Developing Food Safety and Standards of Food Delivery Service in Thailand during the COVID-19 Pandemic

Natissareeya Suksrimuang and Pornthipa Ongkunaruk

Department of Agro-Industrial Technology, Faculty of Agro-Industry, Kasetsart University, Bangkok 10900, Thailand

natissareeya.su@ku.th, pornthipa.o@ku.ac.th

Abstract

Food delivery services have become the main connection between consumers and restaurants during the COVID-19 pandemic in Thailand. Many sectors are affected and must adapt to survive. This study aimed to explore and assess food delivery's importance and satisfaction scores from a customer perspective during the COVID-19. Then, 18 service attributes in terms of tangible, reliability, responsiveness, assurance, and empathy were developed based on a SERVQUAL and the questionnaires were designed and used. Then, the descriptive analysis, the paired T-Test, gap value, and importance-satisfaction analysis were performed to evaluate the satisfaction of the food delivery service. The gap analysis showed that 16 attributes were under expectation. Similarly, there were significant differences between importance and satisfaction scores in 15 attributes. An IS analysis showed that the food delivery service provider should improve in assurance attributes such as privacy and security of the user's personal information, management and control of food safety and food hygiene throughout the delivery to the customer, and knowledge of preventive measures against COVID-19. In summary, food delivery service providers should focus on food safety and other standards to assure the quality of food delivery services in Thailand.

Keywords

Food Delivery Service, Service Quality (SERVQUAL), Importance-Satisfaction Analysis, COVID-19.

1. Introduction

Food delivery services have become the majority connection between consumers and restaurants during the COVID-19 pandemic. The severe and rapidly spreading epidemic situations caused by the coronavirus, or COVID-19 has affected many industrial sectors such as airline and tourism, food industries and society, public health, the economy, etc. The governments in many countries had to seriously introduce self-defense practices by keeping a social distancing from various enforcement measures used to contain the epidemic, such as lockdowns, curfews, and temporary closures of some businesses and activities to suppress and slow down the spread of this virus, so many sectors such as restaurants and hotels were affected (Ozili and Arun 2020). A new normal has been created in daily lives during the COVID-19 situation to drive the economy and society (Baum and Hai 2020). Operating procedures of business and consumer buying and eating behavior have changed (Sheth 2020). Many restaurants have adapted their business models to address the challenge and focus on online delivery (Gavilan et al. 2021), while consumers cannot sit and dine in the restaurant. Hence, consumers, food, and consumption that ever have a relationship were significantly affected (Byrd et al. 2021). Food safety and delivery hygiene are the other concerns of customers (Duda-Chodak et al. 2020; Faour-Klingbeil et al. 2020). According to a delivery survey of the Electronic Transactions Development Agency (2020), the main reasons 80.37% of respondents in Thailand do not want to go to the restaurant to dine in, 57.63% of respondents do not want to waste time in line to buy food, and 47.04% get the in-app discount. It is predicted that the volume of food delivery will increase by 18.4-24.4% compared to 2020 (Kasikorn Research Center 2021). Since the behavior and lifestyle of the customer change, customer satisfaction with services is the important factor that impacts the choice and use of food delivery services. Therefore, SERVQUAL and The Importance-Satisfaction (IS) analysis are taken to assess service quality and to rank the attributes of the customer satisfaction factors in food delivery service during the COVID-19 epidemic in our study.

Based on the situation above, food delivery services are the salient link between consumers and restaurants in Thailand during the pandemic. Therefore, we are interested in and try to study the user's opinion on this service. The purposes of this study are to survey customer satisfaction with the food delivery services using SERVQUAL, to

Proceedings of the International Conference on Industrial Engineering and Operations Management Nsukka, Nigeria, 5 - 7 April, 2022

identify the significant attributes, and to assess customer satisfaction in various attributes from the customer's perspective. The study in this research can support food delivery service providers to understand the customers, improve the food delivery service attributes, and control the service quality, especially in food safety and food hygiene, to cope with the COVID-19 disease.

2. Literature Review

The food delivery business is a new approach to using technology to build a platform and thus a network service system. Food delivery services via smartphone-based applications are used to reach various restaurants. The food delivery processes are as follows: search for foods, order foods for delivery that is ordered from the customer to the food delivery service provider via a web or mobile application, and makes payments without having to direct connection with restaurant employees (Alalwan 2020; Okumus et al. 2018; Wang et al. 2019).

