



# Unveiling digital transformation: Investigating technology adoption in Vietnam's food delivery industry for enhanced customer experience

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## ABSTRACT

Digital platforms are increasingly playing a crucial role in the digital transformation process, enabling small and medium-sized enterprises to gain a competitive advantage and achieve their business objectives. This research study aims to extend the Technology Acceptance Model by incorporating the Stimulus-Organism-Reaction theory to gain a comprehensive understanding of the factors influencing satisfaction, continued intention to use, and positive electronic word-of-mouth (eWOM) in the context of Food Delivery Apps (FDAs). A quantitative approach was employed, and data were collected through a survey administered to 346 FDA users. The results reveal that both Information quality and Task-technology fit have a positive impact on satisfaction and continued intention to use. Additionally, satisfaction was found to have the greatest influence on continued intention to use and positive eWOM, with information quality exerting the most significant impact on satisfaction. Furthermore, the study findings demonstrated that promotion has a significant impact on generating positive eWOM. This study makes a substantial contribution to the existing literature by providing valuable insights into the factors influencing FDA usage and their impact on satisfaction, continued intention to use, and positive eWOM. It serves as a foundation for further research in this emerging field and offers practical implications for stakeholders involved in the development, management, and utilization of FDAs.

## 1. Introduction

The emergence of digital technology and digital platforms has paved the way for the growth of the digital economy, which is rapidly gaining momentum and has become a new global development trend [1]. As the digital transformation trend has been accelerating in recent years, the food delivery industry has been experiencing a significant surge in demand for food delivery apps (FDAs). Small and medium-sized enterprises (SMEs) are now using FDAs as a means to increase their business performance and reach out to a larger number of customers [2,3]. The study conducted by Li, Yang, Jin and Wang [4] unequivocally highlights the pivotal role that platforms such as FDAs play in the digital transformation of SMEs. Their research underscores the profound importance of embracing these digital platforms as catalysts for success. By leveraging the power of FDAs, SMEs can revolutionize their operations, enhance their reach, and tap into new opportunities. The findings of this study provide compelling evidence for the indispensable role

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that FDAs can play in driving the growth and prosperity of small and medium-sized enterprises. It is clear that embracing these platforms is not merely an option but a strategic imperative for SMEs seeking to thrive in today's dynamic and competitive business landscape.

FDAs are digital platforms, accessible through mobile applications or websites, that enable customers to order food from restaurants and have it delivered to their desired location. These apps offer a broad selection of food options from various local restaurants, food vendors, and SMES in the food and beverage industry. The platform displays menus, prices, and customer reviews, and allows customers to pay for their orders through the app. The app then arranges for the delivery of the order by coordinating with either the restaurant or a third-party delivery service. There are two types of FDAs: those operated by restaurants themselves and third-party intermediary platforms. The latter type is more prevalent and widely used in Vietnam such as NOWFOOD, GRABFOOD, GOJEK, and BAEMIN [5,6]. The internet platform such as FDAs serves as a modern infrastructure that enables seamless integration of advanced information technologies and the economy [7].

The food delivery industry has experienced significant growth in both developed and developing countries over the past decade, as noted by Devanesan [8]. The outbreak of the Covid-19 pandemic in 2020 has further accelerated this trend, resulting in a surge in demand for food ordering and delivery services [9,10]. Zhao and Bacao [11] observed that the pandemic has also led to changes in consumer behavior, with more people using online service platforms for food delivery. To adapt to this shift, SMEs in catering providers' services have transitioned to online-to-offline services, allowing for easier access to food and beverage services during travel restrictions and lockdowns [12,13].

Vietnam was chosen as the research context for the empirical part of this study due to the potential of the country's FDAs sector when compared to its neighboring countries. In Vietnam's market, the number of smartphone subscribers has risen to 93.5 million, and it's estimated that approximately 73.5% of adults use smartphones. Additionally, the percentage of households with fiber optic cable

**Table 1**  
Summary of key studies in the field of Food Delivery Apps (FDAs).

Research	Method	Countries	Key factors	Sample
Pigatto, Machado, Negreti and Machado, 2017 [20]	Content analysis	Brazil	Assessing the viability of websites through analysis of content, functionality, and usability.	30 FDA companies
Yeo, Goh and Rezaei, 2017 [21]	SEM	Malaysia	Exploring the relationship between hedonic motivation, convenience motivation, previous online purchases, time-saving orientation, price-saving orientation, post-usage usefulness, attitude, and behavioral intention.	A total of 224 university students, with females comprising 47.8% of the sample, aged between 17 and 30 years.
Maimaiti, Zhao, Jia, Ru and Zhu, 2018 [22]	Content analysis	China	Investigating the influence of FDAs on food shopping behaviors and the growing occurrence of overweight and obesity.	Article review on the market of FDAs.
Roh and Park, 2019 [23]	SEM	South Korea	The impact of individuals' value systems and moral obligations on the decision to adopt FDAs.	A total of 500 respondents, with females representing 51.8% of the sample, aged between 18 and 50 years.
Suhartanto, Helmi Ali, Tan, Sjahroeddin and Kusdiby, 2019 [24]	SEM	Indonesia	The correlation between food and service quality, satisfaction, perceived value, and consumer loyalty towards FDAs.	405 FDAs customers
Zhao and Bacao, 2020 [11]	EFA, CFA	Portugal	Satisfaction is the primary factor, while perceived task-technology fit, trust, performance expectancy, social influence, and confirmation positively influence users' continued usage of FDAs during the COVID-19 pandemic.	532 FDA users
Pal, Funilkul, Eamsinwattana and Siyal, 2021 [25]	SEM	India	Satisfaction and food quality were significant predictors of loyalty. Information design had the highest impact on satisfaction and loyalty, followed by navigational and visual design.	315 university students
Francioni, Curina, Hegner and Cioppi, 2022 [26]	SEM	Italy	Perceived healthiness, quarantine procedures, perceived hygiene, perceived ease of app use, and attitude significantly impact continuance intention.	360 university students
Wen, Pookulangara and Josiam, 2022 [27]	SEM	USA	Attitude, norms, control, and trust predict continued usage of FDAs. Perceived innovativeness, motivations, usefulness, ease of use, and food safety risk perception are identified predictors.	316 reponses
Gani, Faroque, Muzareba, Amin and Rahman, 2023 [28]	SEM	Bangladesh	The attributes of information and food service play a role in shaping the perceived usefulness of FDAs and influencing the respondents' intention to use them.	246 users
Trivedi, Trivedi, Pandey and Chaurasia, 2023 [29]	ANOVA, ANCOVA	India	Identifying the causes of food waste resulting from online food ordering.	121 respondents
This study	SEM	Vietnam	Investigating the influence of factors like Task-Technology Fit, Information Quality, Promotion, Ease-of-Use, Perceived Value on customer satisfaction, continued intention to use FDAs, and positive Electronic Word-of-Mouth (eWOM) among FDA users.	346 users

coverage in 2021 has increased to 65%, which is a 10% increase from the previous year. Vietnam has also achieved its goal of having 85% of adults using smartphones [14]. According to the Southeast Asia digital economy report [15], Vietnam's digital economy is experiencing the fastest growth rate in the region, with a projected gross merchandise value (GMV) increase of 28% from 18 billion USD in 2021 to 23 billion USD in 2022, mainly due to a 26% surge in e-commerce compared to the same period last year. Vietnam quickly adapted to the "new normal" after the pandemic, and e-commerce has been a key factor in the country's digital economy growth. Around 90% of digital consumers intend to maintain or increase their use of e-commerce platforms in the next 12 months, with Food Delivery (60%) and Online Grocery Shopping (54%) being the top priorities. Urban digital users in Vietnam lead the adoption of digital services, with 96%, 85%, and 85% using e-commerce, food, and grocery services, respectively [15].

In the context of the inexorable trend of digital transformation, platforms have emerged as a critical option for SMEs with limited resources who require effective control of their business operations [16,17]. Among these options, FDAs have proven particularly significant, particularly in the wake of the COVID-19 pandemic that severely impacted the food and beverage industry [18]. Therefore, digital transformation has become a crucial undertaking for SMEs, including food businesses, retailers, and vendors that formerly relied exclusively on traditional onsite channels [11]. However, according to McKinsey's research, only 7% of enterprises have achieved significant results in digital transformation, while the failure rate for traditional enterprises stands at a high 70%–80%. This low success rate raises concerns among small and medium-sized enterprises (SMEs) regarding digital transformation.

