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An Investigation of Customer Acceptance of Food Delivery Systems

Titima Thanapakpawin
Department of Information Technology, Assumption University, Bangkok
titimat@outlook.co.th

Abstract
This quantitative research study focuses on platform-to-consumer internet-based food delivery systems (FDS), which unlike full-service companies that exclusively serve their own food, enables consumers to compare the multiple providers registered in the platform. Specifically, it aims to identify the factors that may affect the use of FDS. It combines various constructs from well-known theoretical models of technology adoption (TPB, TAM, and UTAUT) with FDS-specific aspects. Age, income, gender, and experience were hypothesized as FDS-use moderators. 400 FDS-experienced Bangkok- and metropolitan-based volunteers participated in this study. Structural equation modeling was used to analyze the theoretical model. The results show that out of the thirteen model variables hypothesized in this study, Relative Advantage influences intention to use the most, followed by Mobility, Complexity, Product Information, Self-Efficacy, Promotion, Facilitating Conditions, Observability, Triality, Compatibility, Social Influence, and Delivery Cost. Among the constructs hypothesized to moderate the model variables, gender was found to moderate Self-Efficacy and Compatibility, experience to moderate Relative Advantage, and income to moderate Complexity. These findings suggest new theoretical model constructions, which could benefit FDS providers, Food suppliers, FDS users, software vendors, and any other FDS stakeholders.

Keywords: Food Delivery Systems, Customer Acceptance, Relative Advantage, Moderators.

1. Introduction

Today, restaurant-to-consumer and platform-to-consumer internet food delivery services (hereinafter referred to as 'FDS') abound (Poluliakh, 2020). Some, such as, for example, even-Eleven, Pizza Works, Pizza Hut, Dominos, KFC, and McDonald's, offer full-service delivery. These full-service companies, however, exclusively serve their own food, unlike platform-to-consumer food delivery that enables customers to compare items, pricing, reviews, ratings, and promotions from multiple providers registered in the platform. This study focuses on FDS via Lineman, Grab, Foodpanda, and Robinhood in Bangkok, Thailand, where typically, an aggregator sends orders to restaurants when consumers confirm them. Riders then deliver meals from the eatery. FDS has grown fast in terms of popularity and consumer expectations, most notably in Thailand (Wichiantanon, 2020). According to Kasikorn Research Center (2020), in 2019, the Thai food delivery business recorded a 14% year-on-year growth. And according to Euromonitor International (2020), during the period 2014-2019, the share of online orders to total food-service sales worldwide almost tripled, jumping from 2.6% in 2014 to 6.9% in 2019. Moreover, FDS is widely available with little time and place restrictions (Choi, 2020; Galivan et al., 2021; Siswantara & Muthmainnah, 2020).

It is the author's view that research on FDS is limited and essentially based on the Technology Acceptance Model (TAM) initially developed by Davis in 1989. David's (1989) study increases understanding of FDS in three ways. One way is the development and evaluation of a new theoretical model based on a broad perspective that includes other theoretical approaches to technology adoption, most notably, Ajzen's (1985) Theory of Planned Behavior (TPB) (Troise et al., 2021), Ajzen and Fishbein's (1975) Theory of Reasoned

Action (TRA), and Bankatesh et al.'s (2003) Unified Theory of Acceptance and Use of Technology (UTAUT). Another way is the inclusion of factors specific to FDS (Venkatesh et al., 2003). A third way is the investigation of moderators, such as gender, age, experience, and income, as factors moderating the influence of other factors on an individual (Lisana, 2021).

This study addresses three specific research questions:

- Which factors significantly affect an individual's intention to use FDS?
- Does an individual's experience with FDS, age, income, or gender have a moderating effect on their intention to use FDS?
- What are the theoretical and practical implications of the findings?

Its findings: contribute to the limited theoretical understanding of FDS adoption, especially in the context of Thailand, and have practical implications for a wide variety of interests related to FDS (e.g., developers of technical aspects of FDS, food providers, delivery services, marketing and promotion of FDS, associated payment systems, and consumers).

2. Related Literature and Theoretical Models

- Overview of Previous Studies

Table 1 lists the relevant characteristics of FDS-related studies. They are grouped into two categories. While theoretical models and conceptual development studies are shown as explanatory studies, other studies are reported as exploratory studies as they are theoretically untested.