Fakfare (2021) studied the fundamental of service attributes of food delivery service and a basic model to examine service dimensions that impact customer satisfaction and advocating behavioral constructs in support and aim to reuse the application and prioritize the service attributes of food delivery applications. According to the result of the study, five attributes consist of the convenience of use, delivery experience, food rider, reviews, and time-saving food delivery application attributes have good and dominant impacts on user satisfaction and influence, such as support and aim to reuse the service. The previous research used food delivery application dimensions as strongly dependable predictors of satisfaction and variety of customer prosocial behavior. For instance, Suhartanto et al. (2019) showed that food quality, perceived value, and e-service quality strongly impact user satisfaction. In addition, client experience, the convenience of use, listing, and eatery lookups affect intention to use service customers while the delivery experience, convenience, quality control, and social stress are not substantial factors on use application (Ray et al. 2019).

Service Quality refers to the overall assessment from a client of the services provided (Eshghi et al. 2008) or a service that satisfies the requirements or anticipations of the customer (Asubonteng et al. 1996). This is consistent with the needs of service providers to customers or service recipients by measuring the level of service delivered. Delivery service quality means responding to clients based on their expectations (Lewis and Bloom 1983). Parasuraman et al. (1985) described that service quality was stated as the distinction between perceived service provided by a company and customer expectations of a company. If the perception of the customer is lower than the expectation, then it implies that there is a low quality of service. On the other hand, if the perception is higher than the customer expects, it indicates that the service quality is at a high level. A gap analysis tool can use to find this difference. The company can identify what factor has a negative gap and what management action is required. On the contrary, if the gap value shows a positive value, then it denotes that no additional management is required (Tonge and Moore 2007). Parasuraman et al. (1985; 1988) studied service quality and found that there are ten fundamental factors that consumers use to judge the quality of service: 1) Reliability 2) Responsiveness 3) The ability of service providers 4) Access to services 5) Courtesy 6) Communication 7) Reliability 8) Security 9) Understanding and knowing customers 10) Tangibles. Subsequently, all ten factors were developed into a quality assessment tool called "SERVQUAL" by combining the overlapping factors to five factors as follows: 1) Tangibles: The identity or physical appearance of good service provided to the recipient such as the convenient location, suitable and modern tools and equipment, beauty, etc. 2) Reliability or trust: The service recipients are confident that the service is reliable and accurate. For example, service providers deliver food on time and provide complete services as agreed. 3) Demand Response (Responsiveness): Service providers are pleased and cordial to serve. They can fulfill the needs of service receivers and are prepared to assist customers and provide prompt service. For example, staff can answer customer questions immediately. 4) Assurance: The service providers have the knowledge and good-natured service and have capabilities so that the service recipient has confidence in using the service, especially in food safety. 5) Understanding and perceiving the needs of the service recipient (Empathy): The service provider respects the minds and differences of the recipients according to individual characteristics as vital. There is customer care that the agency provides, such as employees are paying attention and friendly.

Food delivery hygiene means maintaining safety and hygiene procedures in food delivery services by couriers. Consumers are concerned about delivery issues during the COVID-19 pandemic and desire to be assured that food delivery services comply with safety and hygiene. Most of the safety and hygiene measures in shipments involve delivery personnel, such as wearing gloves and masks. In the case of food pickup and delivery, other food safety practices should be emphasized, such as cleaning and disinfecting vehicles, equipment, utensils, and packaging used

Proceedings of the International Conference on Industrial Engineering and Operations Management Nsukka, Nigeria, 5 - 7 April, 2022

in food transport. Proper transport of hot and cold food concerning temperature, time, separation of food (raw from cooked) avoids cross-contamination and maintains social distancing when collecting and delivering food (FDA 2020).

From various research, the use of food delivery services depends on various factors, such as ease of use, food delivery, time-saving, etc., which are major factors that contribute to the satisfaction of using the service of food delivery. During the pandemic, food delivery services are also an important connector. Moreover, consumers pay more attention to food hygiene and safety and are aware of food delivery service providers' safety and hygiene during the delivery in the COVID-19 situation and the future. Therefore, we are interested in the perspectives of service users, not only the services and conveniences of application and food delivery riders but also in terms of the safety and hygiene of food delivery services.

