An Extended Expectation-Confirmation Model for Continuance Intention to Use Online Food Delivery Applications in the COVID-19 Social Distancing Situation

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As COVID-19 has become a global pandemic, social distancing and the lock down policy have been used to control the spread of contagious illnesses. During this difficult period of time, consumers dramatically change their daily life and buying behaviours. In Thailand, food delivery is cited as among the few businesses that gain benefit from the outbreak since the government rolls out lockdowns across the country and all restaurants were required by the government's order with the only option of food takeaway and delivery. Online food delivery platforms and applications were seeing a boom and gained several new users. The purpose of this study is to develop an extended expectation-confirmation model to determine customer's continuance usage intention toward online food delivery applications in the COVID-19 social distancing situation. A research model based on the expectation-confirmation model was built and empirically tested using data from 129 online food delivery users in Thailand. Structural Equation Modelling (SEM) was used to validate our purposed model and test the hypotheses. The results showed that perceived usefulness and confirmation are important determinants of consumer satisfaction, while perceived usefulness, satisfaction and risk perception of COVID-19 are important drivers of continuance usage intention. Interestingly, the effect of risk perception of COVID-19 (Beta = 0.464) is found to be relatively higher than perceived usefulness (Beta = 0.279) and satisfaction (Beta = 0.383) for continuance usage intention. The integrated model has good explanatory power (57.6%) to predict customer's continuance usage

intention toward use of online food delivery application during COVID-19 social distancing situation.

Key words: *Continuance usage intention, Expectation confirmation model, Online food delivery applications, COVID-19, Thailand.*

Introduction

On 11 March 2020, the world and the World Health Organization (WHO) declared the novel coronavirus (COVID-19) outbreak a global pandemic. The COVID-19 pandemic has fundamentally changed the world. People are living, thinking and purchasing differently in many ways. The projection of global GDP in 2020 is currently for a decline from 3% to 1.8% as a result of the continuously growing COVID-19 outbreak (Deloitte, 2020). While traditional industries like manufacturing or tourism have suffered tremendous losses from the COVID-19 pandemic, social distancing situation and shut and lock down policies, various digital platform businesses and online services have benefited. An online food delivery business is seen as one of the few businesses that benefited from the COVID-19 outbreak. According to O'Byrne (2020), the global food delivery industry has been growing substantially during the COVID-19 pandemic. For example, Chinese food delivery market grew by 20% in January 2020 compared to a year earlier. In February 2020, 21% of consumers ordered edible groceries online, up from 18% in the same month last year in the U.S. And takeaways and fast food sales, including deliveries also rose 8.7% in UK. In Thailand, food delivery business in 2019 was worth 33-35 billion baht, up 14% from 2018. Kasikorn Research Centre cited in the Bangkok Post (2020a) projects 17% growth for online food delivery through apps in 2020 as a result of the COVID-19 outbreak has discouraged people from visiting restaurants. According to the survey on March 2020 by Electronic Transactions Development Agency (ETDA), the results found that: 85% of survey respondents used online delivery services during the COVID-19 pandemic; and 40% of online food delivery service users mentioned that the fear of COVID-19 infection is the main reason to adopt and use online food delivery services. Among those respondents who used online food delivery services, 89% ordered food via online applications such as GrabFood, LINEMAN, Foodpanda, Get Food and so on. Figure 1 represents the booming of online food delivery services in Thailand during COVID-19 situation.

Figure 1: Delivery drivers from several online food delivery service providers waiting for customer's orders during the COVID-19 outbreak in Thailand

Source: http://iotbusiness-platform.com/blog/covid-19-trends-likely-to-stick-bangkok-post/

The fear of Covid-19 infection is a catalyst for online food delivery application usage. Risk perception of COVID-19 can be realised as "the push factor" to motivate adoption and continuance usage intention of online food delivery applications. However, to the best of our knowledge, empirical research pertaining to adoption and continuance usage of online food delivery application are very limited and this has not been fully studied and tested by academics and researchers especially, during the unprecedented challenges from COVID-19. Therefore, in order to address this research gap, we advance the body of knowledge in this field by proposing an extended expectation-confirmation model for online food delivery applications during COVID-19 pandemic. This study may contribution more insight and understanding for practitioners with motivational factors and users' attitude and behaviour toward continuance usage of online food delivery service applications.

