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# Technology at the Dining Table: Linking perceived value, service recovery, and continuous intention to use food delivery applications

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## Abstract

**Purpose** – This study examined the influence of convenience, design, trustworthiness, price, and various food choices on the perceived value of food delivery applications. Furthermore, it investigated the role of perceived value and service recovery in the formation of attitudes and consumers' continuous intention to use food delivery apps.

**Theoretical framework –** The study used prior literature to develop a conceptual model of continuous intention to use food delivery apps. Moreover, the study further expands the model by considering the element of service recovery.

**Design/methodology/approach** – The data were collected from users of food delivery apps that have previously faced some service failure issues. Using a sample of 380 respondents, the PLS-SEM technique was applied to test the hypotheses.

**Findings** – The results showed that attitude and perceived value have a positive impact on continuous intention to use food delivery apps, whereas service recovery does not affect continuous intention to use them. However, both service recovery and perceived value have a positive impact on consumers' attitudes towards food delivery apps. The results also revealed that all of the quality attributes of food delivery apps considered in the study positively affect the value perceived by the consumer.

**Practical & social implications of research –** The findings of the study are beneficial for the food delivery businesses in terms of designing appropriate strategies aimed at developing consumers' continuous intention to use food applications. It also contributes to the theory development by further complementing the framework with the service recovery factor.

**Originality/value** – This is the first study to bring "service recovery" into the limelight in the context of food delivery apps. Moreover, it is the first study to establish a set of food delivery app quality attributes in a developing economy to determine perceived value, attitudes, and continuous intention to use such apps.

**Keywords –** Food Delivery Apps, Continuous Intention, Attitudes, Service Recovery, Perceived Value, Various Food Choices.

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# 1 Introduction

The advancement and continuous development of electronic commerce have shifted the trend of the working environment as companies have introduced e-commerce services within their traditional practices, referred to as online to offline (O2O) (W. Liu, R. Batra, & H. Wang, 2017a; F. Liu, B. Xiao, E. T. Lim, & C. W. Tan, 2017b). O2O is a business model that enables the consumer to purchase products and services online and offline in the store (Li & Mo, 2015). This gives opportunities to the businesses as the offline businesses can use the internet fully and develop a comprehensive e-trading platform (Y.-M Chen, Nhai, & Jasmine, 2015).

The availability of mobile phones and the internet is one of the most significant factors that have increased O2O commerce worldwide. Reports on digital development showed that in 2019 the global number of mobile users surpassed 5.5 billion, which also represents a rise in the mobile app market (Kemp, 2019). In 2017, the highest penetration was recorded in Europe (86%), whereas North America reached 292 million users. The report also highlighted that Asia had the highest number of users: 2.765 billion (GSMA, 2017). Among all O2O services, food delivery services have seen the highest growth rate worldwide (Pressreader, 2017), as they provide convenience to users as well as the opportunity for restaurants to increase their sales (Pressreader, 2017). Mobile users can simply tap to order food through their food delivery applications (FDAs) and their favorite food becomes available at their doorstep. This new trend in ordering food through mobile applications is in line with the modern way of living and is becoming more and more common globally. The global COVID-19 pandemic has further strengthened the trend of ordering food online through FDAs (Jordan, 2020; Lattanzi, 2020) as many restaurants were temporarily closed for dining in (Jordan, 2020).

The growing popularity of FDAs has increased the competition within the food delivery business worldwide (S. W. Lee, Sung, & Jeon, 2019). Moreover, consumers have increased their expectations related to the perceived value pertaining to the use of FDAs (Cho, Bonn, & Li, 2019). Hence, there is a need to understand the factors that provide value to customers and influence their intention to continuously use FDAs. In the previous literature, there are a limited number of studies that have addressed perceived value by considering the quality attributes of FDAs. While scholars have stressed in the past that mobile app quality attributes increase adoption and consumer loyalty (Al- Dmour, Alshurideh, & Shishan, 2014; Handel, 2011; Kim & Hwang, 2012; W. Liu et al., 2017a, F. Liu et al., 2017b; Nilashi, bin Ibrahim, Ithnin & Sarmin, 2015; Yang, Jun & Peterson, 2004), they have failed to determine the effect of quality attributes on perceived value. Moreover, to our knowledge, none of the previous studies have considered the service recovery factor for FDAs and its influence on attitudes and continuous intention to use FDAs. It is quite a common issue for customers to experience service failure due to an inadequate service or the service being below their expectations (Harrison-Walker, 2019; Steyn, Mostert, De Meyer & van Rensburg, 2011). Service recovery refers to actions taken by service providers in response to a service failure (Johnston & Mehra, 2002). Studies have reported that customers often discuss service failures publicly (Huang & Ha, 2020), hence they negatively affect consumers' attitudes. Service recovery helps in retaining customers. The significance and outcomes of service recovery are crucial for businesses, hence it is important for it to be fully understood (Jung & Seock, 2017).

Therefore, this study aims to determine the role of FDAs' quality attributes in perceived value and their impact on attitudes and continuous intention to use FDAs. Moreover, the study aims to explore the impact of service recovery on attitudes and continuous intention to use FDAs. It is important to note that, while value involves positive aspects, service recovery involves negative aspects of experiences, which further justifies adding service recovery to this established framework in order to capture a more complete picture. Cho et al. (2019) recommended that future researchers explore the element of service recovery in relation to continuous intentions to use FDAs, as it plays a significant role and increases customer satisfaction, through which the intention to repurchase or revisit a particular place can be developed (Othman, Zahari, & Radzi, 2013). Previous studies have also confirmed the importance of service recovery in determining consumers' perceptions in various service-related businesses such as airlines (Y.-W. Chang & Chang, 2010; Chou, 2015), the hotel industry (H.-S. Chang & Hsiao, 2008), and electronic retailing (Y.-S. Wang, Wu, Lin, & Wang, 2011).

