



Article

Factors Determining the Behavioral Intention of Using Food Delivery Apps during COVID-19 Pandemics

Chaiyawit Muangmee ¹, Sebastian Kot ^{2,3,*} , Nusanee Meekaewkunchorn ¹ , Nuttapon Kassakorn ¹ and Bilal Khalid ⁴

¹ Faculty of Management Sciences, Bansomdejchaopraya Rajabhat University, Bangkok 10600, Thailand; Chaiyawit.m@bsru.ac.th (C.M.); nusanee.me@bsru.ac.th (N.M.); n.kassakorn@gmail.com (N.K.)

² Faculty of Management, Czestochowa University of Technology, 42-201 Czestochowa, Poland

³ College of Business and Economics, University of Johannesburg, Johannesburg 2092, South Africa

⁴ KMITL Business School, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand; khalidb9998@gmail.com

* Correspondence: sebastian.kot@wz.pcz.pl

Abstract: The purpose of this study was to investigate the factors determining the behavioral intention of using food delivery apps (FDAs) during COVID-19 pandemics, under a case study of Bangkok, Thailand. The study was necessitated by the increased use of FDAs during the lockdown; online transactions were considered important in preventing the spread of the virus. The study used quantitative techniques involving structural equation model (SEM) to evaluate the effects of exogenous variables on endogenous variables. Primary data were collected from people who had installed and used FDAs. The findings indicated that performance expectancy, effort expectancy, social influence, timeliness, task technology fit, perceived trust, and perceived safety significantly influence the behavioral intention to use (BIU) to use food delivery apps during the COVID-19 pandemic. To this end, effort should be intensified to study and understand FDAs as it pertains to safety and usage.

Keywords: food delivery apps (FDAs); COVID-19; online transactions; behavioral intention; internet; food online; lockdown



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1. Introduction

The use of the internet in sales and purchases of goods and services has registered a significant and heterogeneous diffusion among varied products, countries, and different areas of concern, especially in the field of bio-economy [1–3]. The increase in the use of the internet as a platform facilitating the exchange of goods and services is facilitated by the increasing number of e-commerce websites, mobile commerce (m-commerce) applications, instant payment systems, and mobile payment systems [4]. Online to offline (O2O) refers to a form of online food delivery service, where the consumers see and are interested in a product online and move forward to complete the transactions offline. Online food delivery platforms are one of the systems which have significantly been influenced by e-commerce and the use of the internet to conduct online transactions.

All over the world, the rise and the use of food delivery applications and platforms have revolutionized the manner in which food suppliers and consumers interact. The food delivery applications (FDAs) refer to an online-to-offline mobile service, that provides a means for convenient and efficient online ordering and offline delivery of goods and services. The use and the revenues generated from FDAs have been experiencing an increasing trend over the years. The global FDA revenue in 2018 was 95.4 billion USD and increased to 107.4 billion USD in 2019 [4]. The revenue is expected to increase to 164.5 billion USD by the year 2024 [5].

Meanwhile, the rise and the spread of coronavirus (COVID-19) resulted in a global pandemic [6–10], leading to a global infection of approximately 5 million confirmed cases

according to the World Health Organization (WHO) as of May 2020. By February 2021, the confirmed cases were approximately 106 million, with more than 2.32 million deaths. During this period of the COVID-19 crisis, various preventive measures have been adopted in various countries. These include wearing masks, maintaining social distancing, and self-isolations to prevent direct contact between people. These measures were to ensure the reduction of the spread of COVID-19 as much as possible [11–13].

There was an increase in online transactions and the use of FDAs as a result of the measures adopting the use of cashless transactions for the purchase of goods and services to avoid direct contact between people [14–16]. The consumption and the transaction habits have accelerated from the traditional cash and in-store services towards online-to-offline services, facilitated by online payment platforms and applications, including FDAs. In Thailand, according to Rakuten Insight, 58% of the respondents interviewed ordered more food using FDAs during the COVID-19 pandemic [17]. The rapid increase of the adoption of cashless payment methods in Thailand has led to the establishment of additional FDAs, such as Robinhood, which was launched by Siam Commercial Bank (SCB), a financial service provider in Thailand [18]. FDAs are also boosted by the shift from the cash-on-delivery mode of payment, which was common between 2016 and 2018, towards mobile payment, digital wallets, and card payments that are dominating amid the COVID-19 pandemic.