The structure of the paper is as follows. In section two, literature review, proposed research model and hypotheses development are discussed. Section three includes the research design, data collection process and questionnaire development. Results of the study are represented in section four. Finally, discussion and conclusion including limitation and future research are described in section five and six.

Literature Review and Theoretical Background
Online Food Delivery Applications

According to Alalwan (2020), online food delivery applications can be defined as mobile applications that smartphone users download and use as a convenient channel to access restaurants, view food menus, place food orders and make payments without any physical interaction with restaurant staff. According to Euromonitor International cited in Bangkok Post (2020a), the share of online orders to total food service sales worldwide has almost tripled from 2.6% in 2014 to 6.9% in 2019, as online delivery platforms prosperity. By utilising these applications, users can more simply and efficiently contact and order their food from an extensive range of restaurants at times and locations convenient to users. Online food delivery applications also offer customers more comprehensive, up-to-date and precise information about restaurants and menu options. Accompanying this information is the ability for customers to see their order progress through all its stages. Online food delivery applications contain numerous advanced features that support both customers and restaurants overcoming problems such as long waiting times, traffic jam, miscommunication, delayed delivery and dealing with customers' complaints Alalwan (2020). Yeo, Goh & Rezaei, (2017) stated that there are two types of service providers that provide food delivery services. The first are restaurants themselves. This category largely consists of fast food chains such as Pizza Hut, McDonalds, Domino's Pizza, Kentucky Fried Chicken and so on. The second category is comprised of multiple restaurant intermediaries that provide delivery services for numerous restaurants. Examples include Food Panda, LINEMAN, GrabFood, Lalamove, GET, NOW and so on.

Food applications were the second most downloaded applications by Apple iOS users in 2015 and around 60% of food catering customers had already adopted at least one online food delivery application (Alalwan, 2020). Approximately 30% of food orders in Thailand come from major name brand restaurants while 70% are from SMEs and street food stalls (CBRE, 2020). Online food delivery businesses have expanded to other large cities in Thailand apart from Bangkok, the capital city. GrabFood and LINEMAN, two of leading companies in online food delivery business in Thailand, have been competing to gain market share outside Bangkok. GrabFood is now providing ride-hailing services in 20 cities across 18 provinces. The company aims to expand capabilities to more second-tier cities with a high number of tourists. LINEMAN, which claimed that more than 100,000 restaurants in Bangkok, Samut Prakan and Nonthaburi and 3,000 shops in Pattaya have been associated with them, is also targeting to cover 25% of Thailand by 2020 (CBRE, 2020).

The body of knowledge about online food delivery application adoption and continuance usage is still in the early stage. There have been attempts to investigate factors affecting customer's adoption of online food delivery applications. A previous study of Pigatto,

Machado, Negreti & Machado (2017) revealed that content, usability and functionality impacted on customers' adoption of online food delivery applications. Yeo, Goh & Rezaei (2017) found that as long as consumers perceive that using such online food delivery applications is enjoyable, useful and making their daily life much easier, consumers are more likely to have more positive attitudes and to be willing to continue using those applications. Online food delivery applications' capability to save users' time and money has an impact on attitude and behavioural intention towards online food delivery services.