Table 1: Overview of FDS-Related Studies

Project Focus	Reference
Explanatory Studies	
Effects on the adoption of a system resulting from the availability and observability of the system.	Siswantara & Muthmainnah (2020)
Marketing mix as the toolkit of transaction marketing and archetype for operational marketing planning Quo vadis, marketing? Toward a relationship marketing paradigm.	Grönroos (1994).
Impact of mobility on intentions to use m-payment services.	Anthony & Mutalemwa (2014).
Effects of the extent to which an innovation provides an advantage relative to ideas it supersedes.	Alshamaila, Papagiannidis, & Li (2013); Lin & Chen (2012); Low, Chen, & Wu (2011); Wu (2011).
Extent to which users perceive an application as a sum of its features.	Harrison & Datta, 2007
Studies of the use of TAM for explaining and predicting intentions and usage behavior.	Davis, 1989; Marangunić & Granić, 2015; Venkatesh & Davis, 2000; Zhang, Zhu, & Liu (2012).
Assessment of models studying influences on the intention to use a system.	Davis, 1989
Influence of user satisfaction on intention to adopt FDS.	Selim, 2007
Degree to which an innovation may allow individuals to "try and buy."	Wahid & Iswari, 2007
Exploratory Studies	
Social influences on a consumer's decision to adopt and use FDS.	Venkatesh et al., 2003
The relationship between compatibility and intention to use in previous FDS studies.	Dass & Pal (2011); Kapoor, Dwivedi, & Williams (2015); Schierz, Schilke, & Wirtz (2010); Yang et al. (2012); Zhang et al. (2012)

FDS adoption is influenced by having no restriction on the time and place FDS may be used.	Mallat et al., 2008 (Mallat & Tuunainen, 2008
Influence of the personal usefulness of a food delivery system on the behavioral intention to use the system.	Hamza, 2014; Kim, Mirusmonov, & Lee, 2010; Tobbin & Kuwornu, 2011; Zarmpou et al., 2012
FDS adoption is influenced by the amount of effort required to use the system.	Kim et al., 2010

Note: In their study, Siswantara & Muthmainnah (2020) used literature review as data collection method. For all the other studies mentioned above, a questionnaire was utilized.

Based on a review of previous studies, the following comments relate to existing theoretical models and specific features used to research FDS:

- Theoretical Models

Many research studies use the Technology Acceptance Model (TAM) developed by Davis in 1989 (e.g. Alagoz & Hekimoglu, 2012; Maranguni & Grani, 2015; Venkatesh & Davis, 2000; Zhang et al., 2012). Using the TAM to examine smartphone meal ordering intentions, Okumus and Bilgihan (2014) determined that perceived usefulness, self-efficacy, enjoyment, social norms, and convenience were important factors. Hwang and Kim (2019) applied the TPB to explore customers' views on FDS's environmental benefits using unmanned aerial vehicles and Quevedo-Silva et al. (2016) to examine online food purchases. In their study of mobile apps and word-of-mouth in meal delivery, Belanche, Flavián, and Pérez-Rueda (2020) stressed Customer Lifestyle Compatibility, Planned Behavior, and Perceived Security. The TPB has been extensively used to study popular mobile meal delivery apps that let customers contact restaurants, look for meals, order delivery, and pay without interacting with restaurant staff (Alalwan, 2020; Okumus & Bilgihan, 2014; Wang, Ou, & Chen, 2019). Okumus et al. (2018) examined mobile diet app users' intentions using the UTAUT and found that performance expectations, effort expectations, social influence, facilitating conditions, and personal ingenuity affect users' intentions. Barrane, Karuranga, and Poulin (2018) also relied on the UTAUT to study e-commerce innovation as did Chhonker et al. (2018) to construct a new mobile commerce model and Capistrano (2021) to study trust in FDS and e-commerce acceptability. Izzati (2020) suggested utilizing the UTAUT to study online FDS incentives.

- FDS Specific Features

It was found that accessibility and mobile payment services affect FDS adoption (Anthony & Mutalemwa, 2014). It has also been found that FDS adoption can be influenced by product/service marketing (information, price, service, and promotion) (Grönroos, 1994), "try-and-buy" opportunity (Wahid & Iswari, 2007); social influence (Venkatesh et al., 2003); innovation (Alshamaila et al., 2013; Lin & Chen, 2012; Low et al., 2011; Wu, 2011); system features (Harrison & Datta, 2007); and compatibility (Dass & Pal, 2011; Kapoor et al., 2015; Schierz et al., 2010; Yang et al., 2012; Zhang et al., 2012). Elements from the existing models discussed above and features of FDS have been incorporated into the theoretical model developed for this study.

- Model Variables and Hypotheses

The variables and associated hypotheses discussed in this sub-section are derived from a review of the previous studies listed in Table 1 above:

- Relative Advantage

Relative advantage implies that the latest innovation is better than its predecessors. If no gain is perceived, customers will use the current technology. But they will adopt the invention if they perceive a relative benefit. Cloud computing adoption studies show that relative advantage matters (Alshamaila et al., 2013; Low et al., 2011; Wu, 2011). In relation to FDS, it can therefore be hypothesized that:

H1: *Relative advantage has a significant positive direct effect on intention to use.*

- *Complexity*

Complexity refers to how hard an innovation is to grasp and use. High complexity hinders adoption. This concept matches the TAM measure Perceived Ease of Use and has been employed in technology adoption research (Jasperson, Carter, & Zmud, 2005; Harrison & Datta, 2007). In relation to FDS, it can thus be hypothesized that:

H2: *Complexity has a significant negative direct effect on intention to use.*

-*Compatibility*

Compatibility shows how well an innovation matches prospective users' values, requirements, and experiences (Rogers, 1983). FDS (Dass & Pal, 2011; Kapoor et al., 2015; Schmerz et al., 2010; Yang et al., 2012; Zhang et al., 2012). Moreover, several other technology adoption studies have shown a positive correlation between compatibility and intention to use (Harrison & Datta, 2007; Tobin & Kuwornu, 2011; Zarmpou et al., 2012; Hamza, 2014). In relation to FDS, the following hypothesis can thus be developed:

H3: *Compatibility has a significant positive direct effect on intention to use.*

- *Observability*

Observability indicates how visible innovation's results are (Siswantara et al., 2020). Experience increases confidence in an innovation's acceptance. Siswantara & Muthmainnah (2020) argued that the widespread availability and observability of novel cloud-based note-taking tools will boost their adoption. In relation to FDS, it can therefore be hypothesized that:

H4: *Observability has a significant positive direct effect on intention to use.*

- *Triality*

Triality refers to how much an idea may be "tried and bought." If an idea can be tested and fits needs, people are more inclined to adopt it. However, unsuccessful trial results can lead to invention rejection (Wahid & Iswari, 2007). In relation to FDS, it can be hypothesized that:

H5: *Triality has a significant positive direct effect on intention to use*

- *Mobility*

Mobility means freedom in time, location, and FDS access (Mallat et al., 2008). It refers to the use of various mobile devices to access mobile phone services and complete transactions anywhere within a mobile network territory (Kim et al., 2010). Mobility and FDS utility have been linked in a Korean (Kim et al., 2010). A study in Tanzania, however, found that mobility was negatively correlated with FDS use intentions (Anthony & Mutalemwa, 2014). In relation to FDS, the following hypothesis has been developed:

H6: *Mobility has a significant positive direct effect on intention to use.*

- *Facilitating Conditions*

Facilitating conditions refer to a user's expectation that elements and resources that will facilitate their use of a system will be readily accessible (Venkatesh et al., 2003). Previous research has established a significant positive correlation between Facilitating Conditions and Intention to Use (Chiu & Wang, 2008; Cho, Cheng, & Lai, 2009; Rahmat & Au, 2013). In relation to FDS, it is therefore hypothesized that:

H7: *Facilitating conditions have a significant positive direct effect on intention to use.*

- *Social Influence*

Social influence refers to the way others influence consumers to use FDS. Typically, they are relatives, friends, or coworkers (Venkatesh et al., 2003). Subjective norms, an individual's assessment of whether others in their immediate social circle think the activity should be done, has been studied (Ajzen, 2020) and found to increase perceived utility (Venkatesh & Davis, 2000) and behavioral intention to utilize FDS in China, Nigeria, and Tanzania (Yang et al., 2012; Chachage, Kamuzora, & Malima, 2013; Tossy, 2014). Consumers are more inclined to

utilize FDS if others do (Hamza, 2014; Murendo et al., 2015). In relation to FDS, the following hypothesizes can be developed:

H8: *Social influence has a significant positive direct effect on intention to use.*

- *Product Information*

Production information refers to everything that can be sold to a market to satisfy a need or want (Kotler et al., 2018). In e-commerce marketing, information is a product. Lee et al. (2017) categorized information into user-generated and firm-generated types. Product ideas can also be shared online. Businesses can gather consumer data directly from consumers to create better products. This lets international companies tailor their products to local markets (Quelch & Klein, 1996) or establish new ones. Businesses can also sell advertising during transactions (Ghosh, 1998). Consequently, in relation to FDS, it can be hypothesized that:

H9: *Product information has a significant positive direct effect on intention to use.*

- *Delivery Cost*

Delivery cost consumer pricing information. According to Kotler et al. (2018), all corporate processes are expenditures. Internet competition will standardize prices. Quelch and Klein (1996) identify two conflicting Internet price effects. First, the technology can be used to charge consumers in different countries different prices. If nothing is done, purchasers may quickly notice the price difference and object. Quelch and Klein (1996) believed these traits would enhance worldwide pricing homogeneity. Internet sales require new pricing approaches. Rayport and Sviokla (1994) noted that technology's ability to cut prices will make it hard for customers to set prices. According to Elvandari, Sukartiko, and Nugrahini (2018), consumers need an affordable delivery cost. In relation to FDS, the following hypothesis can thus be developed:

H10: *Delivery cost has a significant positive direct effect on intention to use.*

- *Service*

Companies can now communicate with clients online and keep improving the service quality (Sealy, 1999). Service that exceeds customer expectations encourages positive customer behavior as internet product reviews replace TV advertising. research, sales, promotions, coupon distribution and make customer support possible. (Aryani et al., 2022). In relation to FDS, it can be hypothesized that:

H11: *Service has a significant positive direct effect on intention to use.*

- *Promotion*

Promotion can be defined as a company's efforts to promote its products and attract customers (Kotler (2003). Incumbent merchants and manufacturers can offer consumers a wealth of information. Moreover, today, data mining enables companies to create consumer profiles for personalized promotions. This advantage is greatest when the consumer wants detailed product information or the product is represented as cutting-edge (Kotler et al., 2018). Brands that link their products to emotions, associations, and memories will likely do better than those that focus on product features (Evans & Wurster, 1999). 46% of new internet customers choose to buy from offline merchants. 34% of repeat internet shoppers picked well-known offline retailer websites (Kane, 1999). According to Quelch and Klein (1996), new users look for well-known brands first. Ray et al. (2019) noted that the customer experience provided by FDS is contingent on offers, coupons, cashback and discounts, loyalty programs, and referral incentives. These advantages are also referred to as customer engagement programs. In relation to FDS, the following hypothesis can therefore be developed:

H12: *Promotion has a significant positive direct effect on intention to use.*

- *Self-Efficacy*

Self-efficacy has been associated with a wide variety of human actions (Rollnick & Heather, 1982; Yang et al., 2012) and has been defined as a belief that one possesses the necessary skills for a particular behavior (Schwarzer & Fuchs, 1995). It has been shown to influence how individuals think, feel, and act (Elango, Dowpiset, & Chantawaranurak, 2018). In relation to an FDS, the following hypothesis can thus be developed:

H13: *Self-efficacy has a significant positive direct effect on intention to use.*

- Moderators

Many technology adoption studies (e.g. Venkatesh et al., 2003; Francioni et al., 2022) have determined that four respondent characteristics, namely, gender, age, experience, and income, have a direct impact on the other constructs, including user intention to avail themselves of the system. These four constructs are therefore hypothesized in this study to moderate each of the 13 variables discussed above that have a direct impact on Intention to Use (Hypotheses H1-H13). UTAUT supports gender, age, and experience moderating effects (Venkatesh et al., 2003). As can be seen in Table 2, there is a large body of online system research showing that gender, age, experience, and wealth moderate the direct impacts of social influence, self-efficacy, complexity, compatibility, and facilitating factors on intention (Lisana, 2021). It is important to note, though, that there are very few studies on moderating effects in the context of FDS. This is precisely why the following hypotheses are regarded as exploratory. However, they represent one of the main contributions of this study:

H14-17: *Gender (H14), Age (H15), Experience (H16), and Income (H17), each have a significant moderating impact on the direct effect of each of the variables hypothesized in H1-H13 on intention to use.*

Table 2: Studies Supporting Moderating Effects

Variable with Direct Effect on Intention	**Moderator**			
	Gender	**Age**	**Experience**	**Income**
Social Influence	Hamza & Shah (2014), Musa, Khan, & AlShare (2015), Wong, Leong, & Puah (2020).	Eze & Poong (2013), Musa et al. (2015), Shin (2009), Sobti (2019)	Giovanis et al. (2019), Yunpeng & Jamal (2018)	Eze & Poong (2013)
Self-Efficacy	-	Shin (2009)	-	-
Complexity	Hamza & Shah (2014), Wong et al. (2020)	Alsswey & Al-Samarraie (2020), Sobti (2019), Zhu et al. (2018)	-	-
Compatibility	Bao, Chen, & Guo (2013), Giovanis et al. (2019), Kalinić et al. (2019), Liébana-Cabanillas, Sánchez-Fernández, & Muñoz-Leiva (2014a), Liébana-Cabanillas et al. (2018), Yunpeng & Jamal (2018)	Alsswey & Al-Samarraie (2020), Eze & Poong (2013), Giovanis et al. (2019), Musa et al. (2015)	Giovanis et al. (2019), Liébana-Cabanillas et al. (2014b), Musa et al. (2015), Yunpeng & Jamal (2018)	Eze & Poong (2013)
Facilitating Conditions	Lee, Lee, & Rha (2019)	Sobti (2019), Yunpeng & Jamal (2018)	-	-

Source: Lisana (2021)

- ***Theoretical Model***

Figure 1 presents the theoretical model, which shows the hypothesized direct and moderating effects discussed above. Groups are used to represent the nature of the variables.

