

## Article

# Exploring Factors Affecting Consumer Behavioral Intentions toward Online Food Ordering in Thailand

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**Abstract:** Due to the COVID-19 epidemic, ordering food online has become very popular. This study used a structural equation model to analyze the indicators that influence the decision to order food through a food-delivery platform. The theory of planned behavior and the technology acceptance model were both used, along with a new factor, the task–technology fit (TTF) model, to study platform suitability. Data were collected using a questionnaire given to a group of 1320 consumers. The results showed that attitudes toward on-line delivery most significantly affected the behavioral intentions of the consumers, followed by subjective norms. Among attitudes, perceived ease of use was the most significant, followed by perceived usefulness and trust. The study's results revealed that TTF had the most significant impact on perceived ease of use, followed by perceived usefulness. This means that, if a food-ordering platform is deemed appropriate, consumers will continue to use it, and business sustainability will be enhanced.

**Keywords:** behavioral intention; consumer attitude; food-delivery platform; task–technology fit; sustainable development goals



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## 1. Introduction

The Internet has generated such convenience and speed [1] to our lives that our world has become an online world. In other words, the acceptance and use of the Internet is pervasive [2–4]. In 2018, Thais used the Internet on average 10 h and 5 min per day, an increase of 3 h and 30 min over the previous year. The five most popular Internet features were social media (96.3%), email (74.2%), information searching (70.8%), TV, other video entertainment, and music (60.7%) access, and shopping (51.3%). In addition, Thais completed more tasks online (69.1%), such as reserving hotel rooms, purchasing tickets, and paying for goods and services—including food delivery—compared to completing just 30.9% of these tasks offline. In 2017, the proportions were 52.5 and 47.5%, respectively. From 2014 to 2018, the Thai food-delivery business experienced average an annual growth of 7.7%, rising in value from THB 23,640 million to THB 31,814 million [5].

After the COVID-19 outbreak, Thai authorities imposed drastic measures, that included temporarily shutting down or restricting businesses. Restaurants were only allowed to sell food for takeout or delivery. In the first half of 2020, home delivery via on-line platforms increased by about 150% over the previous year. After the pandemic abated and restaurant dining resumed, the volume of home delivery food was not as high, but still higher than before the pandemic—66–68 million deliveries—for an annual growth of

78.0–84.0% [6]. Because the purchase of goods through apps is so fast and easy, online purchases also represent a growth opportunity for digital service businesses, such as food and parcel delivery. In particular, online food delivery increased more than three times compared to the same period of the previous year, a trend that is reflected in the use of Google to search for e-commerce and logistics, parcel delivery, and online food delivery [7].

Additionally, the food-service industry experienced growth amid the pandemic and associated lockdowns. In Thailand and elsewhere, the number of restaurants, couriers, and customers joining these platforms in 2020 increased dramatically. As a result, food-delivery platforms worldwide became more profitable [8].

From a review of the literature, most studies on online food delivery through applications focused on marketing mix, service satisfaction, and application selection factors: drone food delivery [9], channels that affect the intent to use food-delivery platforms (Taiwan) [10], consumer innovation motivations in drone food delivery before and after the outbreak [11], online food delivery (Bangladesh) [12], psychological advantages of using greener drone food-delivery services [13], customer satisfaction and continued intention to order online [14], predicting online food-delivery satisfaction and intention [15], comparison of food-delivery services and customer preferences [16], gaps in behavioral control, trust, and satisfaction in organic food consumption [17], risks of drone food delivery before and after the pandemic [11], anti-innovation perspectives related to food-ordering apps [18], the use of drone food delivery services [19], food ordering from fast-food restaurants (China) [20], sustainable digital food purchasing [21], web mining to evaluate the effect of food-delivery ordering on the consumer [22], eco-friendly and value-model drone food-delivery service, scrutinizing product involvement [23], application aesthetics in the use of a food-ordering application [24], the role of a food-ordering application in developing satisfaction and brand loyalty during the pandemic [25], and the behavioral intent of using food-delivery apps [26] and food delivery during the pandemic [27].

There have also been studies on the technology adoption model (TAM) examining customer attitudes regarding ordering food online [28], factors influencing the intent to use food delivery apps [29], reasons why consumers purchase food through a food-delivery application [30], acceptance of purchasing clothing via mobile devices (China) [31], attitudes and intentions of customers using smartphone chatbots for shopping [32], the TAM for mobile health care [33], online shopping behaviors of middle-aged adults [34], willingness of young consumers to purchase environmentally friendly products in developing countries [35], consumer attitudes and intentions toward healthy food (Norway) [36], healthy food purchase intentions (Korea), including the behavior of consumers toward buying organic milk [37], online food delivery using the TAM and the technology process and business (TPB) theory [38], the differences between Generation Y males and females regarding online auctions by applying TPB theory [39], and the role of social distancing in mobile shopping acceptance [40] using both the TAM and TPB.