Expectation-Confirmation Theory

In previous information technology adoption research has not articulated the differences in user perceptions between the initial adoption and the continued usage although there have been some theoretical supports for the differences between adoption and continued usage (Hong, Thong & Tam, 2006). Bhattacherjee (2001) stated that the ultimate success of new information technology is more dependent on users' continuance usage rather than its initial adoption. The importance of continuance usage has been confirmed from the fact that acquiring new customers may cost as much as five times more than retaining existing ones (Bhattacherjee, 2001). Increasing customer retention rate by 5% could result in a decrease of operating costs by 18%, and contribute to an increase in profits by 25% to 95% (Hong, Thong & Tam, 2006). As an attention to the difference between initial adoption and continued usage behaviour in an information technology context, Bhattacherjee (2001) introduced an expectation-confirmation model (ECM) to examine information system continuance by drawing on expectation confirmation theory. The model highlights the impact of a user's expectation and subsequent confirmation of using an information system on their satisfaction and perceived usefulness, which eventually influence information system continuance usage intention (Joo & Choi, 2016). ECM is comprised of four main constructs namely: confirmation, perceived usefulness, satisfaction and continuance usage intention. Confirmation is defined as the extent to which users perceive that their initial expectations are being confirmed during actual use. Perceived usefulness is another important construct of ECM. Perceived usefulness is found to be the stable variable to investigate user behaviour, both initial and post-adoption stages (Venkatesh, Morris, Davis & Davis, 2003). ECM emphasises that expectation beliefs in post-consumption use and confirmed expectation on perceived use performance are important dimensions of perceived usefulness as a post-ante expectation (Bhattacherjee, 2001). Perceived usefulness and confirmation from prior use significantly influence users' satisfaction in adopting and using a technology. Confirmation also influences perceived usefulness. Perceived post-acceptance usefulness and user satisfaction lead to continuance intention to use (Susanto, Chang & Ha, 2016). Prior research has extended ECM to understand consumer behaviour in different continuance contexts (Zhang, Lu, Gupta & Gao, 2015). Thong, Hong & Tam (2006) attempted to expand the set of post-adoption beliefs in the ECM by adding perceived enjoyment and perceived ease of use

into an original ECM. The expanded ECM had good explanatory power to explain satisfaction and continued IT usage intention in mobile internet service context. Oghuma, Libaque-Saenz, Wong & Chang (2016) expanded the ECM by integrating perceived usability, perceived security and perceived service quality to explain continuance intention to use mobile instant messaging. They found that perceived service quality and perceived usability significantly affect user satisfaction and continuance intention to use mobile instant messaging. Perceived service quality also influences confirmation, which in turns affects perceived usability. Humbani & Wiese (2019) developed and tested an integrated model of the modified technology readiness index (TRI) with the extended expectation-confirmation model to explain the adoption and the intention to continue to use mobile payment applications.

Under the circumstance of COVID-19, mobile food applications have gained substantial demand. According to the recent statistics from Apptopia, the average daily downloads of food delivery apps like Grocery, Walmart, Shipt have increased to 160%, 124% and 218% respectively during the COVID-19 outbreak. People adopted and used online food delivery applications as a result of the fear of getting infected and the social distancing policy. Digital restaurant orders increased by 63% and delivery by 67% in March 2020 in U.S. (Mobilepaymentstoday, 2020). According to Cori, Bianchi, Cadum & Anthonj (2020), risk perceptions refer to people's intuitive evaluations of hazards that they are or might be exposed to. It also includes a multitude of undesirable effects that people associate with a specific cause. The perception of risk is the subjective judgment that people create regarding the characteristics, severity and way in which the risk is managed. According to Gupta (2020), the public overall remains wary of frequenting businesses, with 44% saying they would be uncomfortable visiting a grocery store and 78% saying they would be uncomfortable eating at a restaurant in the U.S. There was also some evidence that increased reliance on food delivery happened in China. There was a 20% growth in spending on food deliveries in China during January 2020, compared to the previous year. Based on this premise about risk perception and changes in online food delivery usage, the authors included risk perception of COVID-19 as one of the predictors of continuance usage into the ECM. We proposed that risk perception of COVID-19 may be the "push factor" to trigger people's adoption and continuance usage of online food delivery applications.

Research Framework and Hypotheses Development

The purpose of this study is to develop the extended ECM for explaining continuance usage intention of online food delivery applications during the COVID-19 pandemic. The original ECM contains four constructs namely: perceived usefulness, confirmation, satisfaction and continuance usage intention (Bhattacherjee, 2001). Risk perception of COVID-19 was included in our proposed model framework as a result of social distancing and the

governments rule in regards the only option of food takeaway and delivery. One of our assumptions is that the perceived risk of COVID-19 plays as a catalyst for online food delivery adoption and continuance usage. The proposed research framework in this study is shown in Figure 2.