The research is helpful for designing service recovery strategies that benefit businesses through restoring the reputation of their brand and enhancing customer satisfaction. In addition, the study stresses the importance of

quality attributes that foster perceived value and encourage customers to continue to use FDAs. It also contributes to the theory development by further complementing the framework with the service recovery factor.

The paper is structured as follows. Section 2 presents the theoretical background and hypotheses development. The methodology of the study is discussed in section 3 and section 4 reports the results. Lastly, section 5 provides a discussion and recommendations.

# 2 Theoretical Background

## 2.1 Quality attributes of a mobile app

The advancement of technology and the increasing availability of tablets, smartphones, etc. have provided opportunities for businesses to sell their products and services via mobile apps (Magrath & McCormick, 2013). In the past, practitioners and scholars have established that quality attributes of mobile apps drive adoption and customer loyalty. In addition, quality attributes of mobile apps activate the inner cognition and emotions of individuals (Peters, Işık, Tona, & Popovič, 2016). The interactive design of a mobile app enables consumers to use the app's features to experience the brand (Kapoor & Vij, 2018; Mollen & Wilson, 2010). For measuring the quality attributes of applications related to well-being, Handel (2011) considered ease of use, reliability, information quality, information scope, and aesthetics. Al-Dmour et al. (2014) further investigated the impact of quality attributes on satisfaction and considered convenience and mobile features, technical adequacy, and assurance as technology-oriented quality attributes. On the other hand, trustworthiness, a competitive price, and various options to choose or customizations were considered as service-oriented quality attributes. W. Liu et al. (2017a) and F. Liu et al. (2017b) considered convenience, design, and trustworthiness as attributes of mobile app quality while Kim and Hwang (2012) and Yang et al. (2004) explored the design of the app in determining app quality. Mobile app design has been considered as an important element of quality attributes in other studies as well (Kapoor & Vij, 2018; Kim & Hwang, 2012; Nah, Eschenbrenner, & DeWester, 2011). Also, trustworthiness has been explored in some previous studies as an important element in mobile app shopping (Nilashi et al., 2015).

Considering the importance of both types of quality attributes, the present study explored both service-oriented attributes (trustworthiness, competitive price, various food choices) as well as technology-oriented attributes (convenience and design) in determining the perception of quality of FDAs by the consumer.

## 2.2 Perceived value

Perceived value refers to "the overall consumer evaluation of a product's utility based on expectations on what is obtained and what is offered" (Zeithaml, 1988). In other words, it is the consumer's perception of the benefits offered by a service or a brand (Aslam, Farhat, Ejaz, & Arif, 2020) and it is regarded as a fundamental basis of service marketing activities (Holbrook, 1996). Consumers feel valued if the brand/service provides better value to them (Yeh, 2016).

Consumer-perceived value is considered as an essential element for achieving a competitive edge (Landroguez, Castro, & Cepeda-Carrión, 2013) and a vital strategic instrument for maintaining and acquiring new customers (S.-C. Chen & Quester, 2006). In the competitive environment, organizations try to offer superior value to their customers by enhancing their level of service performance (Yeh, 2016). It is a dynamic construct that can be generated through multiple factors, such as providing affordable rates and superior quality or offering greater benefits (Holbrook, 1996). Hence, it contains many heterogeneous elements (Sweeny & Soutar, 2001). Customers are not homogeneous and so they perceive values differently (Ulaga & Chacour, 2001). In the past, studies have discussed different dimensions of value such as quality, price, and social, emotional, conditional, and convenience value (Pura, 2005). However, the common understanding is that perceived value is a ratio of overall benefits to total costs (F. Liu, X. Zhao, P. Y. Chau, & Q. Tang, 2015).

In the context of O2O services, the quality of mobile applications provides perceived value to customers (Cho et al., 2019; Magrath & McCormick, 2013), which further helps in developing a positive attitude towards FDAs (Cho et al., 2019). Also, studies have proven that perceived value affects purchase intention in an offline context (Holbrook, 1996) as well as in an online one (Z. Chen & Dubinsky, 2003).

## 2.3 Service recovery

Service failure is an error or issue that customers encounter when shopping or engaging with businesses (Maxham,

2001) and this leads to dissatisfaction and a collapse in the relationship with customers (Bitner, Booms, & Tetreault, 1990). Service recovery is an effective business practice to win back disgruntled customers and retain relationships with them (Maxham, 2001). This basically translates to the response and strategy of service providers to address issues arising from service failures (Jung & Seock, 2017; Weun, Beatty, & Jones, 2004). Effective service recovery helps businesses to regain satisfaction and retain long-term relationships with their customers or, in other words, it helps in maintaining loyalty (Jung & Seock, 2017; Kuo & Wu, 2012). A business that is capable of reacting efficiently to service failure and offering some form of service recovery would be in a much stronger position to maintain profitable customers (Michel & Meuter, 2008; Nadiri, 2016).

The online context encompasses different causes of service failures such as late delivery, packaging errors, payment-related issues, etc. (Forbes, Kelley, & Hoffman, 2005). Hence, it is more likely that a consumer will become dissatisfied in an online environment and switch service providers more quickly (Shankar, Smith, & Rangaswamy, 2003). Customer experiences of service failure lead to negative attitudes and can even lead to termination of the relationship with the service provider (Harrison-Walker, 2019; Steyn et al., 2011). However, a limited number of studies have addressed service recovery in determining behavioral intentions in an online context (Jung & Seock, 2017).