This study used TPB, TAM, and TTF theories to evaluate consumers using online food ordering services. From the review of the past research, it was found that no researchers have conducted studies using all three theories; TPB and TAM have been studied together, but both of these methods only study consumer behavior. Therefore, this research further studies the TTF theory to determine whether or not the online food ordering application is suitable for online food ordering services. In this regard, entrepreneurs can use the research results to develop strategies to continuously encourage consumers to use the service. No research had been conducted on the use of TTF with the TAM and TPB. Research related to TTF for ordering food through apps has been concerned with the repeated use of food-delivery apps [41], consumers' attitudes and behavior toward Internet-enabled TV shopping [42], and extending the TAM–TTF theory through the application of telematics [43]. The three studies found that the TTF factor provided positive research results. Companies that operate a food-ordering application platform can apply our results to develop policies related to consumer demand. If more consumers turn to online food-ordering, such companies will generate more sales. A review of the research into food

delivery and sustainable development goals found that consumer behavior studies are still in the early stages (e.g., there was not much use for drone food delivery. As a result, business owners were required to do a significant amount of marketing [44]. The article “Supply Chain Sustainability During COVID-19: Last Mile Food Delivery in China” analyzed factors affecting consumer acceptance for sustainability in business operations [45], specifically, the last mile of online food delivery on the Glovo platform.

The research question for this study concerned factors affecting consumer behavioral intention of online food ordering in Thailand. For this evaluation, we used data collection and statistical model development. Section 2 is a literature review. Section 3 describes the research and methodology. Section 4 presents our findings. Section 5 is the discussion. Section 6 outlines our conclusion. Section 7 describes the limitations of our research.

## 2. Literature Review

### 2.1. Definitions about Food Delivery through Apps

Food-delivery apps are a part of a technology change known as “digital disruption.” They not only change consumer behavior, but also change restaurant business operations. In addition, they play an important role in expanding the food-delivery business. From 2014 to 2018, the average annual growth rate was around 10%, which is only 3–4% higher than the overall average annual restaurant growth rate [46].

Food-delivery apps (FDAs) are an emerging online to offline (O2O) mobile technology that mediates between catering organizations and customers through online ordering and offline delivery services. FDAs are classified into two types [47]: chain restaurants, such as KFC, Domino’s, and Pizza Hut, where customers can order online; and third-party platforms, such as Uber Eats, Zomato, and Baidu Waimai [48].

According to Wang [49], “Mobile food ordering apps are mobile apps that users can download and use as a convenient way to access restaurants, view menus, order and pay without interacting with restaurant staff.”

### 2.2. Theory of Planned Behavior (TPB)

TPB is a behavioral science theory that predicts and analyzes individual behavior [50]. It was developed from the theory of reasoned action (TRA) by Fishbein and Ajzen. It describes human behavior based on the premise that human beings are logical, use information systematically, and consider consequences before deciding to perform an action [51].

However, Ajzen [50] found that the TRA is of limited use for predicting behaviors over which an individual has incomplete volitional control. He or she is unable to decide whether to perform an action that requires other opportunities or resources, such as money, time, skills, or cooperation from others. In 1985, Ajzen proposed the TPB, which differed from the TRA by adding perceived behavior control. The theory further explained that individuals plan their behaviors, and that successful achievement results from the intent to control factors that obstruct behavior. Most behaviors are under volitional control, which consists of three factors: attitude, subjective norms, and perceived behavioral control.

Tandon, Kaur, Bhatt, Mäntymäki, and Dhir [30], and Troise, O’Driscoll, Tani, and Prisco [38] confirmed the studies which showed that the main predictor of a customer’s attitude toward online food delivery was behavioral intention toward online shopping. Several studies highlighted the use of apps to buy food and the importance of attitude (ATT) in explaining behavioral intention (BI) [9,19,52–56]. These factors were used to develop the following hypothesis:

**Hypothesis 1 (H1).** *Attitude positively influences the behavioral intention to order food online.*

The subjective norm (SN) is “the perception of social pressure to act or not to take action” [50]. It is also a factor related to using FDAs [48]. The researchers found a significant positive correlation between SN and BI in food-delivery services and online shopping [38,48,57]. Thus, the second hypothesis is stated as follows:

**Hypothesis 2 (H2).** *The subjective norm positively influences the behavioral intention to order food online.*

According to the TPB model, perceived behavioral control (PBC) may also influence BI [58]. PBC is defined as “a subjective level of control over the effectiveness of behavior itself.” Various studies have confirmed that PBC is a relevant factor in BI to order food online. For example, one study revealed the importance of considering PBC in BI analysis to buy food online [38]. Thus, the third hypothesis is stated as follows:

**Hypothesis 3 (H3).** *Perceived behavioral control positively influences the behavioral intention to order food online.*

In TPB, SN is the primary factor of ATT. When customers recognize that their friends, family, and other related parties have a positive attitude toward online food ordering, they will be more willing to receive such food. Several studies have found that this relationship is important for the acceptance of online or mobile food purchases [38,57]. Thus, the fourth hypothesis is stated as follows:

**Hypothesis 4 (H4).** *Subjective norms positively influence attitude toward ordering food online.*

### 2.3. Technology Acceptance Model

Customers accept emerging technologies in a variety of ways [59]. The TAM, adapted from the TRA, is a well-known theory that researchers use to describe behavioral intention, and it can be used to study information technology acceptance.