Figure 2: The proposed research framework
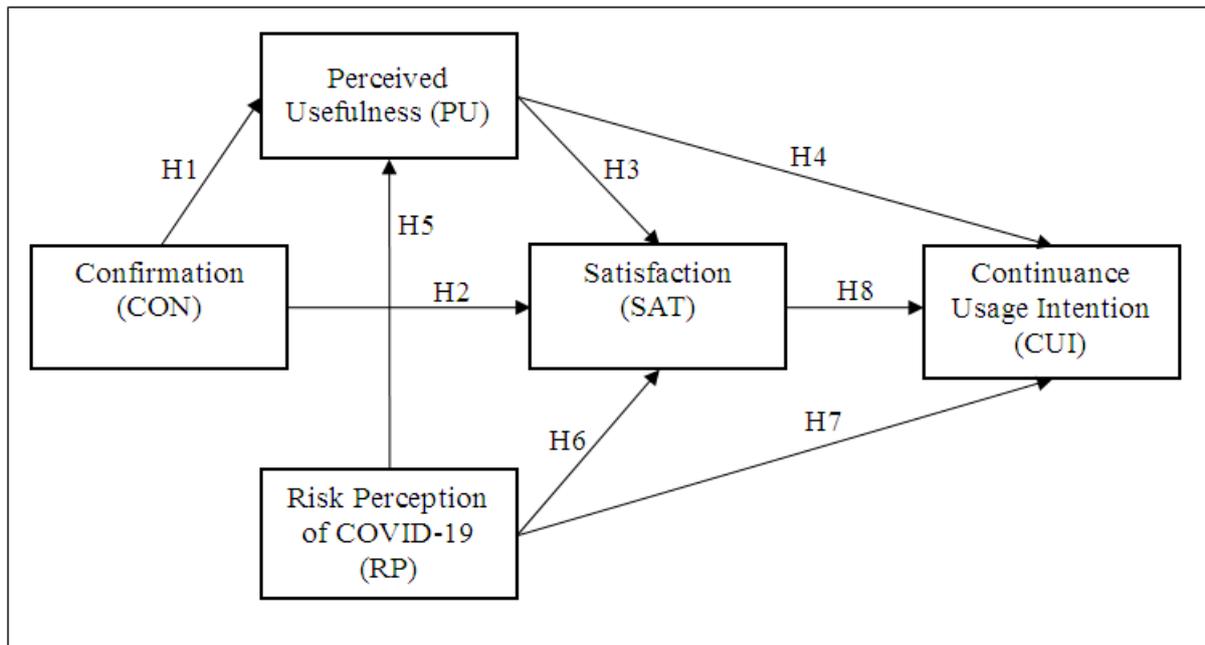
Based on the proposed research framework, the hypotheses are as follows.

H1: Confirmation (CON) will have a positive impact on perceived usefulness (PU).
H2: Confirmation (CON) will have a positive impact on satisfaction (SAT).
H3: Perceived usefulness (PU) will have a positive impact on satisfaction (SAT).
H4: Perceived usefulness (PU) will have a positive impact on continuance usage intention (CUI).
H5: Risk perception of COVID-19 (RP) will have a positive impact on perceived usefulness (PU).
H6: Risk perception of COVID-19 (RP) will have a positive impact on satisfaction (SAT).
H7: Risk perception of COVID-19 (RP) will have a positive impact on continuance usage intention (CUI).
H8: Satisfaction (SAT) will have a positive impact on continuance usage intention (CUI).