3. Methods

3.1 Design a Questionnaire and Survey Method

First, we designed a questionnaire to assess the satisfaction and importance scores in five dimensions of SERVQUAL consisting of tangibles, reliability, responsiveness, assurance, and empathy, based on literature review and expert opinion. Then, 18 attributes were selected for online food delivery. Tan and Eng Kim (2021) showed that perceived price, promotion and discount, convenience motivation, service approach quality, and food quality had a positive impact on customer satisfaction for online food delivery services. In addition, questions were adapted from the studies of Al Amin et al. (2021), who studied the effects of the factors consists of food safety, delivery hygiene, social isolation, personal normative beliefs, consuming attitudes, and behavioral control on the behavioral and continuous intention to use mobile food delivery applications during the COVID-19 crisis. Then, the 18 questions were created based on the attributes from both studies and expert opinion in the five dimensions of SERVOUAL. The questionnaire consisted of four sections. First, the demographic data such as sex, age, education, career, and dwelling region. Second, the evaluation of the customer satisfaction of food delivery services in 18 attributes. Third, the importance of food delivery service in 18 attributes is evaluated. In these sections, the five-point Likert scale rating is used. The scale runs from 1 to 5, with 5 = highly important/highly satisfied; 4 = important/ satisfied; 3 = fairly important/neutral; 2 = slightly important/dissatisfied; and 1 = not important/very dissatisfied. In the steps of data collection, there were 18 questions for the user of food delivery service to evaluate in terms of the level of the importance and satisfaction in each attribute from user opinion towards food delivery service providers at present in user perspective. Hence, we can measure the importance and customer satisfaction of 18 attributes and identify the weak points of the current food delivery service. Finally, the respondents add suggestions or comments about the food delivery service they faced or expected. After that, we created questionnaires by Google forms, and questionnaires were pretested with thirty-one customers who used the food delivery services. The pretest of questionnaires was surveyed from 28 December 2021 to 3 January 2022. Then, the reliability of the questionnaire was tested using Cronbach's alpha. If it is reliable, the questionnaire was ready to be conducted. Otherwise, the questionnaire must be edited and tested the reliability. Then, it was distributed using the social network throughout during 3 – 11 January 2022. In the COVID-19 situation, a questionnaire survey was conducted online using Google Forms, which was used to make it easier for participants to fill out and submit the questionnaire.

3.2 Data Analysis

First, the descriptive statistical analysis was studied, including the category of respondents in terms of gender, age, education level, occupation, and dwelling region. Next, the averages, standard deviations (S.D.), and coefficients of variation (C.V.) of both importance and satisfaction scores for all attributes were calculated. The scores can be interpreted into five ranges as follows: 1) [1,1.8) denotes not important/dissatisfied2) [1.8,2.6) denotes slightly important/dissatisfied 3) [2.6,3.4) denotes fairly important/neutral 4) [3.4,4.2) denotes important/satisfied 5) [4.2,5] denotes highly important/highly satisfied. Then, the gap analysis was computed by the satisfaction score minus the importance score. If the gap value is negative, then managing is mandatory. On the other hand, if value show as a positive, then it means that no additional management is mandatory (Tonge and Moore 2007). Next, a paired T-test was used to determine whether there is a disparity in the mean of the importance and satisfaction scores. The hypothesis is set as follows.

$$H_0$$
: $\mu_1 = \mu_2$
 H_1 : $\mu_1 \neq \mu_2$

Where μ_1 and μ_2 denote the importance and satisfaction scores, respectively. With a confidence interval (CI) of 95%, we will accept the null hypothesis (H₀) that is no difference between the satisfaction scores and the importance

scores. On the other hand, if there is a significant difference between the importance and satisfaction scores, we will reject the null hypothesis.

Finally, the Importance-Satisfaction Analysis (IS Analysis) or the Importance-Performance Analysis (IPA) is a useful measure because it is straightforward to calculate and comprehend. Starting with the collection of the importance and satisfaction scores. Then, plot them on the y-axis and the x-axis, respectively. Then, the mean of overall importance and satisfaction and scores are the dividers in each axis. Hence, there are four quadrants denoted as the following: 1) Concentrate Here: the attributes that have higher importance scores than the overall importance mean, but have lower satisfaction scores than the overall satisfaction mean. This implies that these attributes need to be improved since they are not performing well at present. Hence, the company should make improvements a top priority. 2) Keep up the Good Work: the attributes with higher importance scores than the overall importance mean, and the satisfaction scores are also higher than the overall satisfaction mean. This implies that the service provider performs well in these attributes. It is a competitive advantage that these attributes should be maintained at this level. 3) Low Priority: the attributes that have lower priority scores than the overall importance meanwhile the satisfaction scores are less than the overall satisfaction mean. It implies that customers do not focus on these attributes, hence it is a low priority to focus on improvement in these attributes. 4) Possible Overkill: the attributes that have lower importance scores than the overall importance mean but have greater satisfaction scores than the overall satisfaction mean. It implies that the customer is very satisfied with these attributes more than their importance. Hence, with the limited resources, the service provider can focus to improve the attributes in Concentrate Here instead. The IBM SPSS Statistics 19 was used for the statistical analysis.