The TAM is a factor that determines each individual’s perception of how information and communications technology (ICT) helps contribute to improving operational efficiency and directly affects the BI for repeated use. The TAM can provide insight into the acceptance of technology for its functions and the usefulness of ICT. Many previous studies considered the factors influencing consumers’ attitudes toward ordering food online. For example, the authors of [28] analyzed customer attitudes in the process of food-delivery application, and Davis [60] identified two principles of cognitive response for predicting ATT: perceived ease of use (PEOU) and perceived usefulness (PU). According to Davis [61], PEOU is “the degree to which an individual believes the use of a particular system will be effortless.” For FDAs, this refers to factors influencing behavioral intentions to use a food-ordering app, and to choose an FDA [29,56]. PU, in this case, refers to the perceived usefulness of apps for food ordering [38,56]. Therefore, we proposed the following hypotheses:

**Hypothesis 5 (H5).** *Perceived ease of use positively influences the attitude toward ordering food online.*

**Hypothesis 6 (H6).** *Perceived usefulness positively influences the attitude toward ordering food online.*

Several scholars have shown that trust (TR) influences ATT, and trust in the mobile app is a crucial factor in O2O commercialization in food delivery [52]. It showed that TR influenced ATT in the same way that the study in [38] confirmed these results. In addition, TR has a great influence on ATT. Thus, the seventh hypothesis is stated as follows:

**Hypothesis 7 (H7).** *Trust positively influences the attitude toward ordering food online.*

Many scholars [38,48] have studied how PEOU influences PU; therefore, the eighth hypothesis is stated as follows:

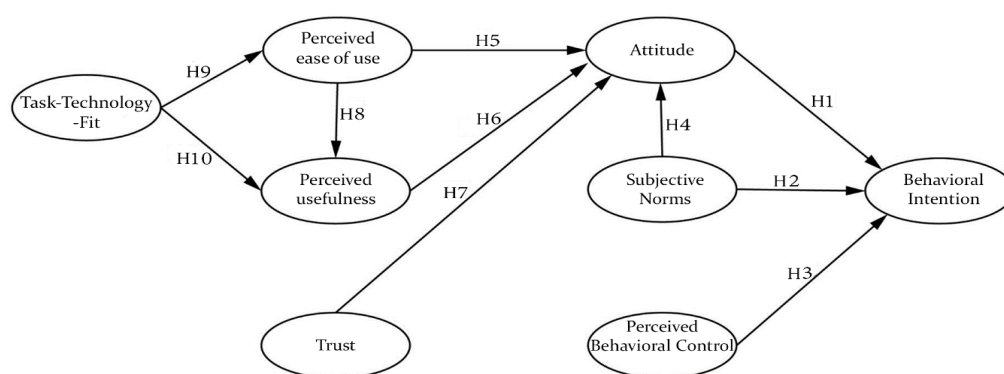
**Hypothesis 8 (H8).** *Perceived ease of use positively influences the perceived usefulness of ordering food online.*

In addition, this research added the TTF theory and technology characteristics to determine if the food-ordering platform was suitable. TTF theory is used to assess technology effectiveness, [62] its impact on work operations, and its matching of job requirements to technology characteristics. If it is insufficiently useful, it will not be used [63]. Consistent with the research of [64], extending the TAM–TTF theory with telematics [43] confirmed that TTF affected PEOU and PU. Therefore, we proposed the following hypotheses:

**Hypothesis 9 (H9).** *Task–Technology Fit positively influences the perceived ease of ordering food online.*

**Hypothesis 10 (H10).** *Task–Technology Fit positively influences the perceived usefulness of ordering food online.*

Based on the H1–H10 hypotheses, we established a conceptual framework of relevant studies on factors affecting behavioral intentions to order food delivery, as shown in Figure 1.



**Figure 1.** The conceptual framework.

From a review of related research to test the structural correlation between factors related to attitudes and consumer behavior and other related studies, most articles focused on consumer attitudes and behaviors. The details of these factors are related to the TAM theory and the TPB, as shown in Table 1, which presents a review of research related to the structural relationship between factors related to consumer attitudes and behaviors using analytical methods. These methods are confirmatory factor analysis (CFA), structural equation modeling (SEM), analysis of variance (ANOVA), partial least square SEM (PLS-SEM), and the covariance-based approach (CB-SEM).

#### 2.4. Sustainable Development Goals (SDGs)

Sustainable development is designed to meet the needs of the current generation without sacrificing the ability to respond to the needs of the next. It has three key components: economic growth, social inclusion, and environmental protection.

This research responds to the SDGs: decent work and economic growth—the online food-ordering market is growing, and as a result, the economy continues to grow; and responsible consumption and production—online food ordering is highly responsive to consumers because they can order anywhere, anytime. This results in business sustainability in line with the SDGs and the master plan under the country’s national strategy [65].



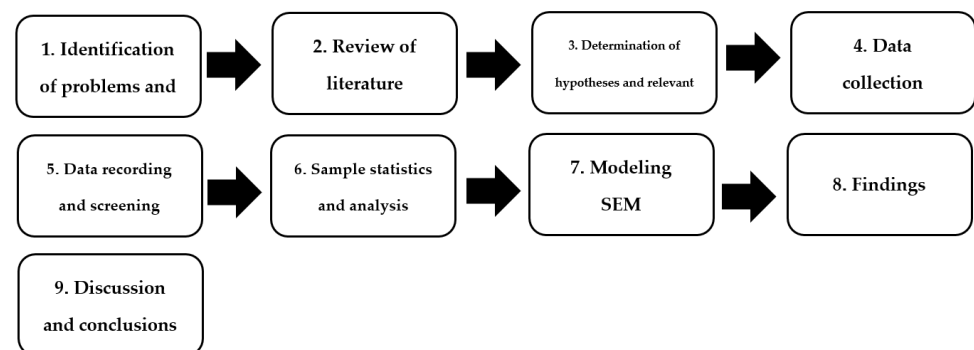
**Table 1.** Types of relationships found in studies of the technology acceptance model (TAM) theory, the theory of planned behavior (TPB), and other related topics.