One of the primary reasons for the low success rate among SMEs is their limited ability to effectively manage internal and external knowledge. Successful digital transformation requires not only integrating knowledge within the enterprise's productive resources and business systems but also integrating external knowledge from various subjects and fields, which demands a strong knowledge management capability. Therefore, empowering SMEs through industrial internet platforms such as FDAs becomes crucial in reducing the risks associated with digital transformation and assisting them in completing the process smoothly. This is of practical importance in implementing the digital economy and enhancing SMEs' knowledge management capabilities [19].

Despite the growing popularity and widespread adoption of FDAs in the food delivery industry, there is a noticeable research gap regarding the factors that drive satisfaction, continued usage and positive online word-of-mouth for these apps, particularly among student populations. Existing studies have focused on various aspects of FDAs, as illustrated in Table 1, a summary of key studies in the field of FDAs to provide an overview of the current state of the art. However, limited research has specifically examined the technological factors and marketing strategies that influence the acceptance and satisfaction of FDAs among students. Furthermore, while some studies have explored the impact of FDAs on customer loyalty and brand satisfaction, there is still a need to identify the specific features or factors that promote customer loyalty and positive feedback online. Therefore, this study aims to fill this research gap by investigating the factors that drive satisfaction, continued usage and positive word-of-mouth for FDAs, specifically among university students in Vietnam. By doing so, this research will contribute to the existing literature by providing valuable insights into consumer behavior in the context of FDAs and offer practical implications for SMEs, digital platform providers, and local vendors to enhance customer satisfaction and improve business performance.

The article is structured into several sections as follows. The first section serves as an introduction to the research, providing background information and setting the context for the study. The second section presents a comprehensive literature review, offering an overview of relevant theories and existing research in the field. This section highlights the key concepts, theoretical frameworks, and empirical studies that have contributed to the understanding of the topic. The third section delves into the development of the research hypotheses and the proposed research model. This part explains the logical connections between the variables of interest, outlining the conceptual framework that guides the study. Moving on, the fourth section presents the research findings and their analysis. It showcases the empirical results and their implications, supporting or refuting the research hypotheses. The fifth section is dedicated to the discussion of the findings. It goes beyond the presentation of results, offering an interpretation of the data in relation to the existing literature. Following the discussion, the subsequent section serves as the conclusion, summarizing the main findings, their significance, and their implications for theory and practice. This section also acknowledges the limitations of the study. Finally, it outlines promising directions for future research, identifying gaps in knowledge that could be explored to further advance the field.

## 2. Literature review

### 2.1. Theoretical fundamentals

#### 2.1.1. Technology acceptance model

Technology Acceptance Model (TAM) was developed to explain users' perceptions and adoption of new technology [30]. According to this theoretical model, one of the key determinants of technology acceptance is the perceived ease of use. This construct encompasses the prospective users' perception and belief that utilizing an information system requires minimal additional effort beyond their existing knowledge and skills [31]. In other words, it reflects the extent to which individuals perceive the system as user-friendly, intuitive, and convenient to use. A lot of research on FDAs focus on extending TAM with external variables. Su, Nguyen, Nguyen, Luu and Nguyen-Phuoc [6] extended the TAM to include personalization-privacy theory and mobile service quality. By incorporating these additional factors, the objective of the study was to offer a more comprehensive comprehension of the drivers behind consumers' trust in these apps. The study's findings supported the TAM and revealed that TAM factors and information quality were significantly and positively correlated with customer trust in FDAs. This trust, in turn, was positively associated with customer loyalty towards FDAs. Another research of [32] used an extended TAM with personal innovativeness to understand consumers' acceptance intention to use FDAs. They highlighted the importance of considering the ease of use of FDAs. Their study revealed that ease of use is a critical factor in boosting users' intention to use such applications, and therefore, it can guide the development of effective strategies to

improve the user experience and foster continuous usage. Lee's study delves into the usage of FDAs, utilizing the TAM as its theoretical foundation. The study aimed to examine the factors that determine the perceived usefulness, ease of use, and intention to use food delivery app services. The study's findings revealed that several factors influenced perceived usefulness, including delivery time, quarantine regulations, review quality, and ease of use. Meanwhile, ease of use was positively influenced by simple registration and payment processes. Furthermore, the study indicated that ease of use has a positive impact on both perceived usefulness and intention to use, while perceived usefulness is positively linked to the intention to use [33]. Silva, Dias and Rodrigues [34] conducted a study on the factors that drive the continued usage of FDAs. To achieve this, they integrated the health belief model, technology acceptance model and readiness acceptance model. Their study confirmed the TAM and found that technology readiness can also predict perceived usefulness. The study of Song, Ruan and Jeon [35] investigated the connections between the factors that influence the utilization of FDAs by customers. To accomplish this, they utilized an extended Technology Acceptance Model to examine the consumers' experiences while purchasing food delivery through mobile applications. The study discovered that both system quality and design quality had a significant impact on the perceived ease of use.

In 2001, based on TAM, Bhattacharjee [36] introduced the IS Continuance Model as a theoretical framework aimed at understanding users' intention to continue using an information system (IS) over time. This model provides insights into the factors that influence users' ongoing usage behavior and their decision to continue using the IS beyond the initial adoption phase. The model suggests that users' continued usage of an IS is influenced by three key factors: 1 - Perceived usefulness: Users' perception of the system's usefulness in facilitating their tasks and achieving their goals. If users find the system beneficial and valuable, they are more likely to continue using it. 2 - Perceived ease of use: Users' perception of the system's ease of use and the simplicity of interacting with it. If users perceive the system as user-friendly and easy to navigate, they are more likely to continue using it. 3 - User satisfaction: Users' overall satisfaction with the IS, which is influenced by their experience, system performance, and meeting their expectations. Higher satisfaction levels are associated with increased intention to continue using the system. The IS Continuance Model highlights the importance of post-adoption factors in shaping users' ongoing usage behavior. It recognizes that users' initial acceptance of an IS is not sufficient for long-term usage, and factors such as perceived usefulness, ease of use, and satisfaction play a significant role in determining whether users will continue using the system.

#### 2.1.2. Information system success model

The Information System Success Model is a theoretical framework that aims to measure and evaluate the success of an information system within an organizational context. In this model, information quality plays a crucial role as one of the dimensions that contribute to the overall success of an information system [37]. Information quality refers to the inherent characteristics of information, such as accuracy, reliability, and completeness [38]. The significance of information quality is demonstrated by its relevance, usefulness, and currency. It is crucial for information to be accurate, reliable, and complete so that it can be relied upon to make informed decisions. Additionally, the relevance of information ensures that it is pertinent to the matter at hand, while its usefulness pertains to its ability to provide insights or solve problems effectively. Finally, information must be up-to-date and reflect the most recent developments to remain relevant and useful. Hence, information quality plays a vital role in decision-making processes, as it ensures that the information used is relevant, reliable, and useful, providing individuals and organizations with a competitive edge. A research of Lee, Sung and Jeon [39] aimed to identify the factors that drive users' continued intention to use FDAs. To achieve this, they incorporated information quality into the Unified Theory of Acceptance and Use of Technology 2. The study confirmed that several factors, including information quality, performance expectancy, habit, and social influence, played a critical role in encouraging users to continue using food delivery apps. The findings emphasize the importance of ensuring the accuracy and reliability of the information presented through the app, as well as the app's performance and its users' habitual behavior. Social influence, too, was shown to be a significant factor in users' intention to continue using the app, highlighting the importance of a positive word-of-mouth and social media presence for these types of applications.

#### 2.1.3. Task-technology fit

Task-Technology Fit (TTF) is a theoretical model that explores the relationship between work-related tasks and the use of technology. This model was proposed by Goodhue and Thompson in 1995 and places greater emphasis on the relationship between task and technology characteristics, utilization, and performance impact compared to the Technology Acceptance Model (TAM) [40]. TTF is a useful tool for examining the relationship between technology and work-related tasks, and how this impacts the utilization and performance of technology. Previous research has shown that the degree of fit between tasks and technology can significantly impact users' adoption and behaviors of information systems, such as mobile commerce in the insurance industry, mobile information systems, e-learning, and e-books [41–43]. Given the TTF's complementarity with TAM, this study incorporates the perceived TTF into the research's framework. By including the concept of TTF in the framework of research, this study aims to provide a more comprehensive understanding of customers' behavior when using FDAs.

#### 2.1.4. Stimulus - organism - response (SOR)

The present study adopts "Stimulus Organism Response" (SOR) theory as the fundamental framework to establish conceptual relationships among the various constructs under investigation. The SOR theory posits that distinct attributes of the environment act as stimuli, impacting the internal psychological state of individuals/organisms and eliciting behavioral responses [44].