It is important for the involved stakeholders to understand the factors that influence the continuous use of FDAs by the customers during the COVID-19 pandemics. Inferring from [19–21], the main factor that influences FDAs use by customers is their performance expectancy. Other factors that influence adoption and use of FDAs include easiness of use, quality of service, convenience of use, social influence, and satisfaction [22–24]. Though several studies have been conducted to investigate the behavioral intention to use FDAs, there are scarce studies that have investigated the topic within the midst of the COVID-19 pandemic in Thailand. Therefore, this research intends to fill the research gaps by determining the factors determining the behavioral intention of using food delivery apps during the COVID-19 pandemic under a case study of Bangkok, Thailand. The study by Ray et al. [24] empirically examined the aims and the justifications for utilizing FDAs. Using a mixed-method research that included open-ended questions and survey questionnaires, their research was grounded on the uses and gratification theory. They identified eight distinct uses and gratifications of using FDAs, some which include customer experience, delivery experience, convenience, quality control, societal pressure, ease of use, search of restaurants, and listing. Their results portrayed that customer experience, search of restaurants, ease of use, and listing were the significant precursors of intentions to use FDAs. This research employed the unified theory of use and acceptance of technology (UTAUT) model, including performance expectancy, effort expectancy, social influence, timeliness, task technology fit, perceived trust, perceived safety, and behavioral intention.

1.1. Food Delivery Apps (FDAs)

FDAs are an emerging mobile technology offering a platform between the catering businesses and the customers through an online-to-offline integration delivery service. The FDA's operation occurs in two ways, where the catering businesses such as KFC Corporation work with online intermediaries such as Uber Eats to provide online-to-offline delivery services [25]. The delivery process involves customers ordering online through third-party online intermediaries, and the catering businesses deliver the food to the customers' doorsteps. The whole process involves contactless delivery for the customers.

The increased use of FDAs can be attributed to the changing consumer habits and demographics. Many young consumers are increasingly becoming unwilling to stand in queues in restaurants for food services. The food apps offer a solution to the changing consumer behavior and promote the convenience of eating at home. According to [26], the number of global mobile users increased in 2020 to 5.1 billion users. Similarly, many mobile services are developed and used in different industries [27]. Revenue from the

food delivery services is a billion-dollar industry, with China generating one-third of the global revenue from FDAs estimated at \$95 billion in 2019. Revenue from the food delivery services is expected to increase in the coming years, expanding to an estimated \$164 billion by 2024 [5]. Food delivery services through online apps have become a global trend, with China leading the way in the market share. The growth of the food delivery services to new markets is based on the cultivation of consumer eating habits [28] and evolving fashion trends [29]. In Thailand, for instance, the food delivery services Food Panda, Grab, Lineman, Gojeck, Lalamove, etc., have penetrated the market by offering large discounts and free delivery [30].

1.2. Effects of COVID-19 on Online Delivery Business

The COVID-19 pandemic had a negative influence on the catering industry due to the safety regulations which prohibited direct contact and the practice of social distancing for reducing the risk of transmission. However, the pandemic changed many customers' eating habits, accelerating the need for online food delivery services. According to [25], there was an increase in the number of customers using FDAs during the COVID-19 pandemic period in China, averaging 71% between February and March 2020. Many of the FDA's participants considered the services a way to limit the number of trips outside and reduce the risk of transmission of the COVID-19 disease [31].

The growth opportunity for the online delivery business during the COVID-19 pandemic is based on the growth in the number of customers seeking food delivery services and online platforms' availability collaborating with the catering businesses. The customers were willing to pay higher delivery fees, while the delivery riders were willing to accept low wages due to the unavailability of alternative jobs. Similarly, the unavailability of alternative jobs led to the charging of high fees by the online intermediaries to increase their sales that were affected by the pandemic regulations [28]. During the pandemic, the online platforms meet the mode of online-to-offline services offered by FDAs while satisfying the customers' convenience demands and safety concerns.

2. Materials and Methods

UTAUT Model

The unified theory of use and acceptance of technology (UTAUT) predicts users' behavioral intentions toward new technologies. Various determinants can be used to determine the technology usage intentions and behavior; for instance, gender, age, voluntariness, and experience are some of the determinants of user behavior [26]. The theory highlights key constructs towards user behavior and acceptance, including performance expectancy, effort expectancy, social influence, and facilitating conditions. The UTAUT model can therefore be applied together with other variables to determine the factors influencing the FDA users' behavior and acceptance.

