Thus, CMB is not a concern in this study.

Table 3: Discriminant validity

	YD	PT	TH	RR	CP	TT	GT
YD	**0.879**						
PT	-0.164	**0.933**					
TH	0.289	-0.068	**0.882**				
RR	-0.338	0.037	-0.010	**0.885**			
CP	-0.451	0.411	-0.243	0.029	**0.877**		
TT	0.535	-0.124	0.370	-0.166	-0.406	**0.866**	
GT	0.559	-0.358	0.385	-0.082	-0.481	0.537	**0.851**

Note: Bold diagonals represent the square root of the AVE.
Source: Authors.

Table 4: HTMT analyze results

	PT	TH	RR	CP	TT	GT
PT						
TH	0.061					
RR	0.038	0.016				
CP	0.410	0.231	0.031			
TT	0.118	0.367	0.172	0.407		
GT	0.353	0.387	0.083	0.475	0.548	
YD	0.161	0.287	0.333	0.451	0.533	0.567

Source: Authors.

4.2. Structural model

SEM analysis was performed to examine the proposed hypothesis after CFA was verified. All SEM analysis values were consistent with the recommendations of Hu and Bentler (1999) (CMIN/df = 1.719; CFI = 0.977; SRMR = 0.064; RMSEA = 0.046; PCLOSE = 0.797, P < 0.001). The results of the SEM analysis indicated that all proposed hypotheses were accepted.

Table 5 shows the determination coefficients (R^2) of GT and YD are 45.7% and 40.3%, respectively. Regarding the relationships, GT has a positive and statistically significant impact on YD ($\beta_{GT \to YD} = 0.561$, $p < 0.001$), while RR has a negative impact on YD ($\beta_{RR \to YD} = -0.297$, $p < 0.001$). Both TT and TH have positive effects on GT ($\beta_{TT \to GT} = 0.370$, $p < 0.001$; $\beta_{TH \to GT} = 0.189$, $p < 0.001$). Conversely, CP and PT have negative effects on GT ($\beta_{CP \to GT} = -0.211$, $p < 0.001$; $\beta_{PT \to GT} = -0.209$, $p < 0.001$). Therefore, the proposed hypotheses H1 to H6 are supported.

Table 5: Hypothesis test results

Hypothetical path				Standardized β	S.E.	C.R	P	Conclusion
H1	GT	→	YD	0.561	0.052	10.608	***	Supported
H2	TT	→	GT	0.370	0.069	6.554	***	Supported
H3	TH	→	GT	0.189	0.050	3.729	***	Supported
H4	CP	→	GT	-0.211	0.054	-3.683	***	Supported
H5	PT	→	GT	-0.209	0.037	-4.162	***	Supported
H6	RR	→	YD	-0.297	0.038	-6.043	***	Supported
R^2_{GT} = 45.7								
R^2_{YD} = 40.3								

Note: ***$p < 0.001$; GT: Perceived value; TT: Perceived convenience; TH: Perceived enjoyment;
CP: Perceived cost; PT: Perceived complexity; RR: Perceived privacy risk; YD: Intention.
Source: Authors.

5. Discussion and implications

The purpose of this study is to determine the relationship between perceived value, perceived convenience, perceived enjoyment, perceived cost, perceived complexity, perceived privacy risk, and intention to use FDA in Ho Chi Minh City based on the VAM framework. This is considered one of the first studies to apply the VAM theory to identify factors influencing intention to use FDA. Unlike previous studies that focus only on usefulness or ease of use (Choe et al., 2021; Hong et al., 2021; Nguyet et al., 2022), this study examines how perceived benefit and perceived sacrifice affect perceived value, and how perceived benefit and perceived risk affect intention to use FDA.

Perceived benefits and perceived sacrifices have positive and negative effects, respectively, on perceived value. Perceived benefits play an important role in forming customers' perceived value when accepting FDA. Perceived benefits include perceived convenience and perceived enjoyment, with perceived convenience being the most important factor (β = 0.370***), influencing perceived value. This result is consistent with the study by Cho et al., (2019). We argue that perceived enjoyment has a positive influence on perceived value (β = 0.198***). The study's result is similar to previous studies (Liu et al., 2015; Vishwakarma et al., 2020).

The perceived sacrifices, including perceived cost and complexity of using the FDA, have a negative influence on the perceived value. The perceived cost has a significant and strong negative effect on perceived value (β = -0.211***). The results of our study are not similar to the prior study by Vishwakarma et al. (2020). Perceived complexity has a negative influence on perceived value (β = -0.209***). This finding is consistent with the results of Wang et al. (2018).

Perceived value is one of the important factors in predicting customers' intention to use the FDA (β = 0.561***). This finding is also consistent with previous studies on the acceptance of services through mobile applications Wang et al. (2018).

The results of the analysis showed that customers consider both the benefits and sacrifices when accepting FDA. This supports the VAM proposed by Kim et al. (2007). Additionally, this study examined the influence of privacy risk perception on customers' intention to use FDA. Additionally, the results showed that privacy risk perception has a negative and statistically significant impact on FDA adoption intention (β = -0.297***). This result is consistent with previous studies in the context of adopting new technology (Kamalul Ariffin et al., 2018; Li et al., 2016; Wang & Lin, 2017).

The study implies that perceived value is the main driver of the intention to use FDA. The study enhances understanding of consumer behavior in using food delivery apps within the framework of VAM. Convenience perception, enjoyment perception, complexity perception, and cost perception significantly influence the intention to use FDA through the mediating role of perceived value. From a practical perspective, the study suggests that online food businesses need to invest in enhancing both monetary and

non-monetary values, particularly reducing the complexity of using FDA, lowering usage costs, enhancing convenience, and creating a sense of enjoyment for customers. Moreover, the security of personal information using FDA is an important issue for marketers to consider.

6. Limitations of the study

The current study has some limitations that need to be considered. The sample size collected through convenience sampling was small, thus the representativeness of the study sample was not high. Additionally, the study did not address moderating factors in the relationship between perceived value and intention. Future studies should apply the model in different regions to examine the generalizability of the study findings.

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