Author	Method	Perceived Task-Technology Fit	Trust	Perceived Usefulness	Perceived Ease of Use	Perceived Behavioral Control	Subjective Norms	Attitude toward Online Food	Behavioral Intention
Song et al. (2021) [28]	CFA			✓	✓			✓	✓
Hwang et al. (2019) [19]	CFA, SEM							✓	✓
Kim et al. (2020) [38,57]	SEM					✓	✓	✓	✓
Namkung et al. (2018) [9,19,52–56]	CFA, SEM		✓	✓	✓			✓	✓
Roh et al. (2018) [48]	SEM			✓	✓		✓		✓
Cho et al. (2019) [53]	CFA, SEM							✓	✓
Rahi et al. (2020) [63]	PLS-SEM	✓		✓	✓				
Troise et al. (2020) [38]	PLS-SEM		✓	✓	✓	✓	✓	✓	✓
This Study		✓	✓	✓	✓	✓	✓	✓	✓

CFA, confirmatory factor analysis; SEM, structural equation modeling; ANOVA, analysis of variance; PLS-SEM, partial least squares SEM.

### 3. Research and Methodology

This research studied consumer behavior to suggest guidelines for developing a food-ordering application. There are nine steps in the operation process, as shown in Figure 2.

**Figure 2.** Operational process.

#### 3.1. Data Collections

- **Questionnaire design:** The questionnaire was divided into 3 parts. Part 1 concerned personal and household characteristics of the respondents (sex, age, highest education level, occupation, average income) and their experience with using food-ordering services apps. Part 2 concerned the behavior of users ordering food through food-ordering apps. Part 3 involved other suggestions related to the use of food-ordering apps.
- **Scale:** Part 2 consisted of 22 items, assessed on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Although these are ordinal variables, these can also be estimated using maximum likelihood (ML), according to [66], who described it as “the second option for the ordinal variable in which the parcel is being analyzed.” A parcel is a total score across a set of homogeneous items, each with a Likert-type scale. Parcels are generally treated as continuous variables, and their score reliability

tends to be for the collective, rather than for individual, items. If the distribution of all parcels is normal, then the default ML estimate could be used to analyze the data.

- **Sample size:** This study analyzed data with CFA in a SEM model; the optimal sample size was 20 times the number of variables [66]. With 22 variables, the sample size was 440.
- **Participants:** The respondents were service users who ordered food online through the apps. The survey was conducted from January to February 2021 in the six regional economic provinces of Thailand: Central, Northern, Northeastern, Eastern, Western, and Southern. The total sample size was 1320 people, comprising 220 from each region.
- **Table 2** shows the frequency and percentage analysis of basic data from all the samples, such as service users ordering online food delivery, task characteristics, and service frequency. The samples of respondents had the following characteristics—gender: 805 females (61%) and 515 males (39%); age: most were 21–30 (556, 42.1%) and 31–40 (358, 27.1%); education: most had a bachelor’s degree (817: 61.9%), followed by high school (299: 22.7%); occupation: most respondents were students (395: 29.9%), followed by company employees (366: 27.7%); income per month: most earned THB 10,001–20,000 (413: 31.3%), followed by THB 5000–10,000 (266: 20.2%). The highest frequency of online food ordering was less than 4 times a month (683: 51.7%), followed by 5–10 times per month (405: 30.7%)

**Table 2.** Characteristics of the sample.

Characteristics	Types	Frequency	Percentage
Sex	Male	515	39
	Female	805	61
Age (years)	<20	149	11.3
	21–30	556	42.1
	31–40	358	27.1
	41–50	169	12.8
	51–60	83	6.3
	>60	5	0.4
Education	Lower than junior high school	37	2.8
	Junior high school	64	4.8
	Senior high school	299	22.7
	Bachelor’s degree	817	61.9
	Higher than bachelor’s degree	103	7.8
Occupation	Student/College student	395	29.9
	General contractor	162	12.3
	Government employee/	174	13.2
	State enterprises		
	Company employee	366	27.7
	Business owner	184	13.9
Income	Other	39	3.0
	<5000	221	16.7
	THB 5000–10,000	266	20.2
	THB 10,001–20,000	413	31.3
	THB 20,001–30,000	241	18.3
	THB 30,001–40,000	89	6.7
Use frequency	THB < 40,001	90	6.8
	Less than 4 times/month	683	51.7
	5–10 times/month	405	30.7
	More than 10 times/month	219	16.6
	Other	13	1.0

### 3.2. Reliability

To validate the quality of the research tool, five specialists validated the content and determined the consistency of each question by analyzing and scoring the questions against item-objective congruence (IOC). An IOC index above 0.5 meant that the validity of the inquiries was within the acceptable range. A pilot study was subsequently conducted with 30 respondents, not included in this research, using Cronbach's alpha coefficient to analyze the reliability of the questionnaire. The details indicated an alpha value of 0.784–0.965, and these values were higher than the suggested value of 0.7 [67].