Aligned with the SOR theory, the "stimulus" encompasses a collection of attributes that influence consumers' perception and internal state (Mazursky and Jacoby, 1986; Mollen and Wilson, 2010). These attributes serve as cues that penetrate customers' consciousness and prompt them to take action [45]. In the context of this study, the stimulus refers to the information quality,

task-technology fit and promotion offered by FDAs [46–48].

The “organism” pertains to the internal processes that mediate between the stimuli (inputs) and customers’ ultimate responses, which are based on their evaluations and perceptions [49]. Considering that cognition, affection, and activation are key dimensions of customer engagement ([50], we propose that the attributes of FDAs will impact the customer belief (Ease-of-use, Perceived-of-value) and customer feeling (Satisfaction, Continued intention to use) as an organism state with the FDAs. Once the stimulus is triggered, customers process the information derived from it, which is helpful and meaningful for their decision-making [51].

The “response” corresponds to the outcomes reflected through customers’ actions and behaviors [44]. During their interaction with FDAs, customers are exposed to various experiences and recommendations, which, if positive, influence their behaviors towards the FDAs. In response to these favorable experiences, customers will positively talk about FDAs (positive electronic word-of-mouth - PEW) [52].

## 2.2. Research model and hypotheses development

The research introduces a novel model that incorporates three variables - Task technology fit, Information quality, and Promotion - into the TAM framework as pivotal factors influencing customer satisfaction, continued intention to use, and positive electronic word-of-mouth (PEW) for food delivery apps (FDAs). The proposed research model is situated within the well-established Stimulus-Organism-Reaction (SOR) theory, which is widely utilized in studies focusing on individual behavior.

### 2.2.1. Information quality (INQ)

In the context of research on FDAs, Information quality (INQ) could be defined as the users’ perception of the quality of information presented [53]. This concept has been extensively investigated in prior research [54,55]. The significance of information quality as a crucial component of platforms success is emphasized by Petter et al. (, p. 355), who underscore that despite being frequently overlooked, its importance remains paramount [56].

The quality of information provided by mobile apps plays a crucial role in user satisfaction and loyalty. The accuracy, detail, timeliness, and validity of the information impact its quality [57]. When mobile apps offer relevant and abundant information, users tend to engage more with the apps [58]. Studies have shown that information provided by mobile apps enhances brand loyalty and user satisfaction [59]. In the context of smartphone apps, the ability to deliver relevant, up-to-date, and easily understandable information is essential [60].

Factors such as product descriptions, consumer reviews, and exchange/return policies influence consumers’ purchasing decisions. Given that mobile apps often involve transactions and exchanging significant amounts of information related to products, services, delivery, and payment, the availability of relevant, accurate, and timely information increases overall trust in online shopping and enhances user satisfaction [61,62]. Therefore, having the right type of information and easy access to it positively impact consumer satisfaction, loyalty, and purchasing decisions.

On the other hand, irrelevant or unhelpful information or information overload can lead to dissatisfaction and app discontinuation [63]. Therefore, the quality and design of information provided by apps significantly influence consumer satisfaction and loyalty. In summary, the quality and design of information delivered by mobile apps have a direct impact on user satisfaction and loyalty, emphasizing the importance of providing relevant and easily accessible information to users.

It was reveal in prior research that there is a significant impact of INQ on satisfaction (SAT) [64–66]. Earlier studies have also identified a significant association between INQ and Ease-of-use (EOU) [46]. Furthermore, numerous prior research studies have validated the impact of information quality on continued intention to use (CIU) [39,67]. Therefore, we propose the following hypothesis.

**H1.** : INQ has a positive impact on SAT

**H2.** : INQ has a positive impact on EOU

**H3.** : INQ has a positive impact on CIU

### 2.2.2. Task-technology fit (TTF)

Perceived task-technology fit (TTF), as gleaned from the task-technology fit model, is an imperative factor that has a tangible impact on users’ propensity to adopt technology. Goodhue and Thompson (1995) have argued that a more pronounced concinnity between the performance of technology and users’ tasks and requirements significantly enhances the likelihood of technology adoption [40]. Several previous studies have demonstrated a significant correlation between TTF and Ease-of-use (EOU) [68–70]. Furthermore, TTF can have a stronger impact on Satisfaction SAT [47,71]. TTF has been found to be positively effect with user satisfaction. If users are satisfied with a technology, they are more likely to continue using it. Therefore, it is reasonable to hypothesize that there is a relationship between TTF and continued intention to use (CIU). Hence, the following hypothese are suggested.

**H4.** : TTF has a positive impact on EOU

**H5.** : TTF has a positive impact on SAT

**H6.** : TTF has a positive impact on CIU

### 2.2.3. Ease-of-use (EOU)

Ease of use (EOU) refers to the degree to which a user can easily and efficiently operate a system or product, without encountering difficulties or challenges [72,73]. Extensive research in the context of food delivery apps (FDAs) has consistently shown that a high level of ease-of-use indicates an intuitive, simple, and effortless product or service [6]. When customers perceive a product or service as easy to use, they are more likely to have a positive experience and feel satisfied with their overall interaction. Furthermore, ease-of-use plays a crucial role in enhancing efficiency and productivity for customers. By providing easy navigation and operation, a product or service enables customers to accomplish their tasks more quickly and effectively. This increased efficiency contributes to a higher level of satisfaction as customers can achieve their goals with minimal effort. In addition, ease-of-use empowers customers by instilling a sense of control and mastery over the product or service. When customers feel competent and confident in their ability to use a product, they are more likely to derive satisfaction from it. This empowerment further enhances the overall satisfaction with the product or service. These findings have been consistently supported by numerous studies specifically focused on FDAs, which have concluded that ease-of-use (EOU) has a significant impact on customer satisfaction (SAT) [5,74,75]. Based on these arguments, the following hypothesis is formulated.

**H7.** : EOU has a positive impact on SAT

### 2.2.4. Satisfaction (SAT)

Oliver (1980) defined satisfaction (SAT) as the amalgamation of individual prior emotions with disconfirmed expectations from the surrounding environment, resulting in cumulative feelings [76]. Satisfied customers are more likely to have positive experiences with food delivery apps. When customers perceive value in using these apps, such as convenience, time-saving, and a wide variety of food options, they are more likely to continue using them in the future. Furthermore, satisfied customers tend to exhibit repeat usage behavior. When customers have a positive experience with a food delivery app and are satisfied with its features, functionality, and overall service quality, they are more likely to use it again for their future food delivery needs. Consumer loyalty is often viewed as being heavily influenced by satisfaction, which is considered a critical antecedent [77]. Moreover, satisfied customers are more likely to have a positive overall experience with the FDAs. When customers have a smooth, convenient, and enjoyable experience, they are more inclined to share their positive experiences with others through electronic word-of-mouth. Several FDAs research pointed out that SAT is significantly impacting the CIU [18,75] and it also has strong affect to electronic word-of-mouth (eWOM) [78]. The primary focus of this research is on positive eWOM (PEW). Therefore, the following hypotheses are put forward.

**H8.** : SAT has a positive impact on CIU

**H9.** : SAT has a positive impact on PEW

### 2.2.5. Perceived of value (POV)

Perceived of value (POV) refers to a customer's overall assessment of the benefits they receive from a product or service relative to its cost [79]. POV is a crucial determinant of consumers' behavioral intentions. When individuals perceive high value in using FDAs, such as cost-effectiveness, convenience, time-saving, and access to a wide variety of food options, they are more likely to continue using these apps. Furthermore, when individuals perceive substantial benefits, such as improved efficiency, reduced effort in food ordering and delivery, and enhanced overall experience, they are more inclined to continue using the apps. POV plays a crucial role in consumer decision-making processes, as it influences the willingness to pay for a product or service and the likelihood of repeat purchases. In previous FDAs studies, POV is found to have a significant effect on CIU [80,81]. Thus, this following hypothesis is put forward.

**H10.** : POV has a significant impact on CIU

### 2.2.6. Continued intention to use (CIU)

Continued intention to use refers to a user's intention or willingness to continue using a product or service over time [82–84]. When users have a positive experience with FDAs and intend to continue using them, they are more likely to share their positive experiences with others through word of mouth. Satisfied users who have a continued intention to use FDAs are more likely to become advocates and recommend the apps to their friends, family, and colleagues. Furthermore, positive word of mouth can create a ripple effect within social networks. When users share their positive experiences and intentions to use FDAs, it can influence others to adopt and try the apps [52]. The continued intention to use FDAs can, therefore, lead to an increased volume of positive word of mouth, contributing to the overall growth and success of FDAs. Besides, Positive word of mouth resulting from users' continued intention to use FDAs can enhance trust and reduce perceived risks for potential users. When individuals receive recommendations from trusted sources, it increases their confidence in trying the apps and may result in their own positive word of mouth. It has been indicated in previous studies that CIU has a direct and significant impact on eWOM [85,86]. Therefore, the following hypothesis is formed.