4. Results and Discussion

4.1 Descriptive Analysis

In data collection, we performed an online questionnaire for food delivery customers in Thailand.

Northeastern Thailand

Western Thailand

Eastern Thailand

Southern Thailand

Central Thailand

Bangkok and metropolitan

Classification Frequency Proportion (%) Items 28.01 Sex Male 128 326 71.33 Female Not specified 3 0.66 Below 18 1.31 6 Age 18 - 25 160 35.01 26 - 35 26.48 121 36 - 45 59 12.91 46 - 55 50 10.94 56 and above 61 13.35 Below bachelor's Degree Education 114 24.94 Bachelor's Degree 213 46.61 Above bachelor's Degree 130 28.45 Government official/State enterprise employee 14.88 Career 68 Private company employee 124 27.13 General employee 1.97 9 Personal business 62 13.57 Housewife 3 0.66 Student 166 36.32 Others 25 5.47 **Dwelling Region** Northern Thailand 11 2.41

Table 1. Food Delivery Service Customer Profile.

109

9

17

38

80

193

23.85

1.97

3.72

8.32

17.50

42.23

We pretested the questionnaire from 31 customers. The Cronbach's alpha of importance and satisfaction score were 0.908 and 0.833, respectively. This indicated that the questionnaire was trustworthy. Then, the survey was conducted throughout the country with 503 respondents. However, there were 457 usable questionnaires since we removed the irregular response such as having the same scores in all questions. The descriptive analysis result was shown in Table 1. Most of the respondents were female with 71.33%, while male respondents were 28.01% and not specified 0.66%. The majority age of respondents was between 18 to 25 years old which was recorded at 35.01%. In terms of education, the majority were bachelor's degrees 46.61%, while below bachelor's degrees were 24.94% and above bachelor's degrees 28.45%. Mainly, the occupation of respondents was student accounting for 36.32%. Finally, most respondents live in Bangkok and metropolitan 42.23%.

Table 2. The average, standard deviations (S.D.), and coefficients of variation (C.V.) of the importance scores and satisfaction scores of 18 attributes of food delivery service.

Code	Attributes	Impor	tance Sc	ores	Satisfaction Scores		
		Average	S.D.	C.V.	Average	S.D.	C.V.
T	Tangible	4.237	0.779	0.184	4.127	0.717	0.174
T1	1. Friendliness and politeness of the food rider	4.322	0.731	0.169	4.245	0.666	0.157
T2	2. Cleanliness of food rider apparel	4.177	0.812	0.194	3.991	0.784	0.196
Т3	3. Cleanliness and condition of delivery	4.396	0.757	0.172	4.164	0.732	0.176
	containers/boxes						
T4	4. Condition of the food delivery vehicle	4.052	0.815	0.201	4.109	0.686	0.167
R	Reliability	4.374	0.747	0.171	4.295	0.748	0.175
R1	5. Reputation, credibility, and the quality of the	4.249	0.752	0.177	4.295	0.696	0.162
	platform/application						
R2	6. The accuracy of food items ordered and delivered	4.466	0.752	0.168	4.346	0.740	0.170
R3	7. The accuracy of bill/payment of food and services	4.490	0.710	0.158	4.455	0.703	0.158
R4	8. The accuracy of delivery location	4.293	0.773	0.180	4.083	0.852	0.209
S	Responsiveness	4.202	0.783	0.187	3.991	0.772	0.193
S1	9. Short delivery time	4.225	0.769	0.182	3.866	0.759	0.196
S2	10. Convenience in platform/application usage	4.232	0.794	0.188	4.129	0.760	0.184
S3	11. Availability of instructions to use the	4.022	0.835	0.208	3.838	0.792	0.206
	platform/application						
S4	12. Display of ordering status of the	4.311	0.772	0.179	4.166	0.796	0.191
	platform/application						
S5	13. The number of restaurants participating in the	4.221	0.744	0.176	3.956	0.754	0.190
	platform/application						
A	Assurance	4.375	0.784	0.179	3.977	0.818	0.206
A1	14. Privacy and security of the user's personal	4.354	0.806	0.185	3.978	0.797	0.200
	information						
A2	15. Management and control of food safety and food	4.400	0.766	0.174	3.989	0.807	0.202
	hygiene throughout the delivery to the customer						
A3	16. The knowledge of preventive measures against	4.370	0.779	0.178	3.963	0.851	0.215
	COVID-19						
Е	Empathy	4.236	0.812	0.192	3.900	0.820	0.210
E1	17. Understanding Customer Needs	4.267	0.757	0.177	3.982	0.749	0.188
E2	18. Low service fees and frequent promotions	4.206	0.867	0.206	3.818	0.891	0.233