Research Methodology
Research Design and Data Collection

The empirical part of this study was conducted in Thailand using a questionnaire survey, from April to May 2020. Convenience sampling was used to distribute a self-administered questionnaire via Google Forms. In order to improve the credibility of the research all the participants who were selected for the survey were actual online food delivery application users. A preliminary screening question was asked: during the COVID-19 pandemic, social distancing and lockdown situation, have you ever used any online food delivery applications to order foods? Only those respondents who answered "yes" to the question were allowed to take part in the survey. The questionnaire consisted of three sections. In the first section the main purpose of the study was explained and online food delivery applications were clarified with examples (GrabFood, Foodpanda, LINEMAN, GET, Lalamove, Skootar, Honestbee and Now). The second section was devoted to demographic and behavioural questions, while the third section was for the main construct items. A five-point Likert Scale was adopted to measure the main items (1 = strongly disagree/5 = strongly agree, 1 = not at all worried/5 = extremely worried, 1 = not probable/5 = very probable).

Questionnaire Development

Our study attempted to extend the ECM framework (Bhattacherjee, 2001). Therefore, we adopted the ECM to investigate the continuance use intention of online food delivery applications. In addition, perceived risk of COVID-19 was added to our proposed research model. Perceived usefulness was measured by 5 items adapted from Lee, Sung & Jeon (2019). Confirmation was measured by 3 items adapted from Foroughi, Iranmanesh, & Hyun (2019). Satisfaction was measured by 4 items and continuance usage intention was measured by 3 items modified from Bhattacherjee (2001) and Rahi & Ghani (2019). For the risk perception of COVID-19, the authors adopted 6 measurement scales from Gerhold (2020) and Huynh (2020) combining with the self-development of measurement since there are limited prior works. In total, there were 21 questionnaire items and the detail of constructs and measurement scales are shown in Table 1.

Table 1: Questionnaire constructs and variables

Constructs	Items	Observed Variables
Perceived Usefulness (PU)	PU1	I find online food delivery applications useful in my daily life.
	PU2	Using online food delivery applications increases my chances of purchasing foods that are important to me.
	PU3	Using online food delivery applications enables me to accomplish the purchasing process easier.
	PU4	I feel safe when I use online food delivery applications for purchasing foods.
	PU5	Overall, online food delivery applications are useful.
Risk Perception of COVID-19 (RP)	RP1	The COVID-19 worries me.
	RP2	I am afraid of being infected by COVID-19.
	RP3	How likely do you think it is that you might become infected with COVID-19 in the near future?
	RP4	How likely do you think it is that people in your family and friends might become infected with COVID-19 in the near future?
	RP5	How likely do you think it is to get COVID-19 in general?
	RP6	Overall, what extent do you worry about COVID-19?
Confirmation (CON)	CON1	My experience with using online food delivery applications was better than what I expected.
	CON2	The service level provided by online food delivery applications was more than what I expected.
	CON3	Overall, most of my expectations from using online food delivery applications were confirmed.
Satisfaction (SAT)	SAT1	I feel satisfied with using online food delivery applications.
	SAT2	I feel pleased with using online food delivery applications.
	SAT3	I feel contented with using online food delivery applications.
	SAT4	Overall, I am satisfied with online food delivery applications.
Continuance Usage Intention (CUI)	CUI1	I intend to continue using online food delivery applications rather than discontinue its use.
	CUI2	Continuing to use online food delivery applications for ordering foods is something I would do.
	CUI3	I will frequently use online food delivery apps in the future.

Results
Sample Profiles

In total 150 online food delivery application users took part in this survey. After eliminating 21 responses with incomplete or invalid data, a total of 129 valid responses were retained for data analysis. Table 2 summarises the demographic statistics of the sample.

Table 2: Descriptive statistics

Item	Description	Sample	(%)
Gender	Male	59	45.57
	Female	70	54.43
Age	Less than 19	20	15.31
	19-38	54	41.98
	39-54	43	33.56
	55 or above	12	9.15
Marital status	Single	71	54.73
	Married	56	43.22
	Other	3	2.05
Education	Below undergraduate	18	13.80
	Undergraduate	52	40.31
	Postgraduate	59	45.89
On average, how much do you spend on online food delivery per transaction?	Less than 300 Baht	39	29.98
	301-500 Baht	46	35.93
	501- 1000 Baht	31	23.86
	More than 1,000 Baht	13	10.23
When do you use the online food delivery application most often?	Morning (Before 10.30 AM)	6	4.54
	Noon (10.30AM – 1.30 PM)	50	39.06
	Afternoon (1.30 – 4.30PM)	29	22.52
	Evening (After 4.30PM)	44	33.88

Note: N = 129; missing data not shown and calculated in the table; 1 U.S dollar = 31.98 Baht.