**H11.** : CIU has a significant impact to PEW

### 2.2.7. Promotion (PRM)

Promotion is generally regarded as a short-term marketing tactic that is utilized to generate awareness and interest in products or services [48]. PRM activities such as advertising, sales promotions, and public relations are designed to increase the visibility and appeal of a product or service among potential customers. In fact, promotions can make products or services more accessible to a wider

range of consumers. By reducing the price or offering attractive deals, promotions can attract new customers who might have been hesitant to purchase at the regular price. This increased accessibility creates a perception of greater value as customers feel they are gaining access to a desirable product or service at a more affordable cost [87]. Besides, promotions allow customers to make comparisons between the regular price and the discounted price. This comparative evaluation helps customers assess the value they are gaining through the promotion. When customers perceive that the promotional price offers significant savings or benefits compared to the regular price, it enhances their perceived value [88]. Hence, we hypothesize the following.

**H12.** : PRM has a significant impact to POV

Promotion sales often provide customers with added value, such as discounts, freebies, or special offers. These incentives enhance customers' perception of value, making them more likely to engage in positive eWOM [89]. Customers who have benefited from promotional offers are inclined to share their positive experiences, encouraging others to take advantage of the promotions as well. Additionally, promotions that generate positive eWOM can create a sense of social proof, where individuals perceive that others have had positive experiences with the brand or product. This social influence can significantly impact the behavior of potential customers, as they are more likely to trust and be influenced by the positive eWOM generated from promotions [90]. Therefore, based on the arguments presented, we put forward the following hypotheses.

**H13.** : PRM has a significant impact to PEW

Fig. 1 below present the research framework and show the hypotheses of this study.

### 3. Methodology

#### 3.1. Data collection

The research conducted on students was driven by multiple reasons. Students' insights are highly valuable as they make up a significant portion of the population and are quick to embrace new technologies and services. Consequently, understanding their behavior and preferences is crucial to develop effective strategies and remain competitive. Furthermore, since students are the future leaders and decision-makers of society, it is vital to comprehend their values and attitudes towards various issues to shape policies and initiatives that meet their needs and aspirations. Thus, investigating students' experiences and opinions can provide valuable insights into different societal aspects such as education, culture, and technology. In the context of Vietnam, a developing country, where the younger population are typically tech-savvy and increasingly use FDAs for food delivery, it's important for FDAs companies, SMEs in food and beverage, and local vendors to consider the features that can promote customer loyalty and positive feedback online. These factors play a vital role in the success and sustainability of FDAs, as repeat usage and positive recommendations are critical for growth and profitability. This research aims to investigate the factors that drive continued usage and positive word-of-mouth for FDAs. Understanding these drivers is essential to achieving sustained success in the industry.

Content validity of each measurement item was assessed by three academic experts to evaluate its applicability and representativeness. Based on the review findings, the majority of items were classified as moderately to very representative/applicable. Following the expert panel review, a pilot study involving 30 students was conducted to refine the measurement items' wording, language usage, and questionnaire structure. The initial results of the pilot test indicated that the questionnaire met the criteria of clarity and comprehensibility. This positive outcome can be attributed to the careful preparation of the questionnaire as well as the input received from experts prior to conducting the pilot test.

In conducting our research, we employed a multi-faceted approach that combined both online and direct surveys to maximize the

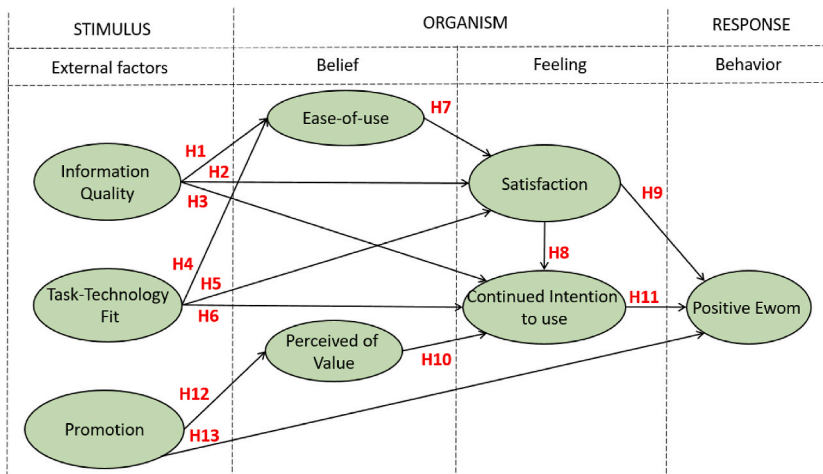


Fig. 1. Proposed Research framework.

breadth and depth of our data collection efforts. From September 2022 to January 2023, data was collected using convenience sampling at the University of Economics - The University of Danang, a prominent institution located in a bustling central city in Vietnam. The questionnaires were distributed through two channels: Google Forms links and paper surveys. Procedures were put in place to identify and handle missing values in the collected data. After excluding surveys with missing or duplicate responses, a total of 346 valid responses were retained out of the initial 438, resulting in a response rate of 78.99%.

Due to the potential coercive effects of rewards, which may result in respondents participating reluctantly solely for the purpose of obtaining the prize, the authors have made a deliberate decision to underscore the voluntary nature of participant involvement. By emphasizing the intrinsic motivation and willingness of participants, the authors seek to enhance the quality and authenticity of the responses obtained. This approach underscores the researchers' recognition of the research's significance and acknowledges the pivotal role played by respondents' active engagement in contributing to the overall success and validity of the study. To ensure the integrity and validity of our results, we meticulously scrutinized and removed any answers that were deemed invalid due to factors such as missing or repeated responses. This rigorous screening process helped us to refine and distill our dataset down to only the most relevant and informative responses.

The authors have implemented the following methods to minimize the potential for Common Method Bias (CMB), as suggested by Podsakoff, MacKenzie and Podsakoff [91]; Viswanathan and Kayande [92]; Weijters and Baumgartner [93].

- Giving clear instructions: We provided clear and explicit instructions to the respondents to ensure a better understanding of the questions and minimize any response bias.
- Ensuring anonymity of responses: We assured the respondents that their identities would remain anonymous, which encouraged them to provide more honest and unbiased answers.
- Avoiding complex and ambiguous items: We made sure that the survey questions were straightforward and easily understandable, avoiding any ambiguity or complexity that could lead to biased responses.
- Keeping surveys concise: We designed the surveys to be concise and focused, preventing respondent fatigue and reducing the likelihood of biased or careless answers.

Additionally, we followed the suggestion by MacKenzie and Podsakoff [94]; Podsakoff, MacKenzie and Podsakoff [91] to collect self-reported data from the same source but at different points in time. This longitudinal approach helps control for potential biases that may arise from cross-sectional data.

Furthermore, to assess the presence of CMB, we conducted Harman's single-factor test through exploratory factor analysis (EFA), as proposed in the study by Kock, Berbekova and Assaf [95]. If CMB were present, EFA with all primary study variables included would result in one factor accounting for more than 50% of the variance. However, our results showed that no single factor accounted for more than 50% of the variance, indicating that CMB is not present, as suggested by Podsakoff, MacKenzie, Lee and Podsakoff [96], Korsgaard and Roberson [97].

By employing these methods and conducting rigorous analyses, the authors have taken significant steps to address and mitigate the potential for Common Method Bias in our study.

Following the recommendation by Roni and Djajadikerta [98], the researchers utilized SPSS to conduct a thorough analysis of our data, specifically focusing on detecting and managing outliers. Our findings indicate that no issues were identified that could significantly distort the results of the statistical analyses.

### 3.2. Survey instrument

The questionnaire was created and distributed using Google Form, a widely recognized and popular online survey tool. Google Form offers researchers a convenient and user-friendly interface for designing and distributing questionnaires. Researchers can easily customize their questionnaires, collect responses in real-time, and efficiently manage data analysis using this platform. The questionnaire comprised a total of 40 questions, which were categorized into three main types: demographic questions, Likert scale questions, and open-ended questions. The breakdown of questions by type is as follows.