As mentioned earlier, previous studies (H.-S Chang & Hsiao, 2008; Y.-W. Chang & Chang, 2010; Chou, 2015; Y.-S. Wang et al., 2011) have confirmed the importance of service recovery in determining consumer perceptions in various service-related businesses. However, in the context of mobile commerce, this relationship is perhaps even more important because of the distance between the customer and service provider (Othman et al., 2013). The importance of service recovery has been proven within mobile commerce (Bijmolt, Huizingh, & Krawczyk, 2014; Othman et al., 2013) and also suggested in the domain of FDAs (Cho et al., 2019).

## 2.4 Hypotheses development

### 2.4.1 *Relationship between convenience and perceived value*

Recognizing the importance of convenience to the virtual or online shopping behavior of consumers, numerous studies have postulated a significant relationship between convenience and perceived value (Cho et al., 2019; Eom, Moon, & Lee, 2016; Pham, Tran, Misra, Maskeliunas, & Damasevicius, 2018). These studies have highlighted that with the rapid development of mobile food delivery apps, consumers' perceived value of mobile commerce has increased, due to convenience (Eom et al., 2016). Another study proved that convenience, as an element of technology-oriented app quality, has a significant impact on consumers' perceived value (Cho et al., 2019). In the study of Chiou, Chou, and Shen (2017), it was clearly verified that convenience has practical importance for improving the user-friendly experience and hence it is one of the essential success factors for mobile apps. Based on the abovementioned theoretical and empirical cognitions, the first hypothesis of the present study is as follows:

*H1. The convenience of FDAs positively affects the perceived value.*

### 2.4.2 *Relationship between design and perceived value*

There are ample past studies that have emphasized the importance of mobile app design as an attribute of perceived value (Blasco Lopez, Recuero Virto, & San-Martín, 2018; Cho et al., 2019;Ponte, Carvajal-Trujillo, & Escobar-Rodríguez, 2015). In the context of FDAs, Cho et al. (2019) empirically proved that the design of a mobile app affects the value perceived by consumers. Likewise, Blasco Lopez et al. (2018) stated that the design of a mobile app can raise the level of consumers' perceived value. Other previous research has also shared similar viewpoints and postulated that the design of an app plays a key role in improving the perceived value in e-commerce (Fang, Ye, Kucukusta, & Law, 2016; Othman et al., 2013). Hence, the present study proposes the following hypothesis:

*H2. The design of FDAs positively affects the perceived value.*

### 2.4.3 *Relationship between trustworthiness and perceived value*

There is extensive previous research highlighting the role of trustworthiness in improving the value perceived by consumers (Chiou et al., 2017; Cho et al., 2019; Olise, Okoli, & Ekeke, 2015; Ponte et al., 2015). For instance, Olise et al. (2015) proved that trustworthiness has a significant relationship with consumers' perception of

value in the food industry. Furthermore, Cho et al. (2019) confirmed that trustworthiness affects consumers' perceived value for FDAs. Ponte et al. (2015) postulated that trustworthiness plays an important role in e-commerce and enhances consumers' perception of reliability and improves their perceived value. In the past, studies have stressed the importance of trustworthiness as an essential feature of FDAs for improving consumers' perceived value (Eom et al., 2016; Fang et al., 2016; Valaei & Rezaei, 2018). Therefore, based on the above research synthesis, this study hypothesized a significant relationship between trustworthiness and consumers' perceived value.

*H3. The trustworthiness of FDAs positively affects the perceived value.*

### 2.4.4 *Relationship between price and perceived value*

"A suitable selection of products/services with a fair and reasonable price" is one of the major online quality attributes that influences users' attitudes and behavior (Cho & Park, 2001). The price of the product affects the value perceived by consumers in the context of FDAs (Cho et al., 2019). Also, Olise et al. (2015) highlighted that price is an essential factor that contributes significantly to the perceived value in the food industry. On the other hand, Eom et al. (2016) explained that in mobile commerce the price factor is less important for the perceived value and so price has no significant influence on the perceived value in mobile shopping. In contrast, Valaei and Rezaei (2018) found that the price factor made an important contribution to successful mobile food apps and Othman et al. (2013) also stressed that price plays an important role for consumers' perceived value, as have numerous other researchers (Chiou et al., 2017; Ponte et al., 2015). Based on the above, the present study also hypothesized the following relationship between price and perceived value:

*H4. The prices on FDAs positively affect the perceived value.*

### 2.4.5 *Relationship between various food choices and perceived value*

Eom et al. (2016) emphasized that a variety of choices plays an important role in improving the perceived value in an integrated shopping mall context. Valaei and Rezaei (2018) stressed a similar view in that a variety of food choices plays a critical role in the value perceived by consumers. Also Cho et al. (2019) confirmed that the choice of a variety of food options plays an important role in increasing the value perceived by consumers. A variety of food choices can improve consumers' experiences to the point of delight and hence perceived value is enhanced (Othman et al., 2013). The variety of food choices enables mobile FDAs to improve the customer experience and retain customers for a longer period, based on the perceived value (Chiou et al., 2017; Nadiri, 2016). Therefore, the present study developed the following hypothesis for the relationship between a variety of food choices and perceived value:

*H5. Various food choices on FDAs positively affects the perceived value.*

### 2.4.6 *Relationship between perceived value and attitude*

Perceived value refers to "the overall consumer assessment of the utility of a product based on perceptions of what is received and what is given" (Zeithaml, 1988). According to Parasuraman and Grewal (2000), perceived value is a function of the "gain" portion, i.e. a buyer receives benefits from the offers of a seller, and the "give" component, i.e. the monetary and non-monetary cost of receiving offers from the buyer. In recent years, the empirical and theoretical literature has paid considerable attention to the importance of perceived value for improving consumers' attitude (Aslam, Arif, Farhat, & Khursheed, 2018; Pham et al., 2018; Ponte et al., 2015,). Cho et al. (2019) stated that cost and benefit differences create consumers' value proposition and that it has a significant relationship with their attitude. Furthermore, improving the perceived value from the consumers' perspective steers consumers' attitudes in a positive direction (Antón, Camarero, & Laguna-García, 2017). Similarly, Ponte et al. (2015) established that a delightful customer experience can also create value that eventually translates into a better consumer attitude. Hence, the present study hypothesized a significant relationship between perceived value and consumer attitude in light of the above discussion.