Performance expectancy under the UTAUT model involves the user's level of belief that the technology will improve performance in particular activities. The performance expectancy can therefore be used to determine the user's likeliness to adopt new technology [32]. Thus, using the performance expectancy concept to determine users' acceptance intention to FDAs indicates greater intentions [33]. The aim of using FDAs by many consumers includes the convenience of food delivery to their doorsteps at any time and the increased transparency in pricing, among other benefits. The performance expectancy of the FDAs affected the continuation of their use due to the closing of the satisfaction gap during the COVID-19 pandemic.

Hypothesis 1 (H1). *Performance expectancy (PE) positively affects behavioral intention to use (BIU) FDAs during the COVID-19 pandemic.*

The effort expectancy is another determinant variable of the UTAUT theory, which involves the level of association of use of particular technology with the users. The effort expectancy can be used to determine the continued use of technology based on its perceived easiness of use [34]. FDAs are often easy to use as they involve few steps and offer multiple choices of payments. Effort expectancy positively affects the use of particular new technologies and, in this case, indicates a continued intention of use of FDAs by the users. However, in the long term, increasing the familiarization of the users with the new technologies does not directly affect its continued use.

Hypothesis 2 (H2). *Effort expectancy (EE) positively affects behavioral intention to use (BIU) FDAs during the COVID-19 pandemic.*

Social influence is another determinant of behavior and intention of use of new technology. Social influence involves users gaining willingness to try new technologies from others, including friends, colleagues, and families. The social influence has a positive effect on the user's intentions to use new technologies [34–36]. Thus, this determinant can determine the user's intention of continued use of the FDA. According to [37], the growing number of mobile social networks has increased the social influence on the use of new mobile technologies, including FDAs. The increased social influence is, however, pegged on the positive effects on the user's satisfaction.

Hypothesis 3 (H3). *Social influence (SI) positively affects behavioral intention to use (BIU) FDAs during the COVID-19 pandemic.*

Timeliness is another important determinant of behavior and intention of use of new technology by the users. According to [28], timely diffusion of technology influences the willingness and the intention to use the technology. The mobile industry has been growing at an increasing pace, with the business industries integrating mobile apps into their business operations. The timeliness of diffusion of FDAs during the COVID-19 pandemic had a positive effect on the intention of continued use and influences user behavior towards continued use.

Hypothesis 4 (H4). *Timeliness (TM) positively affects behavioral intention to use (BIU) FDAs during the COVID-19 pandemic.*

The task-technology fit is a technology effectiveness theory that articulates that the effectiveness of new technology can be determined through the assessment of the relationship between the technology and the tasks supported. Based on the task-technology fit (TTF) model, new users are likely to have a positive impact with new technologies if the technology's performance matches the tasks that the user hopes to perform [38]. Various factors can be used to measure the level of task-technology fit, including systems reliability, compatibility, ease of use, quality, and the relationship with the user.

The perceived task-technology fit is an important measure of the user's behavior intentions towards new technologies. Inferring from [39], high fitness of the technology's performance with the user's tasks leads to a positive adoption of the new technologies. Thus, determining the adoption of the users with FDAs can also be determined by the performance of customer's tasks by the FDA. During the COVID-19 pandemic, many consumers had limited mobility due to lockdown regulations and limited contacts to limit the spread of the disease. The need for new food delivery technology thus could perform tasks which the users had limited ability to perform, such as easy access to food, reduced queuing to order food in restaurants, and the ability to access the online delivery services at any time. The perceived task-technology fit had a positive impact on the continued intention of users to use FDAs during the pandemic, as it successfully performed the user's intended tasks.

Hypothesis 5 (H5). *Task-technology fit (TT) positively affects behavioral intention to use (BIU) FDAs during the COVID-19 pandemic.*

Perceived trust can be used as a measure of determining the behavioral intention of using new technology as it involves the state of individuals' faith regarding a particular technology. The individuals' faith intentions are often followed by other behavior, such as integrity [28,40]. In determining the behavior leading to the use of FDAs during the COVID-19 pandemic, the level of integrity accorded by FDAs could have led to the development of trust by the users and indication of a continued behavior to use the applications. Indeed, the operation of FDAs is simple and includes not only the convenience of placing an online food order for delivery to the doorstep but also the increased transparency in pricing with no hidden charges and the provision of multiple ways for payment. The increased integrity has a positive effect on the user's trust and influences the continued intention of use of the FDAs.