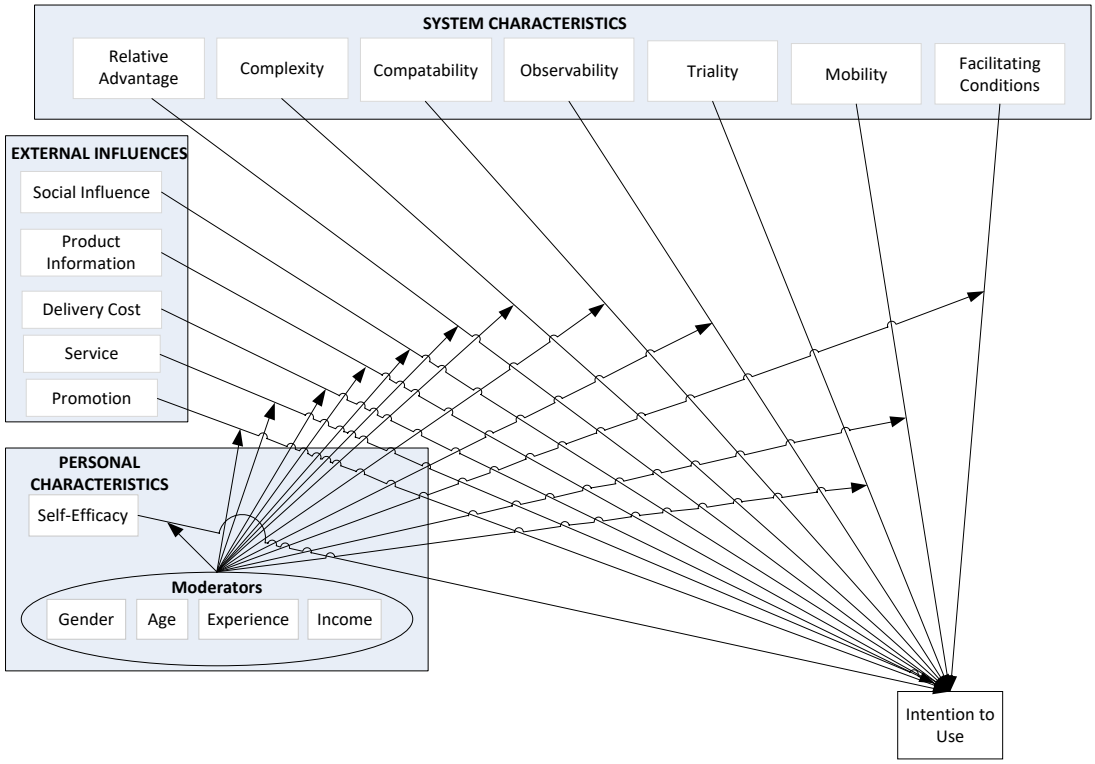

Figure 1: Theoretical Model (created by the author for this study).

3. Methodology

This quantitative cross-sectional study used a questionnaire to examine FDS and address the research questions. A Thai-English self-administered questionnaire was created based on Neuman's (2006) design guidelines and evaluated by a focus group of five qualified individuals. It includes three sections. Section 1 contains participant instructions, Section 2 records the respondents' gender, age, education, occupation, and monthly income; and Section 3 examines the theoretical model's variables. In order to increase the validity and reliability of the measurements of the variables, various measuring tools were used as shown in Tab

Table 3: Measurement of Variables

Variable	Indicator	Existing Measuring Instrument
Relative Advantage (RA)	RA1 – 4	Mandari et al. (2017)
Complexity (CPX)	CPX1 – 3	Kim et al. (2010)
Compatibility (C)	C1 – 3	Hamza (2014)
Observability (O)	O1 – 3	Siswantara & Muthmainnah (2020)
Triality (TRI)	TRI1 – 3	Wahid & Iswari (2007)
Mobility (M)	M1 – 3	Kim et al. (2010)
Facilitating Condition (FC)	FC1 – 5	Venkatesh et al. (2003)
Social Influence (SI)	SI1- 3	Al Mansoori, Sarabdeen, & Tchantchane (2018)
Product Information (PI)	PI1- 5	Venkatesh et al. (2003)
Delivery Cost (DC)	PP1- 3	Quelch & Klein (1996)
Service (PS)	PS1- 3	Quelch & Klein (1996)
Promotion (PPR)	PPR1- 7	Sealy (1999)
Self-Efficacy (SE)	SE1- 5	Saxena, 2018
Intention to Use (IU)	IU1 - 7	Susanto & Aljoza, 2015; DeLone & McLean, 2003

In this table, each variable is a latent variable with its indicator measured on a 7-point Likert scale ranging from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*). The Age, Experience, and Income moderators are ordinal level measures and the Gender moderator nominal level. The target population in this study were Internet-connected 19-to-54-year-old Bangkok residents who have had FDS experience. Given these criteria, the desired population may well surpass 100,000. Based on 5% precision and 95% confidence, 400 was the required sample size (Israel, 2003). This sample size ensured the study's statistical validity. Because there was no sampling frame, Google Forms were used to distribute the surveys to the target population using a purposive sample method. The researcher's connections helped as well.