*H6. Perceived value positively affects the attitude of the consumer towards FDAs.*

### 2.4.7 *Relationship between perceived value and continuous intention*

Pham et al. (2018) stated that there is clear evidence of a significant relationship between perceived value and

continuous intention to use, when it comes to online shopping. Other studies also revealed that perceived value can increase tendencies for repeat purchases and continuous intention (Antón et al., 2017; Cho et al., 2019). According to Hsiao, Chang, and Tang (2016), quality attributes result in creating value for consumers, which leads to a higher degree of continuous intention in the long run. From the strategic marketing perspective, superior value creation is an important and integral part because it is directly associated with continuous intention (Cho et al., 2019). Based on the above, the present study also integrated a significant relationship between perceived value and continuous intention into the hypothesized model.

*H7. Perceived value positively affects the consumer's continuous intention to use FDAs.*

### 2.4.8 *Relationship between service recovery and attitude*

A satisfying experience with a service encourages positive feelings and attachment that can help in creating a positive consumer attitude (Bijmolt et al., 2014). Previous literature has extensively emphasized this perspective, as well as the fact that service recovery plays an important role in augmenting consumer attitude (Nadiri, 2016; Othman et al., 2013). In the context of mobile commerce, this relationship is quite important as the distant relationship between the customer and service provider can hinder the quality of the service (Othman et al., 2013). In the case of service failure, it is important to react in a way that will stop or minimize the formation of a negative attitude. In some cases, it is even possible to create a more positive attitude than before the service failure. However, that can only be the case if the service recovery surpasses the consumer's expectations. The importance of service recovery for improving customer evaluations and experiences within mobile commerce and consequently influencing attitudes has unquestionably been proven (Bijmolt et al., 2014; Othman et al., 2013). Thus, the present study developed the following hypothesis on the basis of previous empirical evidence:

*H8. Service recovery positively affects the attitude of the consumer towards FDAs.*

### 2.4.9 *Relationship between service recovery and continuous intention*

An increase in customer satisfaction through a delightful experience can increase the tendencies for repeat purchases and continuous intention (Nadiri, 2016). However, as stated earlier, in the case of service failure, this satisfaction can be damaged and have the very opposite impact. In that case, the level of fairness and accomplishment in dealing with customers' complaints and solving their problems plays a critical role in developing repurchase intentions and continuous use intentions (Bijmolt et al., 2014). Moreover, if the customer receives a particularly high level of service recovery that exceeds their expectations, it may even make them more loyal in the future than if there was no reason to complain in the first place. On the contrary, failure to handle customers' complaints can be disastrous. Naturally, it adversely affects the customer experience and ultimately diminishes customers' continuous use intentions or repurchases (Nadiri, 2016; Othman et al., 2013). This usually leads to the termination of the customer-service provider relationship and can even stimulate negative advertising or some legal actions taken by the customer. It is therefore unquestionable that service recovery plays an important role in forming a consumer's continuous use intention. Therefore, this study hypothesized the following relationship between service recovery and continuous intention:

*H9. Service recovery positively affects the consumer's continuous intention to use FDAs.*

### 2.4.10 *Relationship between attitude and continuous intention*

Based on ample theoretical and empirical evidence, there is a clear postulation that a positive attitude leads to continuous use intention (Gong, Lee, Liu, & Zheng, 2018; Hsiao et al., 2016; J. Lu, Yu, Liu, & Wei, 2017). Kapoor and Vij (2018) stated that consumers' attitudes increase their tendency for continuous use behavior. Fang et al. (2016) also revealed that consumers' attitudes play a vital role in determining continuous intention to use a certain technology, while Valaei and Rezaei (2018) stated that consumers' attitudes make a significant contribution in developing their continuous intention to use mobile apps. Even more specifically, Cho et al. (2019) shared a similar viewpoint in the context of FDAs. Based on the extant empirical evidence, this study hypothesized a significant relationship between attitude and continuous use intention.

*H10. Attitude positively affects the consumer's continuous intention to use FDAs.*

### 2.4.11 *Conceptual model*

Based on the previously elaborated hypotheses, a conceptual model was designed, as depicted in Figure 1.

## 3 Research Methodology

### 3.1 Research instrument and sampling technique

The data were collected with the help of a structured questionnaire composed of two sections. The first section comprised demographic details such as age, gender, education, and preferred FDA, while the second section contained construct items that were extracted from the previous studies of Cho et al. (2019) and Nadiri (2016). The construct items were measured on a 7-point Likert scale, where 1= strongly disagree and 7= strongly agree.

The data were collected based on purposive sampling from individuals in Karachi, in Pakistan, that had previously used FDAs and had faced some service failure issue such as late delivery, over-charging, wrong item delivery, etc. In the past, many of the studies have used a sample within a single city for measuring attitudes and intention to use FDAs. For example, Cho et al. (2019) used a sample of citizens of Guangzhou in China. Yeo, Goh, and Rezaei (2017) collected data in the Klang Valley, which is a city in Malaysia, while Gupta and Duggal (2020) used a sample of citizens of Delhi, in India. The present study focused on Karachi, since this city is known for its diversity as it hosts all communities from across the country (International The News, 2018).