- Demographic questions (6 questions): Age, gender, FDAs using time, FDAs usage frequency, income, number of internet-connected devices
- Likert Scale Questions (34 questions): Participants were asked to rate their agreement on a 5-point scale (1 = strongly disagree, 5 = strongly agree) regarding various aspects related to the research topic. Example questions include: The ordering process on FDAs was very easy for me; The quality of food on FDAs corresponds to the money spent; I am willing to provide positive information about FDAs to internet users.

In designing our survey instrument, we took great care to draw upon and adapt the research model developed by Al-Emran, Arpaci, and Salloom (2020). We acknowledge the significance of including other variables that have been found to have a considerable influence on the subject under investigation. Hence, we made considerable efforts to identify and integrate these factors into our research framework.

In sum, the survey utilized a comprehensive range of eight variables and 34 indicators, as displayed in [Appendix A](#). This resulted in a highly detailed and extensive framework for our study. These variables were carefully selected to capture the full breadth and depth of the complex interplay between various factors and dimensions that impact our chosen topic.



To facilitate ease of use and clarity, we employed a Likert scale to measure participant responses, ranging from 1 to 5, where 1 represented a total disagreement with the statement being presented, and 5 represented a total agreement. By utilizing this well-established and widely recognized measurement tool, we were able to capture the nuanced and multi-faceted nature of participants' opinions and attitudes, enabling us to generate a rich and detailed dataset that will prove invaluable in driving our research forward.

The items included in our survey instrument are provided in full detail in the appendix, which serves as a comprehensive and informative resource for those seeking a deeper understanding of the intricacies and complexities of our research model. Through our careful and rigorous approach to survey design and implementation, we are confident that our results will provide a valuable and informative contribution to the field of study, driving forward our understanding of the complex factors that impact our chosen topic.

### 3.3. Data analysis

The objective of our study was to investigate the intricate and multifaceted relationships among eight key constructs: Task-technology fit (TTF), Information quality (INQ), Ease-of-use (EOU), Perceived of value (POV), Continued intention to use (CIU), Satisfaction (SAT), Positive eWOM (PEW) and Promotion (PRM). To achieve this, this study proposed thirteen distinct hypotheses, each of which was designed to shed light on the various causal relationships that exist among these key constructs.

Given the intricate and interrelated nature of these constructs, the authors recognized that a comprehensive and sophisticated approach to data analysis would be necessary. To this end, structural equation modeling (SEM), a powerful analytical tool that allows for the mapping of complex causal relationships among multiple dependent variables simultaneously, was employed [99]. In this study, Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed as the estimation method. PLS-SEM is a statistical technique commonly used in social sciences and business research, especially when dealing with complex models or small sample sizes. Unlike covariance-based SEM, PLS-SEM focuses on predicting latent variables through a series of iterative regressions. It is particularly suitable for exploratory studies and theory development. By utilizing PLS-SEM, we aimed to capture the relationships between latent variables and uncover the underlying mechanisms in our research model. By employing this approach, the researchers were able to analyze all the various paths and dependencies among latent variables within our research model, providing a rich and detailed understanding of the complex relationships that exist among these constructs [100].

It is worth noting that Structural Equation Modeling (SEM) comes in two primary forms: Covariance-based SEM (CB-SEM) and Partial Least Squares SEM (PLS-SEM). CB-SEM is typically utilized to evaluate the degree to which established theories align with empirical data, whereas PLS-SEM is commonly used for exploratory analysis and testing of emerging theories. Given the exploratory nature of our study and the complexity of the relationships we sought to explore, PLS-SEM was the ideal approach for our research purposes [101].

To analyze our data, SmartPLS was utilized in employing a two-step approach. Prior to examining the proposed linkages among our theoretical constructs, also known as the structural model, it was essential to establish the convergent and discriminant validity of our measurement instruments, referred to as the measurement model [100]. By carefully analyzing and assessing the validity of our measurement tools, we were able to ensure the accuracy and reliability of our results, providing a robust and comprehensive foundation for our subsequent analysis of the complex relationships that exist among these key constructs.

## 4. Results

### 4.1. Characteristics of respondents

In terms of the demographic information of our respondents, as presented in Table 2, the overwhelming majority of our respondents

**Table 2**  
- Demographic information.

Variable	Characteristic	N	Percentage
Gender	Male	70	20.2%
	Female	276	79.8%
Using time	Less than 3 months	91	22.8%
	From 3 months to less than 1 year	83	23.7%
	From 1 year to less than 2 years	92	27.2%
	From 2 years	80	26.3%
FDAs usage frequency	Rarely	58	16.8%
	Occasionally	144	41.6%
	Frequently	101	29.2%
Income	Always	43	12.4%
	Less than 5 million VND (approximate 212 USD)	235	67.9%
	From 5 million VND to less than 10 million VND	64	18.5%
	More than 10 million VND	47	13.6%
Number of internet-connected devices	1	231	66.8%
	2	93	26.9%
	≥3	22	6.4%

were female, with a staggering 79.80% of participants identifying as such. While this might seem surprising at first glance, it is actually quite typical of this university was surveyed, where female students tend to outnumber their male counterparts. The researchers also observed that usage frequency among our respondents was relatively even across four distinct groups, with the largest group consisting of individuals who had used our survey platform for a period of one year to less than two years, accounting for a substantial 27.2% of our sample population. Additionally, this study found that most people surveyed reported earning less than 5 million VND, a finding that is not altogether surprising given that our sample population consists primarily of students who are not yet working. The majority of our respondents reported having one device that is capable of connecting to the Internet, with a substantial 66.8% of participants.

#### 4.2. Measurement model evaluation

The examination of the measurement model involved eight distinct factors, consisting of 34 measurement items. The determination of the model’s effectiveness was established by evaluating its internal consistency reliability, convergent validity, and discriminant validity against the prescribed criteria outlined in Table 4.

Firstly, composite reliability was employed to assess the internal consistency reliability, which should ideally be above 0.7 [102]. Our results indicated that all constructs had composite reliability values ranging from 0.887 to 0.918, which were statistically acceptable.

Secondly, the authors assessed the convergent validity using the outer loadings and average variance extracted (AVE) values. As shown in Table 3, most outer loadings of measurement items were above the recommended threshold of 0.7 [103]. Although the outer loading of indicator TTF3 was slightly lower than 0.7, it was retained in the scale following the recommendation of Chin [104] because its exclusion did not result in a significant impact on the Composite Reliability (CR) and Average Variance Extracted (AVE) values of the associated construct. Additionally, all constructs had AVE values greater than 0.5, ranging from 0.65 to 0.736, indicating high levels of convergent validity.

Finally, the discriminant validity was evaluated using the HTMT criterion, as recommended by Hair et al. If the HTMT value is below 0.90, discriminant validity has been established between variables. Our results in Table 5 showed that all HTMT criterion in the table satisfied this criterion, indicating that the discriminant validity of measurement items was satisfied [105].

Overall, our measurement scale demonstrated high levels of reliability and validity, ensuring the quality of our data analysis and results interpretation.

**Table 3**  
Descriptive Statistics.

Items	Mean	Std. Deviation	Outer loadings	Skewness	Kurtosis	VIF
CIU1	3.79	0.862	0.830	-0.574	0.594	2.142
CIU2	3.87	0.869	0.824	-0.738	0.702	2.221
CIU3	4.01	0.851	0.802	-0.635	0.283	2.026
CIU4	3.62	0.915	0.801	-0.326	-0.082	2.132
CIU5	3.62	0.934	0.772	-0.365	-0.075	1.958
EOU1	3.90	0.945	0.850	-0.929	0.795	2.191
EOU2	3.96	0.884	0.898	-0.859	0.951	2.837
EOU3	3.98	0.886	0.863	-0.765	0.608	2.283
EOU4	3.89	0.904	0.794	-0.729	0.335	1.785
INQ1	3.89	0.845	0.811	-0.768	0.948	1.730
INQ2	3.74	0.886	0.828	-0.247	-0.315	1.851
INQ3	3.89	0.796	0.822	-0.489	0.501	1.847
INQ4	3.93	0.847	0.809	-0.564	-0.027	1.754
PEW1	3.82	0.797	0.838	-0.429	0.243	2.024
PEW2	3.88	0.825	0.841	-0.456	0.082	2.061
PEW3	3.77	0.885	0.846	-0.610	0.572	2.053
PEW4	3.81	0.830	0.806	-0.428	0.049	1.769
POV1	3.53	0.920	0.860	-0.299	-0.196	2.564
POV2	3.53	0.917	0.805	0.073	-0.326	1.994
POV3	3.68	0.893	0.836	-0.264	-0.309	2.284
POV4	3.41	1.071	0.802	-0.228	-0.593	1.946
POV5	3.75	0.986	0.780	-0.611	-0.092	1.781
PRM1	3.96	0.835	0.831	-0.590	0.210	1.994
PRM2	4.13	0.927	0.858	-1.112	1.128	2.143
PRM3	3.96	0.879	0.845	-0.648	0.187	2.004
PRM4	3.96	0.932	0.801	-0.828	0.622	1.749
SAT1	3.67	0.846	0.888	-0.290	-0.045	2.732
SAT2	3.64	0.907	0.851	-0.239	-0.075	2.293
SAT3	3.76	0.837	0.844	-0.354	0.067	2.069
SAT4	3.67	0.889	0.848	-0.176	-0.356	2.171
TTF1	3.99	0.978	0.896	-1.211	1.462	3.085
TTF2	4.02	0.928	0.871	-1.026	1.065	2.740
TTF3	3.84	0.969	0.674	-0.647	0.163	1.333
TTF4	3.80	0.967	0.801	-0.700	0.151	1.703