### 3.3. Structural Equation Modeling

SEM is a statistical method that measures the relationship between observed and latent or unobserved variables, or the relationship between two or more latent variables. The important characteristic of SEM is that it is a linear equation. In addition, finding the relationship between variables can uncover causal variables. The interaction between variables or between variable groups occurs simultaneously.

SEM comprises a measurement and a structural model. The measurement model builds candidates, including measured variables and sub-variables, and indicates whether or not the candidate is a good one. In this model, the variable coefficients are called factor loadings. The structural model is the causal model consisting of independent and dependent variables, together with latent variables. It indicates whether the independent variable caused the dependent variable or not. In this model, the variable coefficients are called regression weight and factor loadings. The details of SEM were included in the study by the authors of [66,68].

Therefore, SEM was the method used to build a structural model to determine the relationship between the attitudes, subjective norms, and behavioral control that affect consumer behavior toward online food ordering. Each measurement model was analyzed to determine which factors had the greatest loading for use in further policy recommendations.

## 4. Findings

### 4.1. Descriptive Statistics

The analyses of mean, standard deviation, and R-squared values of the basic data from 1320 samples are shown as in Table 3.

### 4.2. Structural Equation Model

#### 4.2.1. Goodness-of-Fit Statistics

The results showed that the model was quite consistent with the empirical data:  $\chi^2 = 551.898$ ;  $df = 189$ ;  $p < 0.000$ ;  $\chi^2/df = 2.920$ ; RMSEA = 0.038; CFI = 0.984; TLI = 0.981; and SRMR = 0.034. When comparing the appropriate criteria, it was recommended that  $\chi^2/df$  be 2–5 [69]; (2) RMSEA less than 0.07 [70]; CFI equal to or greater than 0.90 [71]; (4) TLI equal to or greater than 0.80 [72]; and SRMR equal to or less than 0.70 [71].

#### 4.2.2. Measurement Model

The statistical values were based on empirical data comprising 8 latent variables and 22 indicators. Considering the standardized loading values, they were in the range of 0.739–0.922, whereas the threshold should be greater than 0.4. Thus, the model was a statistically significant method ( $p < 0.001$ ), and the standard loading values for each item are as follows:

Based on the relative weighting assessment of BI from the three observed variables (I1–3), I3 showed a maximum loading score of 0.894, followed by I1 with 0.890. Of the three observed variables, attitudes toward FDAs (I4–6), I5 and I6 had an equal loading score of 0.761, followed by I4 with 0.740. Of the two subjective norm variants, I7 had the higher loading score of 0.853, whereas I8 had 0.742. Of the three PBC variables (I9–11), I10 had the maximum loading score of 0.922, followed by I9 with 0.890. Of the 3 PEOU variables (I12–14), I12 had the highest loading score of 0.883, followed by I13 with 0.878. Of



the 3 perceived usefulness variables (I15–17) I17 had the maximum loading score of 0.896, followed by I15 with 0.871. Of the two trust variables (I18–19), I18 had a score of 0.861, followed by I19 with 0.829. Out of three TTF variables (I20–22), I21 had the maximum loading score of 0.886, followed by I22 with 0.863.

From the above data, I10 had the highest loading score of 0.922, followed by I3 with 0.894. The lowest indicator was I11 with 0.739. The results of the measurement model are shown in Table 3.

**Table 3.** Descriptive statistics.

Construct	Variables	Mean	SD	R <sup>2</sup>
Behavioral Intention [53]	I1: I intend to use the food delivery app.	3.82	0.839	0.792
	I2: If I have an opportunity, I will order food through the delivery app.	3.85	0.814	0.790
	I3: I intend to keep ordering food through the delivery app.	3.80	0.845	0.799
Attitude [53]	I4: Using the food delivery app is useful.	4.11	0.823	0.548
	I5: I am strongly in favor of ordering food through the delivery app.	3.69	0.927	0.579
	I6: I desire to use the delivery app when I purchase food.	3.77	0.870	0.579
Subjective Norms [48]	I7: How do you think your friends would respond if they thought you had used a food delivery application?	3.72	0.803	0.728
	I8: How do you think your parents would respond if they thought you had used a food delivery application?	3.50	0.917	0.550
Perceived Behavioral Control [73]	I9: In general, ordering food online is very complex.	3.04	1.033	0.793
	I10: With ordering food online via application creates anxiety for you.	2.94	1.083	0.850
	I11: In general, ordering food online yields (will yield) few problems for me.	3.10	1.048	0.546
Perceived Ease of Use [48]	I12: I would find it easy to order food using a food delivery application.	3.93	0.784	0.779
	I13: My operation of a food delivery application would be clear and understandable.	3.91	0.788	0.770
	I14: Using a food delivery application would not require a lot of mental effort.	3.84	0.807	0.693
Perceived Usefulness [48]	I15: Using a food delivery application would enable me to better check the ordering and receiving process of delivery food.	3.93	0.797	0.758
	I16: Using a food delivery application would make it more convenient to order and receive delivery food.	3.97	0.783	0.754
	I17: Food delivery application would be useful for ordering and receiving delivery food.	3.95	0.787	0.803

Table 3. Cont.