Hypothesis 6 (H6). *Perceived trust (PT) positively affects behavioral intention to use (BIU) FDAs during the COVID-19 pandemic.*

Perceived safety was the other factor determining the customer's continued use of FDAs during the COVID-19 pandemic. Safety concerns during the COVID-19 pandemic include reducing the risk of transmission of the COVID-19 disease. Studies of Teo et al. [41] and Rashid et al. [42] highlight the importance of safety as a consideration when adopting new technologies. The food delivery services performed excellently, promoting user safety through encouraging contactless deliveries in a bid to observe the social distancing rules. Other safety measures promoted by FDAs involved cashless transactions and the practice of high hygiene through regular sanitization. The increased perceived safety has a positive impact on the user's behavioral intentions for continued use of the FDA's.

Hypothesis 7 (H7). *Perceived safety (PS) positively affects behavioral intention to use (BIU) FDAs during the COVID-19 pandemic.*

Behavioral intention involves individual attitudes towards particular technology. The individual's intention to accept new technology is based on the technology's abilities to be useful. The degree to which a user considers a particular technology as being useful involves the belief of being free of effort. Thus, the positive behavioral intention towards FDAs depends on the belief of users for the apps to be useful. FDAs come with various benefits to the users, including reduced hustle of queuing for food in restaurants and the convenience of ordering food at any time [43,44]. The COVID-19 pandemic period is coupled with various limitations, including lockdowns and the need for social distancing regulations. The FDAs thus have a positive effect on the behavioral intentions of the users as the apps offer them effortless services to their convenience.

Based on the research conducted in the literature review and the proposed hypothesis developed above, the research model was developed and is graphically illustrated in Figure 1 below.

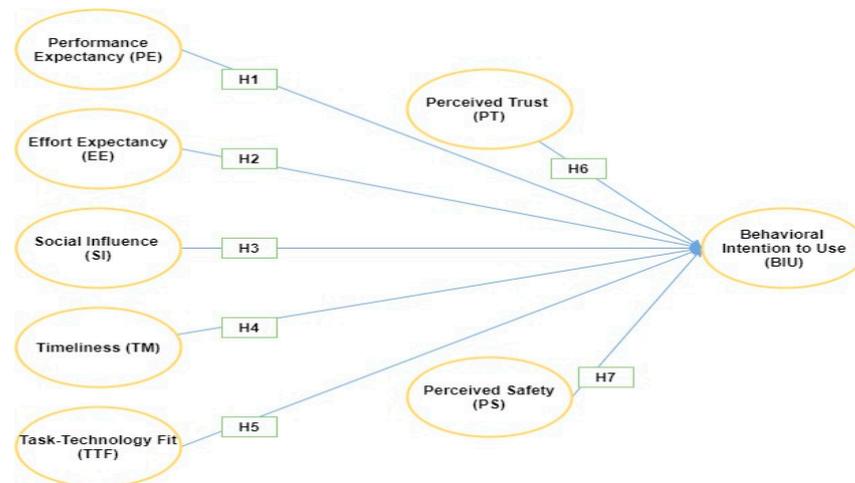


Figure 1. Proposed research model.

Based on the findings of the previous studies, and as shown in the above conceptual framework, a total of eight factors were used in this study. The items for performance expectancy (PE), effort expectancy (EE), social influence, and behavioral intention to use (BIU) were adopted from the works of Venkatesh et al. [45], San Martín and Herrero [46], and Escobar-Rodriguez and Carvajal-Trujillo [47]. Other items for factors such as task-technology fit (TT), perceived safety (PS), perceived risk (PR), and timeliness (TM) were developed with reference to previous studies from Shahbaz et al. [48] and Ponte [49].

The research used the questionnaire to collect the data used to validate the applied conceptual model and examine the proposed research hypothesis. The questionnaire was made of two sections. The first section consisted of the demographic statistics, which included gender, age, education levels, and occupation concerning the use of FDAs during the COVID-19 pandemic. The second section of the questionnaire composed a collection of data from the study constructs developed from literature review. The variables used included PE, EE, SI, TM, TT, PT, PS, and BIU. To collect the data, five-point Likert scale was applied, which included the measurement ranging from 1 = strongly disagree to 5 = strongly agree.