4. Data Preparation and Analyses

The initial sample consisted of 428 responses. Data entry accuracy in an SPSS worksheet was tested using 43 random surveys (10 percent). There was no error. However, ten surveys had missing values and had to be removed from the sample. Outlier screening excluded another 18 surveys, leaving 400 questionnaires in total. A Principal Component Factor analysis was conducted to assess the latent variable construct validity. PS1-3, Observability, and Delivery Cost indicators showed high cross-loadings in the original analysis. To fix, service was deleted. Indicators loaded strongly into only their latent variable with loadings of 0.4 or more and eigenvalues of at least 1. The remaining latent variables had loadings of 0.4 or larger and eigenvalues of 1. (Straub et al., 2004). Cronbach Alpha coefficients assessed indication reliability. Each coefficient exceeded the 0.7 threshold (George & Mallery, 2003). Descriptive statistics for model variables (mean, variance, skewness, kurtosis) show skewness and kurtosis less than 3 and 7, respectively. Thus, an SEM analysis with maximum likelihood estimation is appropriate (Kline, 2016). Grab leads the FDS market, followed by Lineman, Robinhood, and Food Panda. Participants in the survey have diverse employment. Housewives (36%), however, dominate. 58% of the respondents have a master's or doctorate degree, and 98% a bachelor's degree. Table 4 shows the proposed groups within each moderator that were used in the SEM analyses of the moderator effects and the bases for the selection of these groups.

Table 4: Proposed Moderator Groups

Moderator	Group 1	Group 2	Basis for Groups
Gender	Males (187)	Females (213)	Frequency distribution for Gender
Age	19-38 years Generation Y (220)	39-54 years Generation X (180)	These two groups are reported in the literature to be the dominant users of FDS.
Experience	Use FDS 10 times per week or less (229)	Use FDS 11 times per week or more (171)	The median of the distribution
Income	50,000 Baht per month or less (200)	More than 50,000 Baht per month (200)	The median of the distribution

T-tests, with $p < 0.05$, showed that:

(a) For each moderator group, the mean values for all the model variables, except for Complexity, are significantly greater than the *neutral* value of 4 on the 7-point measurement scale. For all groups, the means for Complexity are significantly less than the *neutral* value of 4. This indicates that for all groups, all of the model variables are highly relevant to the use of FDS.

(b) For males, Generation Y, and more frequent users of FDS, Triality is significantly less important than for the other group.

(c) Promotion, Self-Efficacy, and Intention to Use are significantly less important to males than females.

(d) For Generation Y Self-Efficacy, Intention to Use, and Delivery Cost are significantly less important than for Generation X.

(e) Less frequent users of FDS place significantly more importance on Promotion compared to more frequent users.

(f) Those with lower incomes find FDS to be significantly less complex than those with higher Incomes.

Table 5 shows the correlations among the model variables. Statistically significant coefficients ($p < 0.05$) are in bold type.

Table 5: Correlations

Variable	RA	CPX	CI	OI	TRI	M	FC	SI	PI	**DC**	PPR	SE
Relative Advantage (RA)	1											
Complexity (CPX)	**-.211**	1										
Compatibility (CI)	.011	**-.104**	1									
Observability (OI)	**.250**	**-.430**	**.177**	1								
Triality (TRI)	**.144**	**-.384**	**.239**	**.439**	1							
Mobility (M)	**.225**	**-.272**	**.198**	**.405**	**.348**	1						
Facilitating Conditions (FC)	**.169**	**-.217**	.063	**.373**	**.391**	**.233**	1					
Social Influence (SI)	.012	**-.196**	**.111**	**.147**	**.121**	.080	.060	1				
Product Information (PI)	.021	.029	**.256**	.079	**.160**	**.166**	.040	**.127**	1			
Delivery Cost (DC)	**.241**	**.401**	**.208**	**.515**	**.467**	**.414**	**.374**	**.277**	**.204**	1		
Promotion (PPR)	**.263**	**-.440**	**.160**	**.595**	**.366**	**.350**	**.370**	**.186**	**.007**	**.498**	1	
Self-Efficacy (SE)	**.153**	**-.224**	.077	**.279**	**.237**	**.203**	**.167**	**.082**	.027	**.363**	**.356**	1
Intention to Use (IU)	**.396**	**-.294**	.028	**.123**	.047	**.265**	**.356**	.066	**.304**	.030	**.217**	**.267**

From the last row in Table 5, it can be seen that the correlations between Intention to Use and four of the model variables (Compatibility, Triality, Social Influence, and Delivery Cost) are not statistically significant. However, all the other correlations with Intention to Use are statistically significant. Most of the model variables are significantly correlated with each other.

5. Model Analyses

Amos software was used to analyze SEMs. This format displays all effects. The unstandardized effect is shown first, followed by *, **, ***, or NS, indicating that the statistical significance is 0.05, 0.01, 0.001, or not statistically significant at 0.05 or less. The standardized effect is shown in parentheses, followed by an interpretation of its magnitude: Small (S, ≤ 0.1), Medium (M, between 0.1 and 0.5), or Large (L, ≥ 0.5) (Cohen et al., 2013). Figure 2 shows the direct effects in the SEM analysis of the model.