The results from the average, standard deviations (S.D.), and coefficients of variation (C.V.) of the importance scores and satisfaction scores of 18 attributes of food delivery service were shown in Table 2. The average importance and satisfaction scores for all attributes were 4.281 and 4.076, respectively. We examined the average scores of each attribute in both importance and satisfaction based on the five ranges of interpretation of the scores that showed in the data analysis section. There were 15 very important attributes and three important attributes. The top three important attributes were accuracy of bill/payment of food and services (R3), the accuracy of food items ordered and delivered (R2), and management and control of food safety and food hygiene throughout the delivery to

the customer (A2). For the satisfaction scores, there were four very satisfied attributes and 14 satisfied attributes. The top three satisfaction attributes were the accuracy of the bill/payment of food and services (R3), the accuracy of food items ordered and delivered (R2), reputation, credibility, and the quality of the platform/application (R1). From the customer's viewpoint, the number of very satisfied attributes is less than the number of very important attributes. As a result, food delivery service providers should improve customer satisfaction. The range of C.V. of importance and satisfaction scores were (0.158,0.208) and (0.157,0.233), respectively. The highest C.V. implied the difference of customer opinions in those attributes. Hence, the availability of instructions to use the platform/application (S3) and low service fees and frequent promotions (E2) had high C.V. in the importance scores. According to the scores of the satisfaction results, the high C.V. attributes were low service fees and frequent promotions (E2), knowledge of preventive measures against COVID-19 (A3), and the accuracy of delivery location (R4), respectively. Food delivery service providers can know about the customer's perspective. They can know which attributes are important and which are satisfied for their customers and help them know what to improve.

The customers suggested that the food delivery service should be improved in temperature control, delivery container/box design, cleanliness, and short delivery time. In addition, some customers had a hard time searching for food menus because of the too-broad sorter. Some customers need an easier ordering process, discounts for credit cards in every bank, no service fees, the accuracy of location, a more convenient way to contact riders, etc. Some respondents suggested that the condition of the food delivery vehicle should not be an important attribute because it relates to the financial status of the food delivery rider. From the comments, the food delivery service platform should focus more on management and control of food safety and food hygiene throughout the delivery to the customer (A2). They should have suitable temperature control for each food category, such as cooked food, ready-to-eat food, fresh food, etc. The delivery container/boxes should have a separate zone for food. Although there are government agencies to control the standards and practices of food safety and food hygiene throughout the delivery process to the customer, monitoring and enforcement are still the bottlenecks. In addition, food delivery applications and platforms should develop more convenience in platform/application usage and reasonable fees and promotions.

4.2 Gap Analysis and the Paired T-Test

The results from the Gap Analysis and the P-Value of the Paired T-Test of 18 attributes were shown in Table 3. The Gap analysis showed that most attributes, except reputation, credibility, and the quality of the platform/application in the dimension of reliability and the condition of the food delivery vehicle in the dimension of tangible, had negative gap values so there were gaps to improve them for better service from a customer perspective. On the other hand, reputation, credibility, and the quality of the platform/application and condition of the food delivery vehicle have positive gap values so they were satisfied. The paired T-Test result indicated that 15 attributes were significantly different (rejected H_0), which indicated that they need action for these attributes. However, three attributes consist of the accuracy of bill/payment of food and services, reputation, credibility and the quality of the platform/application, and condition of the food delivery vehicle that do not need action because the paired T-Test results are not significantly different (accepted H_0).