Construct	Variables	Mean	SD	R <sup>2</sup>
Trust [53]	I18: I trust the food delivery app.	3.85	0.760	0.742
	I19: The information provided by the food delivery app is reliable.	3.85	0.758	0.687
Task–Technology Fit [41]	I20: The functions of FDAs are enough for me to order and receive the delivery food.	3.85	0.760	0.741
	I21: The functions of FDAs are appropriate to help manage the ordering and receiving the delivery of food.	3.87	0.780	0.784
	I22: The functions of FDAs fully meet my requirements of ordering and receiving the delivery of food.	3.88	0.772	0.774

#### 4.2.3. Structural Model and Hypothesis Testing

The composite reliability [66,68] and average variance extracted (AVE) were calculated, respectively, using Equations (1) and (2):

$$CR = \frac{(\sum_{i=1}^n L_i)^2}{(\sum_{i=1}^n L_i)^2 + (\sum_{i=1}^n e_i)} \quad (1)$$

$$AvE = \frac{\sum_{i=1}^n L_i}{n} \quad (2)$$

where  $L_i$  is the standardized factor loadings obtained by CFA,  $i$  is the number of observed variables in each variable factor, and  $e_i$  is the error variance terms of measurement models under the condition  $CR \geq 0.7$  [66,68]. The CR was 0.779–0.920 for TPB analysis with  $AVE \geq 0.5$  [66,68].

SEM using maximum probability showed that the levels of conformity index were  $\chi^2 = 551.898$ ;  $df = 189$ ; ( $p < 0.000$ );  $\chi^2/df = 2.920$ ;  $RMSEA = 0.038$ ;  $CFI = 0.984$ ;  $TLI = 0.981$ ; and  $SRMR = 0.034$ . The conformity index value indicated that they were sufficient. Thus, it could be concluded that the SEM was based on empirical data. In addition, when examining the 10 hypotheses in Table 4, we found that they influenced behavioral intentions in ordering food online in the following ways:

Table 4 presents the SEM results for a structural model that explores the relationship between the three variables influencing the behavioral intention to order food through online apps. The standard regression coefficient (coef.) indicated that the attitude factor had the greatest influence on behavioral intentions (0.720), followed by subjective norms (0.236) and PBC factors (−0.018). The standard regression coefficient (coef.) indicated that the PEOU factor had the greatest influence on attitude (0.625), followed by the perceived benefit factor (0.258), credibility factor (0.197), and subjective norms (−0.045), and that the correlation analysis results between the two exogenous variables influenced the perceived usefulness of ordering food through apps. A coef. indicated that the PEOU had the greatest influence on perceived usefulness (0.751), followed by the TTF factor (0.252). The results regarding the task and technology suitability analysis influencing PEOU in work operations had a coef. of 1.185. The results of factors affecting behavioral intentions to order online food delivery and the analytical results of the hypothesis testing are shown in Table 5.

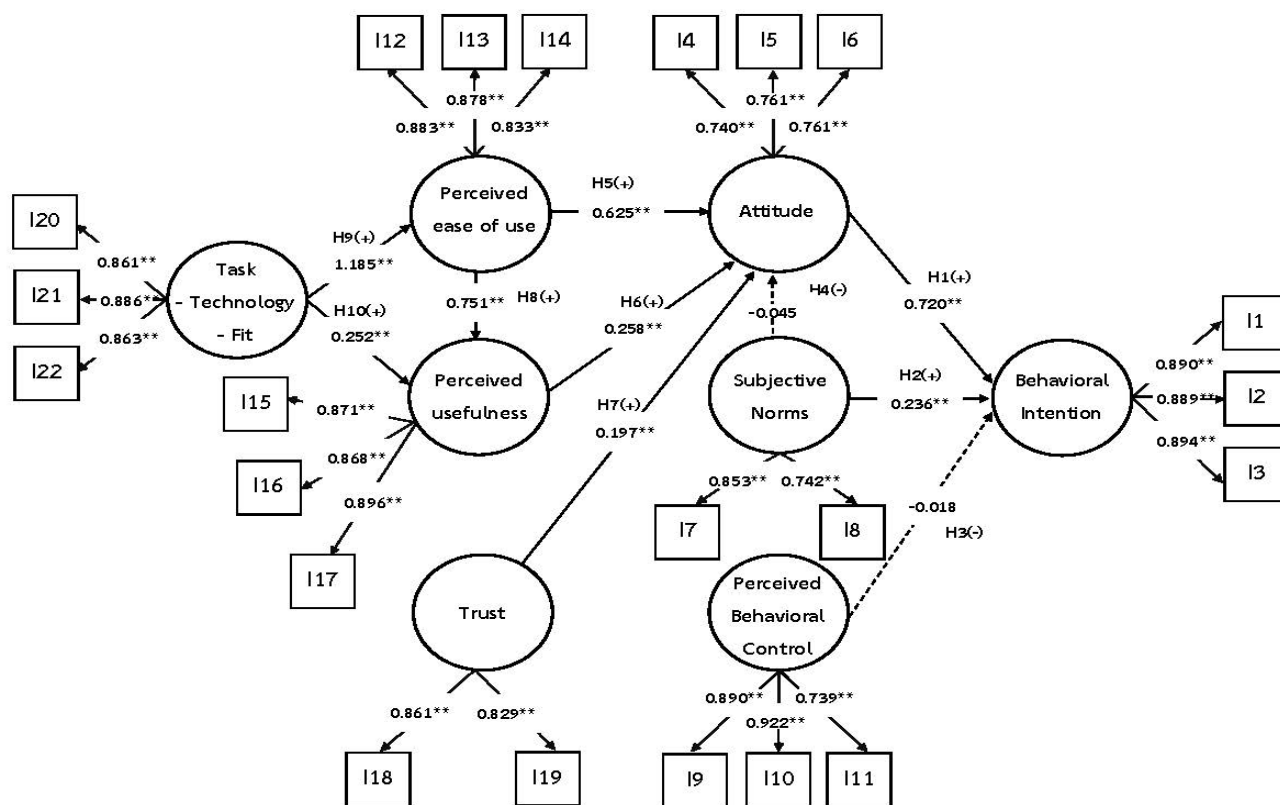
**Table 4.** Measurement model results.