**Table 4**  
– Reliability and validity of measurement constructs.

Constructs	Cronbach's Alpha	Composite Reliability	AVE
CIU	0.865	0.903	0.650
EOU	0.873	0.914	0.726
INQ	0.835	0.890	0.668
PEW	0.853	0.901	0.694
POV	0.875	0.909	0.668
PRM	0.854	0.901	0.695
SAT	0.880	0.918	0.736
TTF	0.827	0.887	0.664

**Table 5**  
Discriminant validity (HTMT criterion).

	CIU	EOU	INQ	PEW	POV	PRM	SAT	TTF
CIU								
EOU	0.755							
INQ	0.862	0.767						
PEW	0.764	0.745	0.776					
POV	0.778	0.641	0.734	0.686				
PRM	0.746	0.862	0.823	0.738	0.645			
SAT	0.877	0.682	0.807	0.791	0.784	0.664		
TTF	0.799	0.809	0.827	0.769	0.635	0.806	0.706	

### 4.3. Structural model evaluation

#### 4.3.1. Model fit

The evaluation of the structural model involved multiple assessments, such as the examination of its fit, predictive capability, and the relationships between the constructs. To begin with, we assessed the adequacy of the structural model fit by employing the standardized root mean square residual (SRMR), which had a value of 0.056. Our findings indicated that the model fit was satisfactory, which is consistent with the recommendation of Henseler, Ringle, and Sarstedt to use a cutoff value of 0.08 for SRMR [106].

The second step involved evaluating the model's predictive ability using two criteria - the coefficient of determination ( $R^2$ ) to measure predictive accuracy, and the Stone-Geisser  $Q^2$  (cross-validated redundancy) to measure predictive relevance [99]. The results indicated that the constructs of Continued Intention to use, Ease-of-use, Positive eWOM, Perceived of value, and Satisfaction were well-explained by the model, with  $R^2$  values ranging from 32.4% to 70.1% (see Table 6). According to the rule of thumb proposed by Henseler, Ringle and Sarstedt [106], these  $R^2$  values suggested a substantial level of predictive accuracy for Continued Intention to use, Ease-of-use, Positive eWOM, and Satisfaction, and a moderate level of predictive accuracy for Perceived of value.

In addition to  $R^2$ ,  $Q^2$  value (Stone-Geisser) was estimated using the procedure blindfolding in SmartPLS. Hair Jr, Hult, Ringle, Sarstedt, Danks and Ray [105] suggested a predictive relevance value of 0.02, 0.15, and 0.35 indicates small, medium, and large predictive relevance for an endogenous construct. Results showed that the  $Q^2$  values for Continued Intention to use, Ease-of-use, Positive eWOM, Perceived of value, and Satisfaction were 0.451, 0.385, 0.382, 0.209, and 0.379, respectively. All but Perceived of value had large predictive relevance, which had a medium predictive relevance. These findings suggest that the predictive capability of the proposed model was highly achievable in this study, based on both  $R^2$  and  $Q^2$  values.

The measure of goodness of fit for a statistical model delineates its efficacy in effectively capturing and aligning with a specific set of observed data points. Following the formula and criteria mentioned by Tenenhaus, Vinzi, Chatelin and Lauro [107] and Wetzels, Odekerken-Schröder and Van Oppen [108] as below, the assessment criteria are established as follows: a lack of fit is indicated when the value is below 0.10, a low level of fit lies within the range of 0.10–0.25, a moderate level of fit falls within 0.25–0.36, and a high level of fit is observed for values exceeding 0.36.

**Table 6**  
R squared.

	R Square
CIU	0.701
EOU	0.537
PEW	0.563
POV	0.324
SAT	0.526

**Table 7**  
- Test hypotheses.

Hypothesis	Path	Beta	Standard Error	T Statistics	P Values	Conclusion
H1	INQ - > EOU	0.345	0.061	5.653	0.000	Supported
H2	INQ - > SAT	0.460	0.067	6.865	0.000	Supported
H3	INQ - > CIU	0.238	0.058	4.108	0.000	Supported
H4	TTF - > EOU	0.451	0.067	6.768	0.000	Supported
H5	TTF - > SAT	0.153	0.061	2.507	0.012	Supported
H6	TTF - > CIU	0.205	0.057	3.604	0.000	Supported
H7	EOU - > SAT	0.193	0.059	3.243	0.001	Supported
H8	SAT - > CIU	0.360	0.055	6.541	0.000	Supported
H9	SAT - > PEW	0.380	0.070	5.395	0.000	Supported
H10	POV - > CIU	0.168	0.051	3.268	0.001	Supported
H11	CIU - > PEW	0.176	0.076	2.319	0.021	Supported
H12	PRM - > POV	0.569	0.039	14.778	0.000	Supported
H13	PRM - > PEW	0.297	0.054	5.523	0.000	Supported

$$Gof = \sqrt{\frac{-R^2}{-AVE}}$$

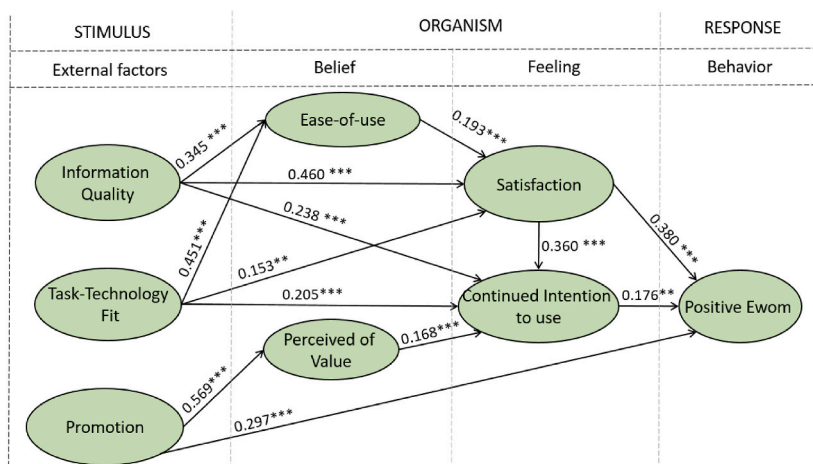
The result of the GoF calculation revealed a high level of fit, with a Gof value of 0.607. This indicates that our proposed model demonstrates a strong alignment with the observed data.

**4.3.2. Hypothesis testing**

The study employed a bootstrapping procedure consisting of 10,000 resamples with a total of 364 cases to scrutinize the path relationships between various constructs in the proposed model. The regression coefficient ( $\beta$ ) and its significance were considered as pivotal determinants to evaluate the path relationships. The empirical t-value greater than 1.96 at a significant level of 5% was deemed as indicative of a significant path coefficient [105]. As shown in Table 7 and Fig. 2, all paths were found to be significant.

The result indicate a significant alignment between the collected data and the theoretical expectations outlined in the hypotheses. This strong empirical support strengthens the credibility and validity of our findings, suggesting that the research is grounded in a robust theoretical foundation. Furthermore, the acceptance of all hypotheses highlights the methodological rigor employed in the study, as well as the representativeness of the sample used.

Interestingly, our findings also revealed that Information quality had a more pronounced impact on satisfaction than Task-technology fit and Ease-of-use, with a  $\beta$  value of 0.460 compared to 0.153 and 0.193, respectively. Moreover, Satisfaction was identified as having the strongest influence on Continued intention to use ( $\beta = 0.36$ ) in comparison to the effects of Information quality, Task-technology fit, and Perceived of value. Satisfaction was also found to have the most substantial impact on Positive eWOM, with a  $\beta$  value of 0.38, followed by Promotion and Continued intention to use with  $\beta = 0.297$  and  $\beta = 0.176$ , respectively. These findings contribute to the understanding of the relationships between the constructs in the proposed model and provide insights for practitioners to enhance customer satisfaction and loyalty.