The specific targets of this research were the people who adopted the use of FDAs during the period of COVID-19 in Bangkok, Thailand. The questionnaire was developed in a native Thailand language to make sure there were no language barriers and to guarantee quality data. The data were collected using the convenience sampling technique from different districts in Bangkok where FDAs were used. In the process of data collection, a total of 550 questionnaires were distributed to the sample respondents. From the sample, 434 questionnaires were filled and returned. The data were collected between 12 December 2020 and 1 February 2021. After evaluating, the data were collected, removing the missing values and the outliers, and a total of 402 valid responses were considered satisfactory for research. The data were primarily collected from Bangkok city, the capital city of Thailand. The data analysis involved carrying out the descriptive statistics, evaluating the reliability and the validity of the data and the analysis using structural equation modeling (SEM) using AMOS Version 26.2.2. Reliability and Validity

Before conducting the actual analysis of evaluating the hypothesis, this study conducted an evaluation of the model through reliability and validity analyses. The validity analysis was conducted using average variance extracted (AVE), while the reliability analysis was conducted through the construct reliability (CR). AMOS 26 was applied to conduct the analysis. The applied CR and AVE formulas are presented below.

$$AVE = \frac{\sum (\text{Standardized Factor Loading}^2)}{\text{Number of Indicators}}$$

$$CR = \frac{(\sum \text{Standardied Loading})^2}{(\sum \text{Standardied Loading})^2 + \sum (ME)}$$

Table 1 below shows the variables used for the study, their factor loadings, the estimates indicators, the CR, and the AVE. The threshold used for the analysis was that the AVE should be greater than 0.5 [50], the factor loadings should be greater than 0.5, while the CR should be greater than 0.6 [51–54]. From the results obtained, all three thresholds were achieved, which implied that reliability and validity levels of the model and the constructs used were satisfactory.

Table 1. Reliability and validity analysis of the model.

| | | Estimates | CR | AVE |
|-----------------------------|------|-----------|--------|---------|
| Performance Expectancy | PE3 | 0.723 | 0.7281 | 0.72199 |
| | PE2 | 0.898 | | |
| | PE1 | 0.821 | | |
| Effort Expectancy | EE3 | 0.721 | 0.8727 | 0.7281 |
| | EE2 | 0.821 | | |
| | EE1 | 0.823 | | |
| Social Influence | SI3 | 0.898 | 0.8781 | 0.6332 |
| | SI2 | 0.723 | | |
| | SI1 | 0.834 | | |
| Timeliness | TM3 | 0.882 | 0.7894 | 0.7792 |
| | TM2 | 0.872 | | |
| | TM1 | 0.723 | | |
| Task-Technology Fit | TT1 | 0.836 | 0.8393 | 0.6892 |
| | TT2 | 0.792 | | |
| | TT3 | 0.872 | | |
| Behavioral Intention to Use | BIU1 | 0.632 | 0.6728 | 0.5289 |
| | BIU2 | 0.723 | | |
| | BIU3 | 0.628 | | |
| Perceived Trust | PT1 | 0.881 | 0.6922 | 0.5287 |
| | PT2 | 0.755 | | |
| | PT3 | 0.729 | | |
| Perceived Safety | PS1 | 0.792 | 0.8745 | 0.7278 |
| | PS2 | 0.729 | | |

Source: research data. CR: construct reliability; AVE: average variance extracted.

3. Results

The survey sample elicited primary data from people who had installed and used FDAs during the time of data collection. Use of FDAs is important because it purposively selects only those knowledgeable on the subject matter and can provide insights that would illuminate deployment and adoption of FDAs by the general public. A total of 402 questionnaires were retrieved and analyzed for the study. The demographic data of the respondents are presented in Table 2.