Construct	Variables	Standardized Loadings *	Standard Error	t-Value	CR	AVE	Cronbach's Alpha
Behavioral Intention	I1	0.89	0.007	122.101	0.92	0.794	0.92
	I2	0.889	0.007	121.894			
	I3	0.894	0.007	125.624			
Attitude	I4	0.74	0.015	50.053	0.798	0.569	0.836
	I5	0.761	0.014	53.954			
	I6	0.761	0.014	53.599			
Subjective Norms	I7	0.853	0.015	58.774	0.779	0.639	0.771
	I8	0.742	0.016	45.165			
Perceived Behavioral Control	I9	0.89	0.009	94.027	0.889	0.729	0.885
	I10	0.922	0.009	104.494			
	I11	0.739	0.014	52.546			
Perceived Ease of Use	I12	0.883	0.008	111.383	0.899	0.748	0.898
	I13	0.878	0.008	108.423			
	I14	0.833	0.01	83.748			
Perceived Usefulness	I15	0.871	0.008	104.782	0.91	0.772	0.91
	I16	0.868	0.008	103.582			
	I17	0.896	0.007	122.945			
Trust	I18	0.861	0.011	75.631	0.833	0.714	0.833
	I19	0.829	0.012	68.189			
Task–Technology Fit	I20	0.861	0.009	94.467	0.903	0.757	0.903
	I21	0.886	0.008	108.25			
	I22	0.863	0.009	95.084			

Note: Regression \* significant at  $\alpha = 0.05$ .**Table 5.** Standardized path coefficient and t-value for the structural model.

Hypotheses	Description	Standardized Path Coefficient	t-Value	Result
H1	ATT→BI	0.720	24.005	Supported
H2	SN→BI	0.236	6.437	Supported
H3	PBC→BI	−0.018	−0.881	Not Supported
H4	SN→ATT	−0.045	−1.062	Not Supported
H5	PEOU→ATT	0.625	8.734	Supported
H6	PU→ATT	0.258	5.506	Supported
H7	TR→ATT	0.197	3.484	Supported
H8	PEOU→PU	0.751	23.923	Supported
H9	TTF→PEOU	0.252	7.283	Supported
H10	TTF→PU	1.185	39.604	Supported

The conclusion of the investigation based on the proposed research hypotheses (H1–H10) found that the hypotheses had a significant effect on the correlation, as indicated and shown in Figure 3.



**Figure 3.** Results of main-test research model. **Notes:** → result is supported; → result is not supported. \*\* significant at 0.05 level.

## 5. Discussion

The key objective of this research was to develop an SEM to examine the structural relationships of online food ordering through food-ordering apps. The factors studied in the TAM theory consist of credibility, PEOU, PU, ATT, and BI. For TPB, the factors included SN and PBC. One additional factor was also explored: TTF and technology characteristics. The study method used a CFA index consisting of 10 hypotheses for structural equation analysis to examine the correlation among the various factors. The CFA assessment results showed that we certified the model components as statistically significant. Moreover, from SEM analysis, we found that the model consistency index was quite consistent with 8 out of 10 hypotheses. The factors were significantly related to the hypotheses as follows:

According to SEM, the factors that directly influenced the intention to order food online through the food-delivery application were ATT, SN, and PBC. While testing the standardized path coefficients, we found that ATT had the greatest influence on BI at 0.720, meaning that shopping attitudes had a direct, positive influence on the BI to use the food-ordering apps. Therefore, if users are satisfied or have a good experience, they will have a positive attitude toward the app and a tendency to use it. Consistent with research by the authors of [19,38,52,54–57,74], results showed that ATT positively affected BI to order food online, followed by SN influencing a continued intention to use equal to 0.236, meaning that when consumers receive advertisements about online food ordering from subjective norms, such as close friends or parents, they will be interested in ordering food through apps and express their behavior by using them, as found in the studies by the authors of [38,48,57]. The factors that directly influenced ATT toward online food ordering through apps are PEOU, PU, and credibility. While examining standardized path coefficients, we found that PEOU had an influence on ATT toward ordering food through apps equal to 0.625, meaning that when consumers perceive an ease of use, they have a positive attitude toward ordering online food through these apps. In addition, the PU influence on ATT to use food-ordering

apps was equal to 0.258, meaning that, when consumers recognize the usefulness of the application for both ordering and receiving food, and checking the details of the food from the app, they have positive attitudes toward online food ordering, which is consistent with the studies by the authors of [28,38,56]. The credibility influence on attitudes toward ordering food through apps had a value of 0.197, meaning that when consumers consider the apps to be trustworthy, they are likely to order food through them, which is consistent with research from the authors of [28,38,52]. The factors directly influencing PU include PEOU and TTF. Examining standardized path coefficients, we found that the value of the PEOU influence on PU was equal to 0.751, meaning that when consumers perceived that apps were easy to use, they perceived food-ordering apps to be highly beneficial, which agrees with research from the authors of [29,38,48].