From a total of 129 respondents, 59 were males (45.6%) and 70 were females (54.4%). Most of the respondents were aged 19–38 years (42.0%), single marital status (54.7%), with postgraduate education background (45.9%). They spend on average 301 to 500 baht per order (35.93%) and the most often time to use online food delivery application is during 10.30AM to 1.30PM (39.1%).

Measurement Model

Following the two-step approach recommended by Anderson & Gerbing (1988) cited in Awang (2015), we initially tested the measurement model to verify the reliability and validity of our research instrument by adopting a confirmatory factor analysis (CFA) approach. After that, we evaluated the structural model and tested our proposed hypotheses. The AMOS program (version 22) was used to estimate both the measurement and structural models.

In order to ensure the measurement of this study, internal consistency, construct reliability, convergent validity and discriminant validity were evaluated. Initially, a Cronbach's alpha test was carried out to assess the internal consistency amongst the measurement items. The results showed that Cronbach's alpha values were all higher than 0.7, indicating their adequacy. Secondly, construct reliability was checked by calculating composite reliability scores. The obtained composite reliability scores of all constructs were above 0.7, which satisfied the recommended threshold. Thirdly, convergent validity was tested by examining the average variance extracted (AVE) and indicator loadings. As shown in Table 3, all AVE values were higher than the recommended minimum of 0.5 (Fornell & Larcker, 1981). The standard loadings of all items were above the desired threshold of 0.7 and significant at 0.001. This showed a good convergent validity. Discriminant validity exists when the square root of the AVE of each construct is greater than its correlation coefficients with other constructs (Fornell & Larcker, 1981). As shown in Table 4, the square roots of the AVEs were larger than the inter-construct correlations depicted in the off-diagonal entries, suggesting acceptable discriminant validity. Overall, the goodness-of-fit indicators for the measurement model above are: Chi-square = 254.349; df = 179; CMIN/df = 1.421; GFI = 0.984; NFI = 0.977; TLI = 0.952; CFI = 0.959; RMSEA = 0.038. This demonstrated a good fit between the model and the data for further structural model analysis.

Table 3: Summary indicators of the measurement model

Constructs and items	Loading	t-value	SE	Alpha	Composite Reliability	AVE
Perceived Usefulness (PU)	-	-	-	0.912	0.751	0.938
PU1	0.809	-	-	-	-	-
PU2	0.865	11.497	0.094	-	-	-
PU3	0.901	12.217	0.077	-	-	-
PU4	0.891	12.012	0.084	-	-	-
PU5	0.864	11.464	0.080	-	-	-
Risk Perception of COVID-19 (RP)	-	-	-	0.903	0.694	0.931
RP1	0.713	-	-	-	-	-
RP2	0.826	9.016	0.124	-	-	-

RP3	0.930	10.148	0.124	-	-	-
RP4	0.907	9.906	0.123	-	-	-
RP5	0.827	9.036	0.129	-	-	-
RP6	0.774	8.451	0.122	-	-	-
Confirmation (CON)	-	-	-	0.920	0.710	0.880
CON1	0.830	-	-	-	-	-
CON2	0.902	11.348	0.097	-	-	-
CON3	0.791	9.940	0.091	-	-	-
Satisfaction (SAT)	-	-	-	0.896	0.535	0.821
SAT1	0.697	-	-	-	-	-
SAT2	0.780	7.311	0.144	-	-	-
SAT3	0.673	6.507	0.150	-	-	-
SAT4	0.770	7.249	0.158	-	-	-
Continuance Usage Intention (CUI)	-	-	-	0.925	0.698	0.874
CUI1	0.819	-	-	-	-	-
CUI2	0.792	9.720	0.095	-	-	-
CUI3	0.892	10.956	0.096	-	-	-