Note: \*\*\*  $p < 0.001$ , \*\*  $p < 0.05$

**Fig. 2.** Structural equation model

Note: \*\*\* $p < 0.001$ , \*\* $p < 0.05$ .

## 5. Discussions

FDAs have become increasingly prevalent in today's digital era, revolutionizing the way people order and enjoy food. These apps provide a convenient and seamless platform for customers to browse menus, place orders, and have their favorite meals delivered right to their doorstep. The significance of FDAs cannot be overstated, both for customers and businesses alike. For customers, these apps offer the convenience of ordering food anytime, anywhere, with a wide range of options to choose from. They eliminate the need for traditional phone calls, saving time and effort. Moreover, FDAs provide transparency, allowing customers to view reviews, ratings, and even track their orders in real-time. For businesses, FDAs present immense opportunities to reach a larger customer base and expand their operations. These platforms enable restaurants and food establishments to showcase their menus, promote special offers, and enhance their brand visibility. With the increasing demand for online food ordering, integrating with FDAs has become crucial for businesses to stay competitive in the digital transformation landscape. However, despite the growing significance of food delivery apps in Vietnam, research studies specifically focused on this area are still limited. In light of this, this study represents a necessary and timely addition to the literature on technology application in improving business performance.

This study introduces a novel model that integrates three variables - Task Technology Fit, Information Quality, and Promotion - into the Technology Acceptance Model (TAM) framework. These variables are identified as crucial determinants of customer satisfaction, continued intention to use, and positive electronic word-of-mouth (eWOM) specifically in the context of food delivery apps (FDAs). The proposed research model is situated within the widely utilized Stimulus-Organism-Reaction (SOR) theory, which provides a solid framework for examining individual behavior in various research studies. As posited by several scholars, constructing diverse and complex models is essential for making theoretical contributions to the field, as human behavior is multifaceted and often changes with the environment [109,110]. Conducted on a survey sample of students in the city of Da Nang, Vietnam, this research collected a total of 346 data points. With 13 hypotheses formulated and accepted after analysis using the SMART PLS software, the study holds significant managerial and academic implications for various stakeholders. These include food delivery app (FDA) service providers, SMEs in the food industry, food vendors, and FDA users themselves. Hypotheses H1, H2, and H3 investigate the positive correlation between information quality and ease-of-use, satisfaction, and continued intention to use FDAs. The analysis results demonstrate that information quality directly impacts all three aforementioned factors. It can be concluded that the most influential predictor of both satisfaction and loyalty is the quality of information. This study confirms the crucial role of information quality as a significant variable that greatly influences user satisfaction. Surprisingly, this variable has not received adequate attention in previous research efforts that primarily focus on technology acceptance behavior. This finding aligns with previous research which also highlighted the positive association between information quality and consumer satisfaction as well as continued intention to use [25,64,65]. The findings of this research signify the profound influence of information quality on satisfaction, surpassing Ease-of-use, a variable conventionally recognized in models, by more than twofold. In fact, when information quality is ensured in terms of content, comprehensibility, and credibility, users are likely to make efficient decisions, conserve time, and minimize errors. Such attributes are particularly significant for customers, given the prevailing fast-paced lifestyle. Therefore, the implications of this study underscore the pertinence of prioritizing and enhancing information quality in technology acceptance models to optimize customer satisfaction.

Hypotheses H4, H5, and H6 examined the relationship between task-technology fit and ease-of-use, satisfaction, and continued intention to use FDAs. The results of the study confirm these hypotheses, aligning with the findings of previous literature [111,112]. Research has shown that TTF is a significant factor in determining the ease-of-use and satisfaction of technology users. When a technology aligns well with a specific task, users are more likely to perceive it as easy to use, leading to increased satisfaction. This positive experience, in turn, influences their intention to continue using FDAs. In contrast, when a technology is a poor fit for a task, users may struggle with usability issues and experience frustration and dissatisfaction.

Hypotheses H12 and H13 examined the relationship between promotion and perceived value, as well as promotion and positive eWOM. The findings of the present study revealed a positive correlation between promotion and perceived value, as well as promotion and positive eWOM. Subsequent research endeavors have sought to explore the impact of the Promotion variable in new technology studies, and the findings have demonstrated that Promotion exerts a significant influence on Perceived of value. Frequently, the cost barrier poses a significant obstacle to technology adoption. However, the use of the appropriate promotion strategy can significantly mitigate the cost barrier, leading to improved user acceptance and utilization of the technology. This, in turn, enhances the intention to continue using the technology. Furthermore, Promotion variable has also been found to have a positive effect on Positive eWOM, thus engendering the dissemination of information to a larger pool of potential customers. The findings from the present study corroborate the impact of promotion on consumer behavior as identified in previous research endeavors [48,113]. The study by Pigatto, Machado, Negreti and Machado [20] confirmed the influence of promotion on the actual usage of FDAs. The findings of this research provide additional insights into the impact of promotion on perceived value and positive eWOM.

According to the SOR theory, the factors within the "Stimulus" group (Information quality, task-technology fit, promotion) will induce changes in customers' "Organism", specifically in their beliefs (Ease-of-use, perceived of value) and feelings (satisfaction, continued intention to use). H7 tested the association between ease-of-use and satisfaction. Consistent with previous research [114-116], the current study also identified a positive link between ease-of-use and customer satisfaction. A well-designed navigation system allows consumers to effortlessly select their desired menu items, efficiently review their order summary, and seamlessly proceed to the final payment page. Moreover, a carefully crafted app interface ensures a smooth and enhanced payment experience by offering users a variety of payment options, including credit cards, debit cards, internet banking, mobile wallets, or cash on delivery. The availability of multiple payment methods has been shown to be beneficial in previous studies.

H10 examined the association of perceived of value and intentions to use the FDAs. The findings of the study provided support for this hypothesis, which aligns with the majority of the existing literature [82,117,118]. Perceived of value plays a crucial role in shaping

consumers' intentions to use FDAs. When users perceive a high value in using these apps, they are more likely to have positive intentions to continue using them in the future. Perceived of value encompasses various factors, such as the convenience and efficiency of the app, the quality and variety of available food options, competitive pricing, and the overall user experience. When consumers perceive that using a FDA brings them convenience by saving time and effort compared to traditional methods of ordering food, it increases their perceived value. Moreover, if the app offers a wide range of food options, including different cuisines and dietary preferences, it enhances the perceived of value as users have more choices to suit their preferences and cravings.

H8 examined the association between the satisfaction and continued intention to use FDAs. The results of this study (refer to Table 7) indicate a significant correlation, aligning with previous research in the field [75,119,120]. This finding suggests that satisfaction plays a crucial role in determining consumers' continued intention to use food delivery apps (FDAs). When users are satisfied with their overall experience using an FDA, they are more likely to develop a positive attitude towards the app and express a desire to continue using it in the future.

Hypotheses H9 and H11 examined the relationship between satisfaction, continued intention to use, and positive eWOM. The results indicated that both satisfaction and continued intention to use have a positive influence on positive eWOM, with satisfaction exhibiting the strongest impact on positive eWOM. The impact of satisfaction on positive eWOM was found to be even greater than that of promotion. These findings align with previous research and confirm the predicted relationships [121–123]. Satisfaction plays a significant role in shaping users' intention to continue using FDAs. When users are satisfied with their experience using an FDA, they are more likely to have positive attitudes towards the app and express a desire to continue using it. This satisfaction stems from factors such as the quality of service, timely delivery, user-friendly interface, personalized experiences, and effective customer support. Besides, when users have a strong intention to continue using FDAs, they are more likely to engage in positive eWOM, which involves sharing favorable experiences, recommendations, and reviews about the app with others. Users who have a positive experience with an FDA and intend to use it again in the future are more likely to spread positive word-of-mouth about the app to their friends, family, and colleagues. The continued intention to use an FDA serves as a form of endorsement and credibility for potential users who receive the positive eWOM. When individuals see others expressing their intention to continue using the app and sharing positive experiences, it creates a sense of trust and reliability, which can significantly influence their decision to try the app themselves.

### 5.1. Theoretical implications

This study stands out as one of the initial research endeavors that extend the Technology Acceptance Model (TAM) and integrate the Stimulus-Organism-Reaction (SOR) theory. By doing so, it offers a comprehensive understanding of the underlying mechanisms that influence satisfaction, continued intention to use, and positive electronic word-of-mouth (eWOM) in the context of FDAs. As posited by several scholars, constructing diverse and complex models is essential for making theoretical contributions to the field, as human behavior is multifaceted and often changes with the environment [109,110].