Table 2. Frequency analysis.

| | | N | Percentage |
|------------------|------------------------|-----|------------|
| Gender | Male | 192 | 48 |
| | Female | 210 | 52 |
| Age | Below 21 | 121 | 30 |
| | 21–30 | 217 | 54 |
| | 31–40 | 36 | 9 |
| | Above 40 | 28 | 7 |
| Education level | High School | 24 | 6 |
| | Bachelor’s Degree | 265 | 66 |
| | Master’s Degree | 81 | 20 |
| | PhD | 32 | 8 |
| Frequency of use | 0–3 times per week | 76 | 55 |
| | Above 3 times per week | 121 | 45 |
| Total | | 402 | 100 |

Source: research data. N: number

3.1. Participants Demographics

The demographic distribution of the respondents is presented in Table 2; it shows that 48% of the respondents were female while 52% were male. Considering the age of the respondents, 30% were aged below 21 years, 54% between 21–30 years, 9% between ages 31–40, while 9% were those above 40 years. This shows that most of the respondents were youths, who depicted a good experience with using food delivery apps.

Considering the education of the respondents, 6% were in high school, 66% were bachelors/college category, 20% were in masters, while 8% had PhDs. The largest proportion was composed of those with bachelor of college education. Another aspect investigated was the frequency of the use of a food delivery app every week during the pandemic. The results indicated that 55% used the app between 0–3 times per week, while 45% indicated above three times per week.

3.2. Model Results

After getting satisfactory results on the suitability of the model and the constructs, the next step was to evaluate the model based on the hypothesis of the research. The research sought to evaluate seven hypotheses, which were investigated to determine the behavioral intention of using FDAs during the COVID-19 pandemic under a case study of Bangkok, Thailand.

From the results presented in the Table 3, BIU to use FDAs during the COVID-19 pandemic was influenced by: EE ($\beta = 0.311, p < 0.05$); SI ($\beta = 0.207, p < 0.05$); TT ($\beta = 0.491, p < 0.05$); PE ($\beta = 0.106, p < 0.05$); PS ($\beta = 0.305, p < 0.05$); TM ($\beta = 0.563, p < 0.05$); PT ($\beta = 0.444, p < 0.05$). This implies that all the variables under consideration (performance expectancy, effort expectancy, social influence, timeliness, task-technology fit, perceived trust, and perceived safety) significantly influenced the BIU to use FDAs during the COVID-19 pandemic. Comparing the effects of individual constructs, timeliness was found to have the highest effect ($\beta = 0.563$) on behavioral intention to use FDAs, followed by task-technology fit ($\beta = 0.491$) and then perceived trust ($\beta = 0.444$). The path model of the analysis is also presented in the graph below.

Table 3. Effects of independent variables on the dependent variable.

| | Relationship | Beta (β) | S.E | CR | p-Value |
|-----|--------------|------------------|-------|--------|---------|
| BIU | ← EE | 0.311 | 0.013 | 10.957 | *** |
| BIU | ← SI | 0.207 | 0.012 | 7.744 | *** |
| BIU | ← TT | 0.491 | 0.016 | 14.694 | *** |
| BIU | ← PE | 0.106 | 0.011 | 4.289 | *** |
| BIU | ← PS | 0.305 | 0.014 | 9.744 | *** |
| BIU | ← TM | 0.563 | 0.015 | 16.338 | *** |
| BIU | ← PT | 0.444 | 0.013 | 14.324 | *** |

Note: *** = $p < 0.01$. Source: research data. Note: performance expectancy (PE), effort expectancy (EE), social influence (SI), timeliness (TM), task-technology fit (TT), perceived trust (PT), perceived safety (PS), and behavioral intention to use (BIU).

This study focused on investigating the factors determining the behavioral intention of using FDAs during the COVID-19 pandemic under a case study of Bangkok, Thailand. The study was guided by seven hypotheses developed from the critical review of the literature, and the research model was presented in Figure 2. The evaluation of the hypothesis and whether they were accepted or rejected after conducting the data analysis is presented in Table 4.