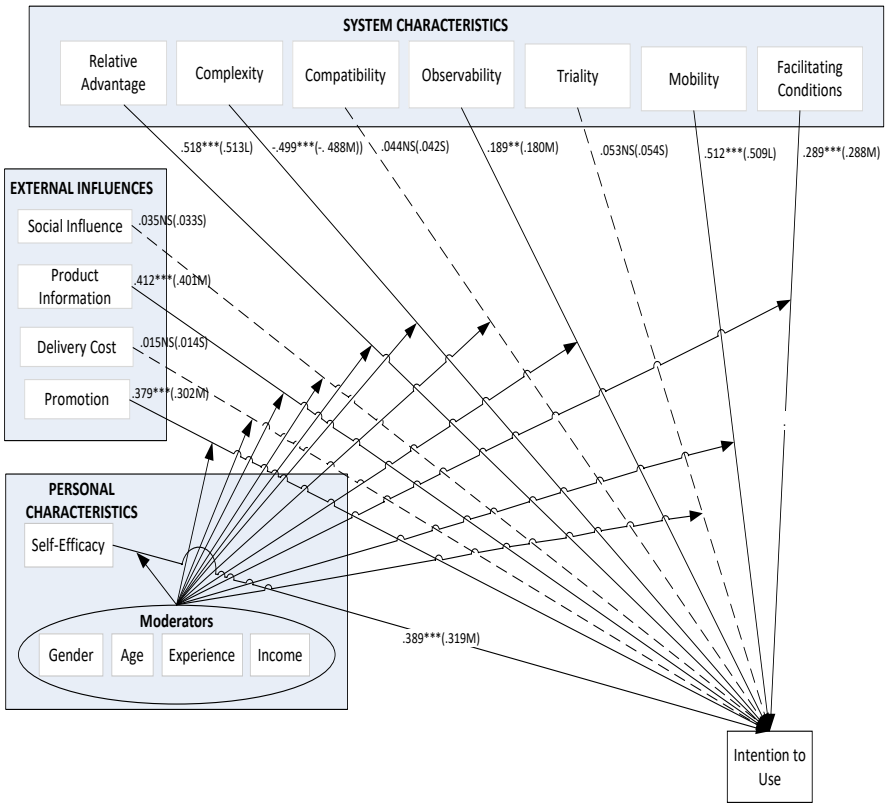

Figure 2: Direct Effects in the Model (created by the author for this study)

Following Kline (2016), the fit statistics for the modified theoretical model are $\chi 2$ = 2215.660, df = 1299, NC = $\chi 2$/df = 1.706, RMR = 0.024, GFI = 0.916, AGFI = 0.901, NFI = 0.915, IFI = 0.925, CFI = 0.924, and RMSEA = 0.042. The fit statistics are a clear indication of a good fit between the data and the model. If any or all of the three small effects (dashed lines) are deleted, then the improvements in the fit statistics are negligible, and so the model in Figure 2 is accepted as a final satisfactory model where 80 percent of the variance in Intention to Use is explained by the 12 variables affecting it. Table 6 presents details of the only six significant moderator effects ($p < 0.05$).

Table 6: Significant Moderator Effects

Unstandardized Effect on Intention to Use			**Difference**	**Magnitude of the Critical Ratio for the Difference**
Gender				
	Males	Females		
Facilitating Conditions	.105 NS	.389***	-.284	2.61**
Self-Efficacy	.115**	.394***	-.280	2.59**
Age				
	Generation Y	Generation X		
Compatibility	.013NS	.189**	-.176	2.10*
Self-Efficacy	.106**	.401***	-.295	2.67**
Experience				
	≤ 10 times per week	≥ 11 times per week		
Relative Advantage	.528***	.311***	.217	2.50*
Income				
	≤ 50,000 Baht per month	> 50,000 Baht per month		
Complexity	-.301**	-.512***	.211	2.31*

In Table 6, considering effects on Intention to Use, the effect is significantly stronger for:
(a) Females than males for Facilitating Conditions and Self-Efficacy;
(b) Generation X than Generation Y for Compatibility and Self-Efficacy;
(c) Those with less experience than those with more experience for Relative Advantage;
(d) Those with higher incomes than those with lower incomes form Complexity.

6. Discussion and Conclusion

The characteristics of the 400 participants showed that they were suited to participate in the study. The results are first discussed from a theoretical perspective and then from a practical one.