Table 3.	The Gap	Analysis and	d P-Value of	f Paired T-	Test of 18 Attributes.
----------	---------	--------------	--------------	-------------	------------------------

Rank	Attributes	Dimension	Means of Importance Score	Means of Satisfaction Score	Gap value	p- value
1	Management and control of food safety and food hygiene throughout the delivery to the customer	Assurance	4.400	3.989	-0.411	0.000*
2	The knowledge of preventive measures against COVID-19	Assurance	4.370	3.963	-0.407	0.000*
3	Low service fees and frequent promotions	Empathy	4.206	3.818	-0.388	0.000*
4	Privacy and security of the user's personal information	Assurance	4.354	3.978	-0.376	0.000*
5	Short delivery time	Responsiveness	4.225	3.866	-0.359	0.000*
6	Understanding Customer Needs	Empathy	4.267	3.982	-0.285	0.000*
7	The number of restaurants participating in the platform/application	Responsiveness	4.221	3.956	-0.265	0.000*

Rank	Attributes	Dimension	Means of	Means of	Gap	p-
			Importance Score	Satisfaction Score	value	value
8	Cleanliness and condition of delivery containers/boxes	Tangible	4.396	4.164	-0.232	0.000*
9	The accuracy of delivery location	Reliability	4.293	4.083	-0.210	0.000*
10	Cleanliness of food rider apparel	Tangible	4.177	3.991	-0.186	0.000*
11	Availability of instructions to use the platform/application	Responsiveness	4.022	3.838	-0.184	0.000*
12	Display of ordering status of the platform/application	Responsiveness	4.311	4.166	-0.145	0.000*
13	The accuracy of food items ordered and delivered	Reliability	4.466	4.346	-0.120	0.000*
14	Convenience in platform/application usage	Responsiveness	4.232	4.129	-0.103	0.003*
15	Friendliness and politeness of the food rider	Tangible	4.322	4.245	-0.077	0.026*
16	The accuracy of bill/payment of food and services	Reliability	4.490	4.455	-0.035	0.272
17	Reputation, credibility, and the quality of the platform/application	Reliability	4.249	4.295	0.046	0.201
18	Condition of the food delivery vehicle	Tangible	4.052	4.109	0.057	0.141

^{*}means there is a significantly different between importance and satisfaction scores

4.3 Importance-Satisfaction Analysis

The graphical illustration of importance-satisfaction analysis was shown in Figure 1.

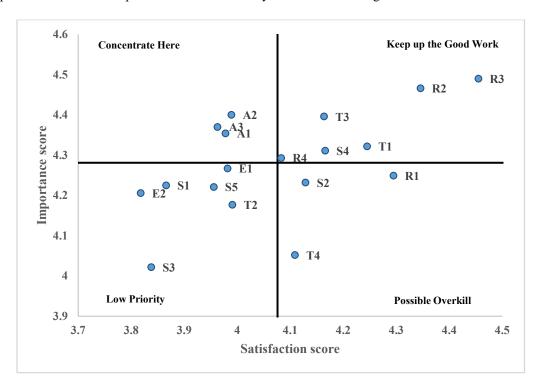


Figure 1. Importance-Satisfaction (IS) analysis model of 18 attributes.

In a quadrant of Concentrate Here, there were three assurance attributes including privacy and security of the user's personal information (A1), management and control of food safety and food hygiene throughout the delivery to the customer (A2), and the knowledge of preventive measures against COVID-19 (A3). Food delivery service providers should make improvements on a top priority. In a quadrant of Keep up the Good Work, there were six attributes

including friendliness and politeness of the food rider (T1), cleanliness and condition of delivery containers/boxes (T3), the accuracy of food items ordered and delivered (R2), the accuracy of bill/payment of food and services (R3), the accuracy of delivery location (R4) and display of ordering status of the platform/application (S4). The food delivery service providers performed well in these attributes and should maintain good quality since these attributes were very important. In a quadrant of Low Priority, there were six attributes. Hence, food delivery service providers should not focus on these attributes now, but maintain the current levels of intention to improve after the improvement of A1, A2, and A3. These attributes were the cleanliness of food rider apparel (T2), short delivery time (S1), the availability of instructions to use the platform/application (S3), the number of restaurants participating in the platform/application (S5), the understanding customer needs (E1) and low service fees and frequent promotions (E2). The last quadrant is Possible Overkill which included three attributes: the condition of the food delivery vehicle (T4), the reputation, credibility, the quality of the platform/application (R1), and the convenience in platform/application usage (S2). It implied that the customers were very satisfied with these attributes although their importance was not very high.