To collect the responses, a link to the Google form was shared through different social media platforms such as Facebook, WhatsApp, LinkedIn, etc. At the beginning of the questionnaire, the consumers were asked whether they had had any experience with a service failure, in order to get feedback exclusively from consumers with such an experience, related to service recovery. The respondents of the study voluntarily participated in the research.

### 3.2 Statistical technique

For the data analysis, the study used the SPSS and Smart PLS software. SPSS was used for the purpose of the pilot study and data screening. For assessing the hypotheses, the PLS-SEM technique was employed because of the several benefits it provides, such as the fact that it allows the researcher to assess a measurement model and structural path coefficients simultaneously, it requires minimum assumptions in terms of sample size to validate the model (Chin, Marcolin, & Newsted, 2003), and it imposes minimal restrictions on the measurement scale and residual distribution (Chin et al., 2003). Unlike covariance-based SEM, PLS focuses more on maximizing the variance of the dependent variables explained by the

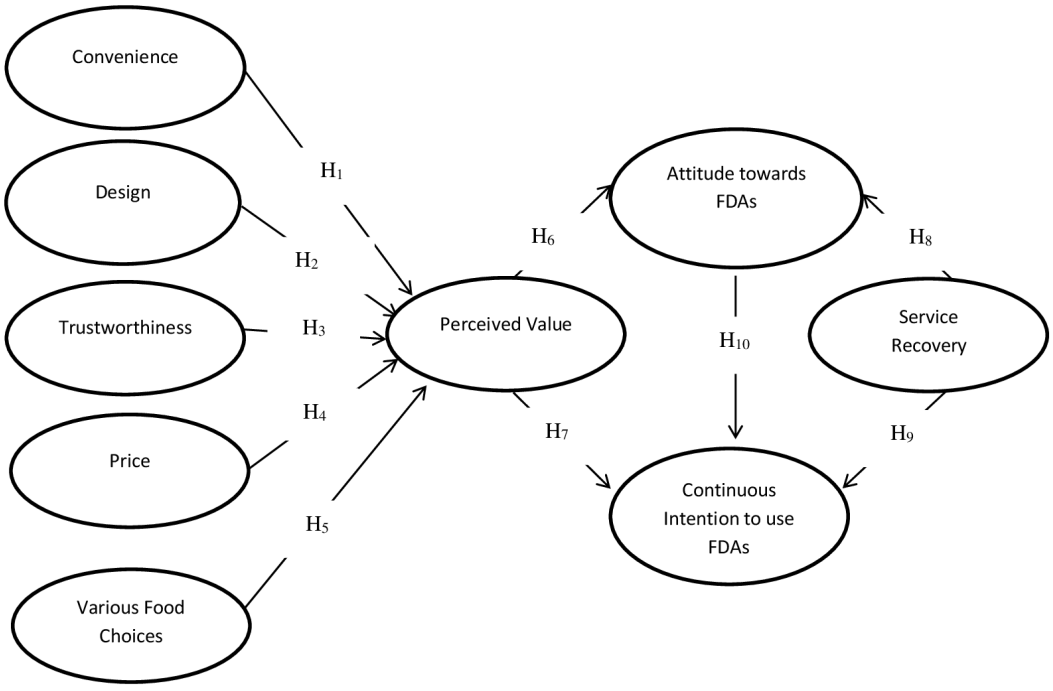


**Figure 1.** A conceptual model

independent variables than reproducing the empirical covariance matrix (Haenlein & Kaplan, 2004). Also, PLS-SEM does not rely on the assumptions of normality (Henseler, Hubona, & Ray, 2016).

### 3.3 Pilot study and data screening

For the pilot study, 50 responses were collected through a Google docs form. The link to the questionnaire was posted on several social media platforms and other communities and it was requested in the description for the person to participate if he or she had had a prior experience of using FDAs and had faced a failure issue. The purpose of the pilot study was to ensure the reliability of the instrument that was used for the data collection (Lavrakas, 2008). For this purpose, reliability analysis was performed using SPSS. The results revealed that the Cronbach's alpha values of the constructs were above the suggested threshold value, i.e. 0.7 (L.-T. Hu & Bentler, 1999). More specifically, the Cronbach's alpha value for convenience was found to be 0.891, for design it was 0.822, for trustworthiness it was 0.769, for price it was 0.712, for various food choices it was 0.900, for perceived value it was 0.907, for service recovery it was 0.877, for attitude it was 0.874, and for continuous intention to use FDAs it was 0.753.

After assuring reliability, additional data were collected from the target audience. In total, 450 responses were collected, on which data screening was performed. Firstly, missing value analysis and out-of-range value analysis were performed. However, there were no missing values and out-of-range values found in the data. Next, univariate outliers were detected using the z-score method and multivariate outliers were detected using the Mahalanobis distance method. In total, 70 outliers were identified and deleted from the collected sample. Hence, 380 usable responses remained for the final analysis. The remaining sample, i.e. 380, met the minimum sample requirement criteria, i.e. 10 times the number of arrows to a latent construct (K.-C. Hair, Hult, Ringle, & Sarstedt, 2013). To examine common method bias (also known as common method variance), Harman's single factor test was used and revealed that no single variable in the research framework of the study explained a variance as high as 50%, indicating the absence of common method bias in the responses.

### 3.4 Profile of the respondents

Of the total of 380 responses, 52.5% were from males and 47.4% were from females. The majority of the respondents belonged to the 18-24 (49.7%) and 25-32 (46.3%) age groups. Moreover, a major portion of the respondents were graduates (61.3%) and 39.5% preferred Food Panda as an FDA. Table 1 reports the details of the respondents' profiles.