This study has provided a novel framework that can serve as a foundation for future research in the field. The framework exhibited a strong predictive capability, as evidenced by the high R-squared and Q-squared evaluation criteria. Furthermore, this model proved superior in explaining the Continued intention to use (CIU) compared to previous studies [112,124,125].

The current study is groundbreaking in its integration of three essential variables - Task technology fit, Information quality, and Promotion - within the stimulus factors based on the SOR theory, to elucidate the relationships among satisfaction, continued intention to use FDAs, loyalty, and positive eWOM among FDA users. To the best of our knowledge, no previous study has explored these variables simultaneously in the context of technology adoption. The inclusion of these variables in the study design provides a comprehensive understanding of the complex relationships between various factors that influence satisfaction, users' loyalty and Positive eWOM about FDAs.

### 5.2. Practical implications

These findings have significant implications for practitioners in FDAs, highlighting the importance of considering Promotion as a crucial factor in shaping users' perceptions of cost and their willingness to adopt and continue using the technology. By employing effective promotion strategies, practitioners can overcome the cost barrier and increase user acceptance and utilization of the technology, leading to improved outcomes and increased competitive advantage [126]. Moreover, these findings offer valuable insights for future research endeavors aimed at explicating the complex relationship between Promotion and technology adoption, underscoring the need for further exploration in this area.

The present study has several practical implications for SMEs, sellers, and platforms seeking to leverage digital transformation to improve their business performance. First and foremost, SMEs can enhance their competitive advantage by leveraging available platforms, which can help them attract potential customers, especially digital customers, in the rapidly growing digital market. This strategy can be especially beneficial for SMEs lacking in capital, technology, and human resources [127]. Moreover, by adopting this strategy, SMEs can improve their business performance, regardless of adverse environmental contexts.

Sellers and platforms can also enhance their information quality to attract and retain customers. Investing in high-quality images, reliable content, and other relevant information can be an effective strategy for enhancing information quality. Platforms can also develop features like like-buttons for images and articles to understand which content is receiving the most support. Such insights can help them develop suitable strategies and adjust their content to provide better quality content. Furthermore, platforms should moderate relevant and quality content to ensure customer satisfaction and enhance ease-of-use when customers use food delivery apps to order food online.

While the use of promotion has been proven to have a significant impact on perceived value and positive eWOM, SMEs and sellers should ensure a reasonable balance of resources and time to optimize their resources for the best results. Therefore, practitioners should carefully consider the best strategies and allocate their resources efficiently to maximize the benefits of their promotional efforts. By doing so, they can enhance their customers' experience, improve their business performance, and gain a competitive edge in the market.

### 5.3. Limitations

While this study has made substantial contributions to theoretical and practical aspects, it is important to acknowledge its limitations. Firstly, the data collected for this research was restricted to FDA users in Danang, Vietnam, focusing primarily on university students who constitute the main user group within the context of a developing country [128]. This targeted population provides valuable insights into the uses of FDAs. However, it is important to note that this specific focus on university students limits the generalizability of the findings to other populations and contexts. Furthermore, although this study examines multiple factors and their effects on satisfaction, loyalty, and positive eWOM within the framework of SOR theory, it is crucial to acknowledge the potential influence of additional factors. Constructs such as brand perception, food quality should be incorporated in future research to establish a more comprehensive and holistic model.

### 5.4. Conclusion and prospects for future research

This research extended the Technology Acceptance Model (TAM) and incorporated the Stimulus-Organism-Reaction (SOR) theory to provide a comprehensive understanding of the underlying mechanisms that shape satisfaction, continued intention to use, and positive electronic word-of-mouth (eWOM) regarding FDAs. The study adopted a quantitative approach, surveying a sample of 346 FDA users. This study utilized an eight-factor structure representing different aspects of FDA usage, namely information quality, task-technology fit, promotion, ease-of-use, perceived value, satisfaction, continued intention to use, and positive eWOM. The measurement model demonstrated good convergent and divergent validity, as well as sufficient construct reliability.

The findings of this study offer theoretical and practical implications for various stakeholders, including FDA service providers, small and medium-sized enterprises (SMEs) in the food industry. Overall, this study significantly contributes to the existing literature by providing valuable insights into the factors influencing FDA usage and their impact on satisfaction, continued intention to use, and positive eWOM. It lays the groundwork for further research in this emerging field and offers practical implications for stakeholders involved in the development, management, and utilization of FDAs.

The research presented in this study offers several opportunities for future studies to further investigate and expand upon the findings. Firstly, while the study focused on students from a city in central Vietnam, future studies could be conducted in other Vietnamese cities or in countries with similar levels of development to strengthen and review the findings of the study. This would allow for a broader perspective on the impact of Task technology fit, Information quality, and Promotion on customer behavior in different contexts. Secondly, other studies could be carried out in developed countries to determine whether any differences exist in moderating variables such as income, usage time, and number of connected devices, which could lead to new discoveries and insights. Thirdly, while the study focused on Gen Z subjects who typically have good technology knowledge, future studies could also focus on older individuals with low technology proficiency to compare satisfaction, loyalty, and Positive eWOM. This would enable researchers to understand how technology adoption and behavior vary across different age groups and levels of technology proficiency. Finally, while the scales used in this study have been shown to be effective, more studies with larger samples are needed to validate the scales and apply them to general technology services. This would help to ensure that the scales are reliable and valid across different technology contexts, allowing for broader applications in future research.

### Ethics statements

We duly solicited consent from all respondents of the survey, which was obtained through a comprehensive explanation of the study's purpose and nature. Additionally, we rigorously upheld the anonymity of the respondents to safeguard against the tracing of any personally identifiable information to any particular individual.

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### Author contribution statement

Ha Hoang: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Le Tan Trinh: Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

## Data availability statement

Data will be made available on request.

## Additional information

No additional information is available for this paper.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Appendix A

Construct		Measurement items	Sources
Task-Technology Fit (TTF)	TTF1	The functions of FDAs support the management of ordering and receiving foods.	[129,130]
	TTF2	The functions of FDAs fully meet my requirements for ordering and receiving foods.	
	TTF3	The functions of FDAs help me to keep my distance from others to protect myself.	
	TTF4	Overall the FDA functions completely met my need to order food online.	
Ease-of-use (EU)	EOU1	It's easy to use FDAs	[5,131]
	EOU2	The ordering process on FDAs was very easy for me.	
	EOU3	FDAs are very clear and easy to understand	
	EOU4	Learning how to use FDAs is easy.	
Perceived of value (POV)	POV1	Food on FDAs is reasonably priced.	[132–134]
	POV2	The quality of food on FDAs corresponds to the money spent	
	POV3	Currently, FDAs offer good prices.	
	POV4	I believe I can save money using FDAs	
	POV5	FDAs save me money by comparing prices between different stores.	
Continued Intention to use (CIU)	CIU1	I look forward to using FDAs more in the future.	[135,136]
	CIU2	I plan to use FDAs in the future.	
	CIU3	If there is a chance, I will use FDAs to buy foods.	
	CIU4	I will try to use FDAs.	
	CIU5	I will frequently use FDAs.	
Information quality (INQ)	INQ1	FDAs allows me to search and get the information I need quickly and efficiently.	[137]
	INQ2	The information provided by FDAs is accurate and reliable.	
	INQ3	The information provided by FDAs is easy to understand and clear.	
	INQ4	FDAs helps me get real-time updates.	
Satisfaction (SAT)	SAT1	I am completely satisfied when I buy food on FDAs.	[138,139]
	SAT2	I think buying food on FDAs is the right decision.	
	SAT3	I am very satisfied with the service provided by FDAs.	
	SA4	I am very satisfied with the food purchased on FDAs.	
Positive eWOM (PEW)	PEW1	I am willing to provide positive information about FDAs to internet users.	[140,141]
	PEW2	I am ready to actively recommend FDAs to relatives and friends on social networks.	
	PEW3	I am willing to share positive information about FDAs on the internet.	
	PEW4	I'm open to positive reviews and discussions about FDAs.	
Promotion (PRM)	PRM1	There are many promotional programs when using FDAs.	[48]
	PRM2	I am very interested in promotions and offers when using FDAs.	
	PRM3	FDAs bring many benefits to me thanks to the accompanying offers.	
	PRM4	I like to search for promotions at different online stores when buying food on FDAs.	

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