5. Conclusion

During the COVID-19 pandemic, food delivery services have become the solution for restaurants and food producers to reduce the contact. The study of current satisfaction and importance score of food delivery service attributes showed that there were gaps to improve. Most customers required them to focus on assurance attributes such as privacy and security of the user's personal information, food handling, and control to be safe and hygienic throughout the delivery to the customer, and knowledge of preventive measures against COVID-19. In addition, in the customers' opinions, the food delivery service providers should strive for food management and control of safety and hygiene throughout the delivery. They should have suitable temperature control for each food category, such as cooked food, ready-to-eat food, fresh food, etc. The delivery container/boxes should have a separate zone for food. This encourages food delivery service providers to focus on food safety and related standards to assure the quality of food delivery services in Thailand.

Acknowledgments

The authors would like to thank the users of food delivery services who kindly responded to the questionnaire and provided opinion comments about food delivery services in Thailand for this research. The authors would like to thank the Department of Agro-Industrial Technology, Faculty of Agro-Industry, Kasetsart University for providing funding for this conference.

References

- Al Amin, M., Arefin, M. S., Alam, M. R., Ahammad, T. and Hoque, M. R., Using Mobile Food Delivery Applications during COVID-19 Pandemic: An Extended Model of Planned Behavior, *Journal Food Products Marketing*, vol. 27, no. 2, pp. 105-126, 2021.
- Alalwan, A. A., Mobile food ordering apps: An empirical study of the factors affecting customer e-satisfaction and continued intention to reuse, *International Journal of Information Management*, vol. 50, pp. 28-44, 2020.
- Asubonteng, P., Mccleary, K. J. and Swan, J. E., SERVQUAL revisited: A critical review of service quality, *Journal of Services Marketing*, vol. 10, no. 6, pp. 62-81, 1996.
- Baum, T. and Hai, N. T. T., Hospitality, tourism, human rights and the impact of COVID-19, *International Journal Contemporary Hospitality Management*, vol. 32, no. 7, pp. 2397-2407, 2020.
- Bunchalieo, W., Ongkunaruk, P. and Puthpongsiriporn, T., Enhancing The Service Quality of A Japanese Restaurant by Importance-Satisfaction Analysis, *ITMSOC Transactions on Innovation & Business Engineering*, vol. 3, pp. 22-29, 2018.
- Byrd, K., Her, E. S., Fan, A., Almanza, B., Liu, Y. and Leitch, S., Restaurants and COVID-19: What are consumers' risk perceptions about restaurant food and its packaging during the pandemic?, *International Journal of Hospitality Management*, vol. 94, 2018.
- Duda-Chodak, A., Lukasiewicz, M., Zięć, G., Florkiewicz, A. and Filipiak-Florkiewicz, A., Covid-19 pandemic and food: Present knowledge, risks, consumers fears and safety, *Trends in Food Science and Technology*, vol. 105, pp. 145-160, 2020.
- Eshghi, A., Roy, S. K. and Ganguli, S., Service Quality and Customer Satisfaction: an Empirical Investigation in Indian Mobile Telecommunications Services, *Marketing Management Journal*, vol. 18, no. 1, pp. 119-144, 2008.