## 4 Research Results

### 4.1 Measurement model

Following the guidelines of Hair, Hult, Ringle, and Sarstedt (2016), firstly the internal consistency of the constructs was assessed using composite reliability (CR). A CR value above 0.7 confirms the presence of internal consistency among the items. Secondly, convergent validity was assessed using the values of the outer loadings and average variance extracted (AVE). Convergent validity measures the degree of association amongst the measurements of a specific developed construct. The concept depends on supporting inter-related theoretical measurements, which are statically related or not (Hair et al., 2016). It is recommended that the outer loadings should be above 0.7 and the average variance extracted (AVE) should be greater than 0.5 (Hair, Anderson, Babin, & Black, 2010; Hair et al., 2016). However, a loading of the item above 0.4 can be considered if it contributes to the AVE and CR of the construct (Hair et al., 2016). Table 2 presents

Table 1
**Descriptive Statistics (n = 380)**

| | | Frequency | Percentage |
|---|---|---|---|
| Gender | Male | 200 | 52.6 |
| | Female | 180 | 47.4 |
| Age Group | 18–24 years old | 189 | 49.7 |
| | 25–31 years old | 176 | 46.3 |
| | > 39 years old | 15 | 3.9 |
| Education | Undergraduate | 85 | 22.4 |
| | Graduate | 233 | 61.3 |
| | Post Graduate | 47 | 12.4 |
| | Other | 15 | 3.9 |
| Preferred FDA | Food Panda | 150 | 39.5 |
| | EatOye | 86 | 22.6 |
| | Eat Mubarak | 94 | 24.7 |
| | Others | 50 | 13.2 |

Table 2
**Outer loadings, CR, and AVE**

| Items | Loading |
|---|---|
| ***Convenience (CON): CR = 0.761; AVE = 0.617*** | |
| Using the food delivery app would be convenient for me | 0.868 |
| The food delivery app would allow me to order food any time | 0.694 |
| ***Design (DES): CR = 0.858; AVE = 0.671*** | |
| The food delivery app's design is concise and easy to understand | 0.720 |
| All the terms and conditions (e.g., payment, warranty) of the food delivery app are easy to read/understand | 0.923 |
| The food delivery app's structure is logical and easy to follow | 0.802 |
| ***Trustworthiness (TRST): CR = 0.867; AVE = 0.767*** | |
| I trust the food delivery app | 0.961 |
| The information provided by the food delivery app is reliable | 0.781 |
| ***Price (PRIC): CR = 0.899; AVE = 0.816*** | |
| When I order food through the delivery app, the food is a good product for the price | 0.870 |
| When I order food through the delivery app, the food is economical | 0.935 |
| ***Various food choices (VFC): CR = 0.879; AVE = 0.785*** | |
| The food delivery app offers a variety of restaurant choices | 0.896 |
| The food delivery app offers a variety of food choices | 0.875 |
| ***Perceived value (PV): CR = 0.844; AVE = 0.648*** | |
| I feel I am getting good food products at a reasonable price when I use the food delivery app | 0.873 |
| Compared with conventional ways of purchasing food, it is wise to use the food delivery app | 0.639 |
| It is worth it for me to devote my time and efforts to using the food delivery app | 0.879 |
| ***Service recovery (SREC): CR = 0.810; AVE = 0.681*** | |
| I am satisfied with the manner in which the service failure was resolved | 0.842 |
| The response to the service failure with the food delivery app was better than expected | 0.809 |
| ***Attitudes towards food delivery apps (ATT): CR = 0.857; AVE = 0.751*** | |
| I am strongly in favor of ordering food through the delivery app | 0.866 |
| I like to use the delivery app when I purchase food | 0.867 |
| ***Continuance intention to use food delivery apps (CIU): CR = 0.889; AVE = 0.728*** | |
| I intend to use the food delivery app | 0.819 |
| I intend to keep ordering food through the delivery app | 0.788 |
| If I have the opportunity, I will order food through the delivery app | 0.944 |

the CR, outer loading, and AVE results. The results confirmed that the CR, outer loading, and AVE values meet the suggested criteria.

Lastly, discriminant validity was checked in order to confirm the uniqueness of each construct. For this, the Fornell and Larcker and cross loadings criteria were checked. According to the criterion of Fornell and Larcker (1981), the square root of the AVE of the construct should exceed the corresponding correlational values in the rows and columns. In Table 3, the diagonal values are the square root of the AVE and it was confirmed that all the values of the square root of the AVE exceed the correlational values present in the associated row and column.

The other criterion to assess discriminant validity is cross loadings. This criterion suggests that all of the indicators should have higher loadings in their own constructs (Hair et al., 2016). Table 4 confirmed that all the construct items have high loadings in their own constructs, hence discriminant validity is achieved.

Moreover, the level of collinearity was also assessed using the variance inflation factor (VIF). A VIF < 5 indicates the absence of multicollinearity (Hair et al., 2016). The results revealed that all of the VIF values are below the threshold value, hence confirming the absence of multicollinearity. Table 5 presents the VIF values.