Note: PU1, RP1, CON1, SAT1, CUI1 are fixed parameters

Table 4: Construct correlations and the square root of AVE.

|	PU	RP	CON	SAT	CUI
PU	0.867				
RP	0.313	0.833			
CON	0.567	0.226	0.842		
SAT	0.457	0.501	0.310	0.731	
CUI	0.563	0.451	0.356	0.502	0.835

Notes: Italic diagonal elements are the square root of AVE for each construct. Off-diagonal elements are the correlations between constructs

Structural Model

The result of structural model analysis is shown in Figure 3. Based on the results of path coefficients, confirmation has a significant positive influence on satisfaction (Beta = 0.452) and satisfaction significantly influences continuance usage intention (Beta = 0.383), thus H2 and H8 are supported. Confirmation also has a significant positive influence on perceived usefulness (Beta = 0.452), thus H1 is supported. The positive effects of perceived usefulness on satisfaction (Beta = 358) and continuance usage intention (Beta = 0.279) are both found to be significant, thus H3 and H4 are supported. Additionally, risk perception of COVID-19 has

a significant positive influence on perceived usefulness (Beta = 0.146) and continuance usage intention (Beta = 0.464), thus H5 and H7 are supported. However, risk perception of COVID-19 does not have an effect on satisfaction, thus H6 was not supported.

Figure 3: The result of research model
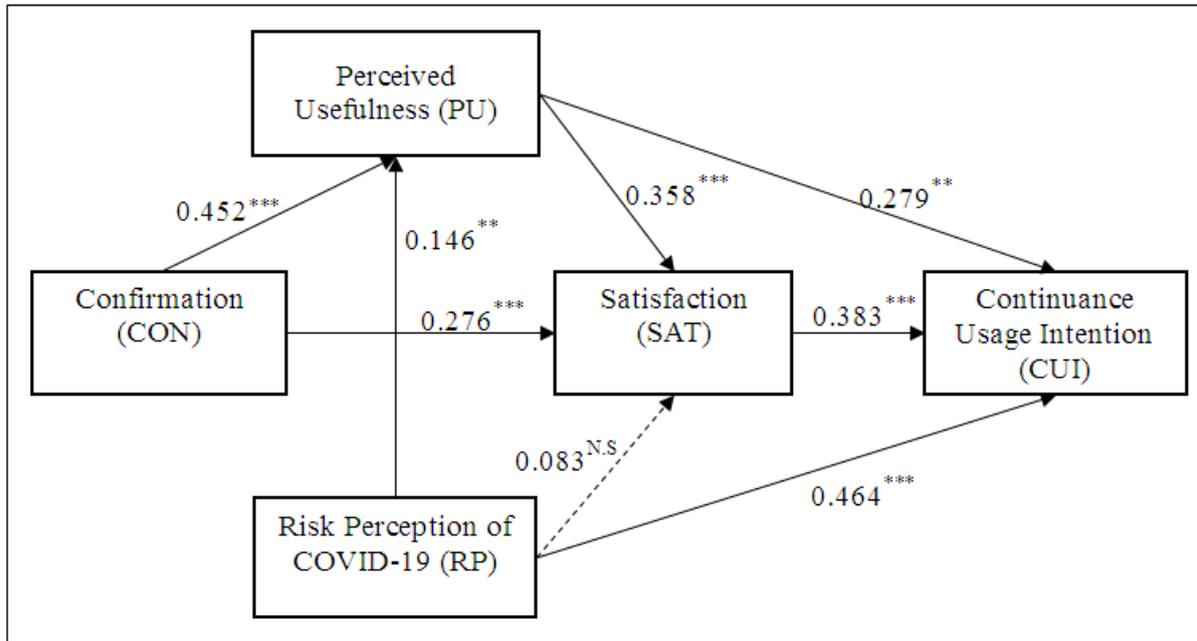
Notes: *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$; N.S: not significant.