- ETDA, Available: https://www.etda.or.th/th/https/www-etda-or-th/th/newsevents/pr-news/Online-Food-Delivery-Survey-2020.aspx, Accessed on January 15, 2022.
- Fakfare, P., Influence of service attributes of food delivery application on customers' satisfaction and their behavioural responses: The IPMA approach, *International Journal Gastronomy and Food Science*, vol. 25, 2021.
- Faour-Klingbeil, D., Osaili, T. M., Al-Nabulsi, A. A., Jemni, M. and Todd, E. C. D., The public perception of food and non-food related risks of infection and trust in the risk communication during COVID-19 crisis: A study on selected countries from the Arab region, *Food Control*, vol. 121, 107617, 2021.
- FDA (The U.S. Food and Drug Administration), Available: https://www.fda.gov/food/food-safety-during-emergencies/best-practices-retail-food-stores-restaurants-and-food-pick-updelivery-services-during-covid-19, Accessed on March 25, 2022.
- Gavilan, D., Balderas-Cejudo, A., Fernández-Lores, S. and Martinez-Navarro, G., Innovation in online food delivery: Learnings from COVID-19, *International Journal of Gastronomy and Food Science*, vol. 24, 2021.
- Kasikorn Research Center, Available: https://kasikornresearch.com/en/analysis/k-econ/business/Pages/food-delivery-z3256.aspx, Accessed on January 15, 2022.
- Lewis, R. C. and Booms, B. H., *The Marketing Aspects of Service Quality, in Emerging Perspectives on Services Marketing*, Emerging Perspectives in Service Marketing, American Marketing Association, Chicago, 1983.
- Okumus, B., Ali, F., Bilgihan, A. and Ozturk, A. B., Psychological factors influencing customers' acceptance of smartphone diet apps when ordering food at restaurants, *International Journal of Hospitality Management*, vol. 72, pp. 67-77, 2018.
- Ozili, P. K. and Arun, T., Spillover of COVID-19: Impact on the Global Economy, SSRN Electron Journal, 2020.
- Parasuraman, A., Zeithaml, V. A. and Berry, L. L., A Conceptual Model of Service Quality and Its Implications for Future Research, *Journal of Marketing*, vol. 49, no. 4, pp. 41-50, 1985.
- Parasuraman, A., V, Z. and Berry, L., SERVQUAL: A multiple-item scale for measuring consumer perceptions of Service Quality, *Journal of Retailing*, vol. 64, no. 1, pp. 12-40, 1988.
- Pisuchpen, R. and Ongkunaruk, P., Importance-performance analysis for improving patient services in a cardiology department in a Thai government hospital, *Proceedings of the 4th International Conference on Industrial Revolution and Its Impacts*, Nakhon Si Thammarat, Thailand, March 27-30, 2019.
- Ray, A., Dhir, A., Bala, P. K. and Kaur, P., Why do people use food delivery apps (FDA)? A uses and gratification theory perspective, *Journal of Retailing and Consumer Services*, vol. 51, pp. 221-230, 2019.
- Sheth, J., Impact of Covid-19 on consumer behavior: Will the old habits return or die?, *Journal of Business Research*, vol. 117, pp. 280-283, 2020.
- Suhartanto, D., Helmi Ali, M., Tan, K. H., Sjahroeddin, F. and Kusdibyo, L., Loyalty toward online food delivery service: the role of e-service quality and food quality, *Journal of Foodservice Business Research*, vol. 22, no. 1, pp. 81-97, 2019.
- Tan, H. and Eng Kim, V. W., Examining the Factors that Influence Consumer Satisfaction with Online Food Delivery in Klang Valley, Malaysia, *The Journal of Management Theory and Practice* (JMTP), vol. 2, no. 2, 2021.
- Tonge, J. and Moore, S. A., Importance-satisfaction analysis for marine-park hinterlands: A Western Australian case study, *Tourism Management*, vol. 28, no. 3, pp. 768-776, 2007.
- Wang, Y. S., Tseng, T. H., Wang, W. T., Shih, Y. W. and Chan, P. Y., Developing and validating a mobile catering app success model, *International Journal of Hospitality Management*, vol. 77, pp. 19-30, 2019.

Biographies

Natissareeya Suksrimuang is currently a master's degree in Agro-Industrial Technology Management, Faculty of Agro-Industry, Kasetsart University, Bangkok, Thailand. She received a Bachelor's degree in Food Science and Technology from, Faculty of Agro-Industry, Kasetsart University, Bangkok, Thailand. She has completed the qualifying process to be a Certified Food Professional as a Certified Member of Thailand's Food Science and Technology Association (FoSTAT).

Pornthipa Ongkunaruk is an associate professor in the Faculty of Agro-Industry, Kasetsart University, Bangkok, Thailand. She received a B.S. in Agro-Industrial Product Development from Kasetsart University and an M.S. in Industrial Engineering from Asian Institute of Technology. She received a Ph.D. in Industrial and Systems Engineering at Virginia Polytechnic Institute and State University. Her teaching and research interests are Supply Chain and Logistics Management, Operations Research, and Simulation in Agro-Industry. She is the author of four books, 28 research articles, and 46 proceedings. She did more than 40 projects involving logistics and supply chain

Proceedings of the International Conference on Industrial Engineering and Operations Management Nsukka, Nigeria, 5 - 7 April, 2022

management, efficiency improvement, new product development, foresight, evaluation projects with governments and international organizations. Dr. Ongkunaruk was a recipient of the Royal Thai Government scholarship for her M.S. and Ph.D., received first-class honors, and James A. Linen III Memorial Prize for the most outstanding student.