## 4.2 Path analysis

Table 5 shows the findings of the path analysis for the hypotheses test using the PLS-SEM bootstrapping technique. The results revealed that both attitude ($\beta = 0.475$, $p < 0.05$) and perceived value ($\beta = 0.264$, $p < 0.05$) have a significant and positive impact on continuous intention to

Table 3
**Discriminant Validity - Fornell and Larcker**

| | ATT | CIU | CON | DES | PRIC | PV | SREC | TRST | VFC |
|---|---|---|---|---|---|---|---|---|---|
| **ATT** | **0.866** | | | | | | | | |
| **CIU** | 0.773 | **0.853** | | | | | | | |
| **CON** | -0.594 | -0.627 | **0.786** | | | | | | |
| **DES** | 0.423 | 0.256 | -0.320 | **0.819** | | | | | |
| **PRIC** | 0.461 | 0.466 | -0.463 | 0.074 | **0.903** | | | | |
| **PV** | 0.731 | 0.692 | -0.467 | 0.276 | 0.615 | **0.805** | | | |
| **SREC** | 0.576 | 0.480 | -0.418 | 0.391 | 0.418 | 0.601 | **0.826** | | |
| **TRST** | 0.358 | 0.319 | -0.147 | 0.420 | 0.205 | 0.267 | 0.385 | **0.876** | |
| **VFC** | 0.351 | 0.531 | -0.405 | -0.041 | 0.367 | 0.692 | 0.127 | -0.064 | **0.886** |

Table 4
**Discriminant Validity - Cross Loadings**

| | ATT | CIU | CON | DES | PRIC | PV | SREC | TRST | VFC |
|---|---|---|---|---|---|---|---|---|---|
| **ATT1** | **0.866** | 0.611 | -0.602 | 0.558 | 0.321 | 0.667 | 0.610 | 0.332 | 0.363 |
| **ATT2** | **0.867** | 0.728 | -0.428 | 0.175 | 0.478 | 0.600 | 0.388 | 0.288 | 0.244 |
| **CON1** | -0.605 | -0.526 | **0.868** | -0.434 | -0.424 | -0.426 | -0.387 | -0.329 | -0.288 |
| **CON2** | -0.284 | -0.460 | **0.694** | 0.006 | -0.289 | -0.294 | -0.255 | 0.191 | -0.373 |
| **DES1** | 0.177 | 0.100 | -0.269 | **0.720** | -0.131 | 0.110 | -0.021 | 0.278 | 0.162 |
| **DES2** | 0.494 | 0.326 | -0.397 | **0.923** | 0.011 | 0.289 | 0.456 | 0.392 | 0.036 |
| **DES3** | 0.266 | 0.131 | -0.103 | **0.802** | 0.227 | 0.221 | 0.341 | 0.343 | -0.226 |
| **CIU1** | 0.635 | **0.819** | -0.711 | 0.454 | 0.476 | 0.549 | 0.568 | 0.332 | 0.333 |
| **CIU2** | 0.637 | **0.788** | -0.353 | -0.023 | 0.268 | 0.624 | 0.331 | 0.121 | 0.520 |
| **CIU3** | 0.701 | **0.944** | -0.547 | 0.236 | 0.450 | 0.594 | 0.341 | 0.362 | 0.496 |
| **PV1** | 0.573 | 0.663 | -0.445 | 0.115 | 0.674 | **0.873** | 0.575 | 0.178 | 0.654 |
| **PV2** | 0.410 | 0.314 | -0.392 | 0.382 | 0.227 | **0.639** | 0.476 | 0.230 | 0.391 |
| **PV3** | 0.741 | 0.625 | -0.319 | 0.244 | 0.505 | **0.879** | 0.424 | 0.253 | 0.590 |
| **PRIC1** | 0.263 | 0.429 | -0.367 | -0.087 | **0.870** | 0.455 | 0.249 | 0.151 | 0.303 |
| **PRIC2** | 0.531 | 0.420 | -0.459 | 0.178 | **0.935** | 0.633 | 0.473 | 0.211 | 0.355 |
| **SREC1** | 0.448 | 0.470 | -0.468 | 0.573 | 0.533 | 0.508 | **0.842** | 0.468 | 0.167 |
| **SREC2** | 0.506 | 0.317 | -0.212 | 0.051 | 0.141 | 0.484 | **0.809** | 0.155 | 0.037 |
| **TRST1** | 0.453 | 0.370 | -0.165 | 0.428 | 0.134 | 0.292 | 0.432 | **0.961** | -0.067 |
| **TRST2** | 0.034 | 0.105 | -0.063 | 0.272 | 0.304 | 0.129 | 0.161 | **0.781** | -0.037 |
| **VFC1** | 0.303 | 0.502 | -0.350 | -0.146 | 0.309 | 0.638 | 0.081 | 0.090 | **0.896** |
| **VFC2** | 0.319 | 0.435 | -0.370 | 0.083 | 0.343 | 0.587 | 0.148 | -0.217 | **0.875** |

Table 5
**Path analysis using PLS-SEM**

| | Estimate | S.D. | T-Stats | Prob. | VIF |
|---|---|---|---|---|---|
| Attitude → Continuous Intention to Use | 0.475 | 0.060 | 7.932 | 0.000 | 2.292 |
| Convenience → Perceived Value | 0.093 | 0.031 | 3.037 | 0.002 | 1.596 |
| Design → Perceived Value | 0.197 | 0.043 | 4.607 | 0.000 | 1.381 |
| Perceived Value → Attitude | 0.590 | 0.031 | 18.905 | 0.000 | 1.566 |
| Perceived Value → Continuous Intention to Use | 0.264 | 0.049 | 5.345 | 0.000 | 2.400 |
| Price → Perceived Value | 0.415 | 0.033 | 12.712 | 0.000 | 1.415 |
| Service Recovery → Attitude | 0.242 | 0.040 | 6.040 | 0.000 | 1.566 |
| Service Recovery → Continuous Intention to Use | 0.084 | 0.052 | 1.628 | 0.104 | 1.670 |
| Trustworthiness → Perceived Value | 0.160 | 0.046 | 3.492 | 0.000 | 1.286 |
| Various food choices → Perceived Value | 0.608 | 0.035 | 17.146 | 0.000 | 1.319 |

use FDAs, whereas service recovery ($\beta = 0.084$, $p > 0.05$) was found to have a statistically insignificant impact on the continuous intention to use FDAs. Hence, $H_{10}$ and $H_7$ are accepted, whereas $H_9$ is rejected. Furthermore, perceived value ($\beta = 0.590$, $p < 0.05$) and service recovery ($\beta = 0.242$, $p < 0.05$) significantly affect the attitude towards FDAs. Therefore, $H_6$ and $H_8$ are accepted. Finally, various food choices ($\beta = 0.608$, $p < 0.05$), price ($\beta = 0.415$, $p < 0.05$), design ($\beta = 0.197$, $p < 0.05$), trustworthiness ($\beta = 0.160$, $p < 0.05$), and convenience ($\beta = 0.093$, $p < 0.05$) significantly influence perceived value. Hence $H_5$, $H_4$, $H_2$, $H_3$, and $H_1$ are accepted.