- *From a Theoretical Perspective:*

(a) Hypothesis H11 about Service could not be tested because the measures of Service were not valid and instead measured parts of Observability and Delivery Costs. Among the other 12 hypotheses on significant effects on Intention to Use, only four (Compatibility, Triality, Social Influence, and Delivery Cost) were not supported. This represents considerable consistency with the limited number of relevant previous studies (Hamza, 2014; Wahid & Iswari, 2007; Tobbin & Kuwornu, 2011; Quelch & Klein, 1996). As to the hypotheses that were supported, the significant effects on Intention to Use were in decreasing order of magnitude due to Relative Advantage and Mobility (both large), Complexity, Product Information, Self-Efficacy, Promotion, Facilitating Conditions, Observability (all medium), Triality, Compatibility, Social Influence, and Delivery Cost (all small).

(b) As shown in Table 6, only six of the 48 hypothesized moderator effects were supported. Four of these hypothesized moderator effects were exploratory in nature. They involved Gender, Age, Experience, and Income and represent an essential contribution and a strong motivation for further studies on moderator effects in relation to FDS.

- *From a Practical Perspective:*

Table 7 sets a hierarchy of eight actions listed in decreasing order of their influence on the objective of increasing one's intention to use FDS. This hierarchy does not include small effects. Based on the analyses of moderator effects, target groups for theese actions are suggested.

Table 7: A Hierarchy of Practical Actions to Increase Intention to Use

Action ***Ensure that:***	**Associated Model Variable**	**Target Group**
1. Continued development of features that make FDS superior to other means of obtaining food.	Relative Advantage	Frequent FDS users
2. Future developments in mobile technologies continue to provide excellent access to FDS.	Mobility	All users
3. FDS are easy to use.	Complexity	Those with higher incomes
4. Product and service information is available in clear form.	Product Information	All users
5. Users feel confident about their abilities to use FDS.	Self-Efficacy	Males and Generation Y
6. FDS is promoted strongly among users.	Promotion	All users
7. Users believe that infrastructure exists to support their use of FDS.	Facilitating Conditions	Males
8. Users are aware of innovations to FDS.	Observability	All users

In practice, the actions in Table 7 need to be decomposed further to develop plans specific to each particular FDS. For each action, there should be:

(a) Statistical information about the number of customers who are using the FDS.

(b) Comparative information about the costs of food items and delivery times from offline vendors, other online vendors, or the home preparation of food.

(c) Comparative information about the main FDS user groups.

(d) Testimonials from users, especially frequent FDS user groups, highlighting the advantages of using FDS and the factors that positively affect FDS usage so that FDS providers can adapt the interface of the FDS application to attract more users.

(e) An advancement of mobile technologies that gives more people access to FDS applications and helps to reduce the complexity of FDS applications, gaining more users and attracting the intended target group in the process.

(f) Relevant information provided to users, such as product, service, and promotional information. Providers can also integrate promotion campaigns into FDS applications and create easy-to-use applications without users having to find information about promotions elsewhere and add complications when trying to apply for the sales/promotional campaign.

(g) An advancement in technology of FDS applications, an adjustment by providers of statistical data and feedback from users, a better infrastructure to support the use of the selected FDS applications, and an empowerment of customers to imbue them with confidence in their ability to use the applications. This will cause users to adopt the more stabled, and easy-to-use applications, those providing well-rounded services.

Obviously, updated information on services, products, payment methods, and improved communication methods should be made clear to customers to ensure that to users are kept aware of innovations in FDS applications. In conclusion, this study has contributed to enhancing the understanding of FDS by: (i) filling a gap in the literature on FDS, particularly in the context of Thailand; (ii) developing and evaluating a new theoretical model derived from previous studies in order to explain an individual's intentions to use a particular FDS; (iii) evaluating the moderating effects of gender, age, income, and experience and how they may directly influence one’s intention to use FDS; and (v) reporting the practical implications of the findings.

- *Suggestions for Further Studies*

Naturally, this study has limitations. For one, it would be erroneous to claim that all the possible constructs related to intention and FDS have been included in this new theoretical model. This is the case in particular with the validity of the measurement of Service, which, as a model construct, requires further investigation. Moreover, since the findings related to moderator effects are considered to be exploratory in nature, future studies should be conducted for further validation. In addition, a repetition of this study is recommended to enhance external validity.

The new findings should also be the subject of future studies. Further evaluation should include the following:

(a) A new theoretical model derived from existing theory is developed and evaluated.

(b) The effects of Compatibility, Triality, Social Influence, and Delivery Cost on Intention to Use FDS are small and not statistically significant. Also, none of these four variables has a statistically significant correlation with Intention to Use. These findings are different from those reported in several previous studies.

(c) There are significant correlations between Intention to Use and 12 of the hypothesized variables for which a significant effect on Intention to Use was supported. In previous studies, these correlations were rarely reported or discussed.

(d) The findings for moderator effects, significant or otherwise, are considered to be new findings. They begin to address the lack of thorough study of moderators in relation to FDS;

(e) The measures of Service, derived from Quelch and Klein (1996), failed to exhibit satisfactory construct validity. Future studies should address this problem.

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