The TTF factor influenced perceived usefulness at 0.252 and PEOU at 1.185, indicating that that consumers saw the app functions as suitable for either ordering or receiving food. In addition, when consumers encounter problems using the apps, channels should be provided so that consumers can contact someone for help, or solve the problem themselves. If the apps provide solutions, consumers will be more satisfied with the apps, which is in line with the research of the authors of [42,43,75]. In addition, two hypotheses were proven false: PBC influences BI and SN influences ATT. In other words, the analysis of PBC data did not influence BI toward online food ordering and had an effect value of  $-0.018$ , demonstrating that consumers are still concerned about ordering food through the apps because they are worried about complicated apps. The analysis result showed that SN did not influence ATT, with an effect value of  $-0.045$ . This means that when consumers receive online food-ordering advertisements from subjective norms, such as close friends or parents, they are not interested in using food-ordering apps at all. For example, consumers may have received information from subjective norms that the apps are not practical or that the food is not as specified in the apps. In the short term, we believe that the demand for online food ordering services continues to be popular because consumers want convenience in daily life, but for the long run, entrepreneurs must create a strategy to convince consumers to continue to use the service. This may be conducted using a marketing mix to motivate and retain customers to use the service continuously.

## 6. Conclusions

The authors used an SEM method due to its compatibility and efficiency for measuring complicated phenomena. Serving a similar purpose to multiple regression, SEM is more efficient for considering the following issues: the interaction model, nonlinearity, correlated independent variables, measurement errors, corresponding error conditions, multiple latent independent variables, and one or more latent dependent variables [66]. The data collected in Thailand was from six regions: Central, North, Eastern, Northeastern, Western, and Southern.

The research results allowed us to rank the exogenous variables by the strength of their influence on BI, which is influenced by ATT. If the consumers have a positive attitude toward using apps, they will have a positive tendency to use FDAs. They may consider or look through them before choosing to use one, particularly, if they have a positive attitude toward PEOU, PU, and credibility.

Since consumers want to order food conveniently through the apps, the entrepreneurs should establish promotions to attract consumers and use the app attributes as a medium. This procedure allows immediate communication between apps and consumers, such as obtaining product information for decision making about using the service and facilitating processes such as payment and food delivery. In addition, if consumers find that apps are suitable, either for ordering or receiving food, consumers will decide to use them. Moreover, subjective norms, such as friends, close friends, and parents, will affect consideration before ordering via the apps or making an immediate purchase decision. Consumers who order food or buy goods through online apps do not choose them without seeing the actual products. If an incentive stimulates their demand, sharing information or advertising

products through social norms about offering the food to consumers may build consumer attention, or if they depend on these groups, an immediate purchase decision may be possible. The analysis results showed that PBC did not influence behavioral intentions toward online food ordering. The reason is that some consumers still have anxiety about ordering food through complicated apps. Thus, if a business owner develops a practical food-ordering app, the consumers will increasingly use it to order food. Moreover, most consumers tend to order food via apps. Therefore, governmental or other relevant agencies should adopt these research results to formulate policies that facilitate the purchase of goods in the digital marketing system.

The results found that the attitude factor (H1) affected consumers' online food-ordering behavior the most, followed by subjective norms (H2). Responding to the needs of users will affect the frequency of use. It was also found that the ease-of-use factor (H5) affected the attitude toward app use the most, followed by perceived usefulness (H6) and trust (H7), respectively. The next factor, perceived ease of use, affected perceived usefulness (H8). Therefore, if the platform is easy to use, it will enhance the users' positive attitudes, resulting in repeated use and referrals to others. In addition, this research included additional studies in the task–technology fit section; the study's results revealed that TTF had the most significant impact on perceived ease of use (H9), followed by perceived usefulness (H10). This meant that if a food-ordering platform is appropriate for use, consumers will continue to use it, leading to sustainable business operations. According to the research, this was consistent with the SDGs: responsible consumption and production. It will allow consumers to use more services, thereby improving profits and employment. Most importantly, it will help businesses achieve sustainability. This is in line with the research by the authors of [76], which studied the behavior of consumers in the early stages of drone food delivery and found that there was not much use for the service.

## 7. Limitations and Future Work

This study highlighted the guidelines for studying users' behavioral intention to use food-delivery services via online apps. However, there were some limitations. There was a slight difference in the question items used in our research because we used questions from various researchers who studied food ordering online to determine behavioral intention. Future research should study theories beyond just TAM and TPB to obtain more diverse attitudes of the service users. Another limitation was the scope of the study. As the results were acquired from questioning only online food-delivery users via apps in the provinces representing each region, the results or levels of significance may vary in other countries. Future studies should examine attitudes toward a wide variety of apps using other theories that affect user behavior to understand users' opinions on FDAs.

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