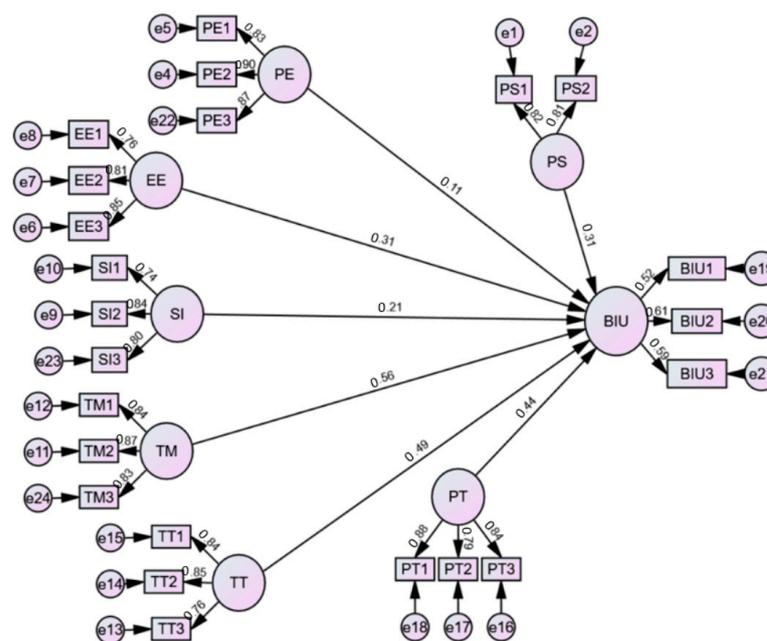


Figure 2. Evaluation of the research model.

Table 4. Evaluation of study hypotheses.

| Hypothesis | Relationship | Beta (β) | p-Value | Accepted/Rejected |
|-------------------|--------------|------------------|---------|-------------------|
| Hypothesis 2 (H2) | BIU ← EE | 0.311 | *** | Accepted |
| Hypothesis 3 (H3) | BIU ← SI | 0.207 | *** | Accepted |
| Hypothesis 5 (H5) | BIU ← TTF | 0.491 | *** | Accepted |
| Hypothesis 1 (H1) | BIU ← PE | 0.106 | *** | Accepted |
| Hypothesis 7 (H7) | BIU ← PS | 0.305 | *** | Accepted |
| Hypothesis 4 (H4) | BIU ← TM | 0.563 | *** | Accepted |
| Hypothesis 6 (H6) | BIU ← PT | 0.444 | *** | Accepted |

Note: *** = $p < 0.01$. Source: research data.

4. Discussions

From the evaluation of the table presented above, all seven hypotheses were accepted. This implied that the behavioral intention of using FDAs during the COVID-19 pandemic is influenced by performance expectancy, effort expectancy, social influence, timeliness, task-technology fit, perceived trust, and perceived safety. These findings could be compared with previous research that were conducted in the same area of study. The study of Ray et al. [24] investigated why people use FDAs by applying the gratification theory perspective. The study found out that performance expectancy, customer experience, searching for restaurants, and ease of use influenced behavioral intention to use FDAs. It is therefore paramount to ensure that FDAs are designed for customers to find a gratification for using the apps, and, in the process, a need is created which transforms into a way of life and profits for the owners of food delivery business with the sustenance of the venture overtime. There should be an ease of use when it comes to application and deployment of such apps, as much information as possible should be provided to satisfy consumer curiosity and inquisitiveness in order to activate a recommendation status for the business based on past experience by customers.

Relating this with the global scourge of the COVID-19 pandemic, which has seen many businesses rely more on online customers not only to meet the safety regulations of reducing human-to-human contact in order to minimize the risk of spreading the virus but also to reduce the deficit from months of lockdowns and restrictions placed on many businesses. In this regard, the study by [31] articulated how FDAs facilitated users' access to prepared meals, helped to keep restaurant owners in business despite the pains of lockdown, and mitigated the impact of the restrictions on income; without FDAs, most restaurant businesses would face bankruptcy and liquidation. In this instance, FDAs have served two purposes, the health benefits (minimizing human-to-human contacts) and the business benefits (keeping the businesses open where owners can get income that allows them to break even or make profit), which ensures the long-term sustainability of the business operations and the overall contribution to the gross domestic product (GDP) of the economy, whether in Thailand or in an oversea nation.

The technical aspect of any FDA is essential to the sustenance of the business. The study H5 accepted the positive correlation between TT and BIU; customers have to trust the technology and feel secure using it for them to repeat using the app. The security of customers' data should be a top priority for restaurants with long-term plans to continue being involved in online food delivery business. Studies of Li et al. [28] and Riana et al. [40] addressed the issue of integrity and how customers need to have faith in a technology to use it. Studies of Riana et al. [40] and Teo et al. [41] also touched on the importance of safety and promoting good hygiene from the technological adoption of using FDAs instead of physically visiting restaurants. Study of Elvandari et al. [29] observed the technical requirements for improving the quality of local online food delivery services. The findings of the research indicated that perceived technology-task fit, conditions of received order, friendliness, and politeness were technical requirements for improving the quality of local online food delivery. Similarly, the study of Cho et al. [23] investigated the differences in perception of FDAs between single-person and multi-person households. The findings of the study indicated that the different perceptions regarding FDAs include task-technology fit, perceived value, attitudes, and re-use intention.