Considering the explanatory power (R^2) for satisfaction and continuance usage intention, satisfaction was explained by two exogenous constructs namely: perceived usefulness (Beta = 0.358) and confirmation (Beta = 0.276), accounting for 54.8 per cent of the total variance together. For continuance usage intention, there were three exogenous latent variables namely: perceived usefulness (Beta = 0.279); satisfaction (Beta = 0.383); and risk perception of COVID-19 (Beta = 0.464) positively affected users' continuance usage intention, accounting for 57.6% of the total variance together. Interestingly, the effect of risk perception of COVID-19 (Beta = 0.464) was found to be relatively higher than perceived usefulness (Beta = 0.279) or satisfaction (Beta = 0.383), and confirmation was found to have an indirect effect (0.294; p<0.001; 95% CI [0.111, 0.412]) on continuance usage intention through perceived usefulness and satisfaction. This result indicates that the extended ECM also has a strong explanatory power in predicting users' continuance usage intention of online food delivery application during COVID-19 pandemic.

Discussions and Conclusions

The purpose of this study was to develop an extended expectation-confirmation model to determine customer's continuance usage intention toward online food delivery applications in

the COVID-19 social distancing situation. The COVID-19 pandemic has changed our daily life and accelerated an adoption and continued usage of various digital platforms to cope with this unprecedented phenomenon. Risk perception of COVID-19 acts as the push factor or driver on users' attitudes and behaviours in information system contexts. An online food delivery service business was seen as one of few businesses that survived and prospered during this period of time. Only limited empirical research trying to clarify and provide more insight on how people change their attitudes and behaviours in online food delivery application usage. To enhance the body of knowledge in this subject, the authors proposed an extend expectation-confirmation model by integrating risk perception of COVID-19 to explain continuance usage intention of online food delivery applications. The results show that perceived usefulness and confirmation are important determinants of consumer satisfaction. Perceived usefulness and satisfaction have direct influence on continuance usage intention. Confirmation is also found to have an indirect effect on continuance usage intention through perceived usefulness and satisfaction. These findings are in line with previous studies by Oghuma, Libaque-Saenz, Wong & Chang (2016); Humbani & Wiese (2019); Foroughi, Iranmanesh & Hyun (2019) that show the ECM can be used to explain continuance usage intention in the information system context. Interestingly but not beyond our anticipation, risk perception of COVID-19 has an impact on perceived usefulness and continuance usage intention of online food delivery applications. Moreover, considering path analysis results, we found that during the COVID-19 outbreak with government policies around the world of social distancing and shut and lock down; the effect of risk perception of COVID-19 has a relatively higher impact on continuance usage intention than perceived usefulness and satisfaction. This implies that push factors like fear of infection or perceived risk play a more important role that pull factors like perceived usefulness and satisfaction in digital transformation and an adoption of new technology. Our extended model provides an enhanced way to understand the factors that influence adoption and continuance usage intention towards online food delivery applications during the crisis time. The results also add to existing knowledge of mobile technology literature.

The present study has also a number of implications for online food delivery service providers. A thorough understanding of the determinants of users' continuance usage intention towards online food delivery applications will help the service providers to identify the factors that contribute to continuous online food delivery application use. Online food delivery service providers should communicate prominently to customers about their COVID-19 free policies and also prepare and train their food drivers about how to minimise infection such as: training contactless delivery processes to limit physical contact with delivery drivers; supporting face masks and hand sanitisers to delivery drivers; motivating their delivery drivers to check their temperature daily and get medical assistance when they are sick; and temporary suspension of drivers who confirm they are unwell until the submission of a medical certificate to verify COVID-19 free.

Limitations and Research Recommendations

This study has some limitations that should be taken into account. First, the authors only studied consumers who used online food delivery application in Thailand. The results should be circumspectly generalised in other countries with different cultures. Therefore, more participants from other countries should be included to verify any significant differences in continuance usage intention of online food delivery applications. This will enable future researchers to capture the effects of cultural differences. Secondly, a cross-sectional method was used in this study. Therefore, a precise perspective of explanations on how risk perception could change over time is not able to be captured. A longitudinal study is recommend in future research to comparative examine how users change in their perception, satisfaction and usage over time.

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