The results have shown that variables such as PE, EE, SI, TM, TT, PT, and PS have a role to play in the BIU FDAs in Thailand. It must be recognized that business landscape is evolving from the human-to-human interactions to one that is solely technology dependent. Thus, businesses whose apps are technically deficient will find it hard to cope with the new realities on ground. Customers expect top level performance when they interact with online business, whether it is from the information point of view or customer service promptness. The business must make itself available within the shortest possible time to address customer enquiries and concerns, and technology should be adopted to accommodate as many sections of the populations as possible or the target demographic of the business

to create trust and security and ensure a continued use of the FDA and patronage of the business.

This study demonstrates the importance of the existing knowledge and the intention to use FDAs, particularly during the COVID-19 pandemic. The research indicates that behavioral intention to use FDAs is influenced by several factors, which needs to be considered by the managers responsible for driving forward sales and marketing of FDAs. Notably, the factors that influence the user's intention to use FDAs include performance expectancy, effort expectancy, social influence, timeliness, task-technology fit, perceived trust, and perceived safety. The study provides the users and the owners of FDAs the aspects that they should keep in mind to focus the overall FDAs technology on timeliness, task-technology fit, and perceived trust. It seems that the efficiency in terms of operational period and the appropriateness of technology in terms of its fit and perceived trust should be considered relevant as long as the improvement of FDAs and its performance is concerned. The study provides relevant information for the start-ups intending to venture into FDAs and other related delivery apps in the future, particularly during the COVID-19 pandemic.

5. Conclusions

The rise and the use of food delivery applications and platforms have revolutionized how food suppliers and consumers interact. Food delivery applications refer to an online-to-offline mobile service that provides a means for convenient and efficient online ordering and offline delivery of goods and services. In Thailand, especially in major cities such as Bangkok, the use and the revenues generated from FDAs have been experiencing an increasing trend over the years. This study sought to find out the factors determining the behavioral intention of using FDAs during the COVID-19 pandemic under a case study of Bangkok, Thailand. The study applied the UTAUT model, and the review of the literature led to the development of seven study hypotheses. The constructs of the study were PE, EE, SI, TM, TT, PT, PS, and BIU.

The study data were collected from the respondents in Bangkok who had used FDAs. From a total of 550 distributed questionnaires, the study considered 402 responses to be valid for analysis. Structural equation modeling technique was employed using AMOS 26. The findings of the study showed that performance expectancy, effort expectancy, social influence, timeliness, task-technology fit, perceived trust, and perceived safety significantly influence the behavioral intention to use FDAs during the COVID-19 pandemic. However, the most significant variables influencing intention to use FDAs were timeliness, task-technology fit, and perceived trust. The study was able to outline concerns and areas for managers and owners of food delivery businesses' online to improve on and things to consider when transitioning from in-person business to online business. The FDA has to be easy to use where potential customers can seamlessly locate items and place orders for the category of food items on display. It is also paramount that the security of the users in terms of sensitive data is protected; just as doors, windows, and walls serve as barriers to intrusion in the physical restaurant business setting, there should be a strong presence of online security to safeguard sensitive data of users, such as credit card information, which can leave the consumers vulnerable to various types of losses when exposed in a data breach.

This study is limited by the fact that it was only conducted in Bangkok, Thailand, and therefore, the application of the findings to a bigger scale should be applied with caution. Additionally, the study was conducted in reference to the COVID-19 pandemic, which limits the application of the findings to the behavioral intention to use FDAs within the pandemic period. Application of the findings in other non-pandemic periods should also be done with caution. The study proposes the future studies to consider applying different models such as Technology Acceptance Model (TAM) and additional variables such as perceived usefulness, price, and convenience motivation to evaluate the behavioral

intention of the use of FDA. Future studies can also investigate the roles demographic data such as age, education, gender, and income play in the behavioral intention of using FDAs.

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