The R-squared values of attitude, continuous intention to use FDAs, and perceived value were found to be 0.5645, 0.554, and 0.735, respectively, and the Q-squared values of attitude, continuous intention to use FDAs, and perceived value were 0.409, 0.465, and 0.578, respectively. The obtained results show that all independent latent constructs explain attitude by up to 56.45 percent, continuous intention to use FDAs by up to 55.4 percent, and perceived value by up to 73.5 percent. Furthermore, all of the Q-squared coefficients were higher than absolute zero.

# 5 Discussion

The growth in the field of online services has brought significant improvements to the lives of consumers (Ray, Dhir, Bala, & Kaur, 2019; Sjahroeddin, 2018). Ordering food online is now a trend and the mounting popularity of FDAs has created competition within the food delivery business worldwide (S. W. Lee et al., 2019). Companies are attempting to introduce this O2O model in their businesses to engage more with their consumers by offering user-friendly online stores that have a wide variety of products and services (Hubert, Blut, Brock, Backhaus, & Eberhardt, 2017) and they have welcomed mobile apps as an additional communication channel to gain loyalty and attract new customers (R. I.-H. Wang, Malthouse & Krishnamurthi, 2015).

Among all e-commerce apps, FDAs have gained the most substantial popularity around the globe (Online food delivery market, 2020). The food app market has recently become a battleground for many emerging food delivery companies exploring the opportunity to expand and develop unique business models (Trending Team, 2018). However, studies related to FDAs are still in the nascent phase (Ray et al., 2019). Therefore, there is a need to determine the factors that affect the value perceived by the consumer and help in developing a positive attitude as well as the factors that stimulate consumers to continuously use FDAs.

Therefore, this study aimed to examine the influence of food delivery applications' attributes – convenience, trustworthiness, price, design, and various food choices – on the perceived value, which leads to attitudes and continuous intentions to use food delivery apps. Moreover, the impact of service recovery on attitudes has also been observed, as well as the influence on continuous intentions to use food delivery apps. In the past, almost none of the studies have considered the service recovery factor in determining consumers' attitudes and continuous intention to use FDAs.

## 5.1 Theoretical contribution

The study enriches the theory through various aspects. Although past studies (H.-S Chang & Hsiao, 2008; Y.-W. Chang & Chang, 2010; Chou, 2015; Y.-S. Wang et al., 2011) have confirmed the importance of service recovery in determining consumers' perceptions in various other service-related businesses, the current study is the first to reflect on the prominence of service recovery in the context of FDAs.

Furthermore, this study complements the emerging literature related to FDAs by considering the role of food app quality attributes in determining the perceived value of FDAs as well as in determining attitudes and continuous intentions. In the past, the majority of the studies related to FDAs have considered behavioral intention (E.-T. Lee, Lee, & Jeon, 2017; Okumus & Bilgihan, 2014) and a handful of studies have considered continuous intention to use FDAs. Finally, to the best of the authors' knowledge, this study is the first to establish food delivery app quality attributes as determining perceived value, attitudes, and continuous intentions in the context of Pakistan. Hence, this study enriches the literature on FDAs in the context of a developing economy.

The obtained results provide evidence that all of the studied characteristics of food delivery apps are vital to enhance perceived value among consumers. Importantly, the results revealed that various food choices have the strongest influence on perceived value, followed by the price, design, trustworthiness, and convenience, respectively. The availability of FDAs allows users to explore multiple food options from various restaurants, which

ultimately brings perceived value to consumers. Moreover, consumers can search for different food options available on FDAs, compared to before FDAs when consumers had limited choices (Cho et al., 2019). The price factor was also found to be one of the important elements of perceived value. This confirmed that for consumers, a reasonable and economical price matters. The findings further revealed that the design of the application also affects the consumer's perceived value. Hence, a concise, easy-to-use application and easy-to-understand instructions also provide value from the consumer's perspective. Past studies have acknowledged that a user-friendly design motivates the consumer to use the app (Grøtnes, 2009) and affects purchase intentions (Kuo & Yen, 2009; H.-P Lu & Su, 2009). In the context of FDAs, the previous literature also highlighted the importance of application design in terms of easy-to-use order placement and the ease of tracking an order (Cho et al., 2019; Ray et al., 2019). Trustworthiness was also found to be a contributing factor in determining the value perceived by the consumer. This is consistent with previous research that indicates that trust plays a significant role in generating satisfying transactions (Li & Yeh, 2010). Siau and Shen (2003) divided trust into two components, i.e. one that is related to trust in mobile technology and the other that is related to trust in the food vendor. This stresses the fact that both the food delivery app and the food vendor should be competent and trustworthy. Last but not least, it was confirmed that convenience also brings value to the customer. Ordering food anywhere at any time provides an opportunity to the consumer and a positive experience (Cho et al., 2019). This finding is also consistent with the previous research such as, for example, that of Correa et al. (2018), He, Han, Cheng, Fan, and Dong (2018), and Roh and Park (2018).

Furthermore, the results confirmed that perceived value tends to improve attitudes as well as stimulate the continuous intentions of consumers to use food delivery apps. When the consumer perceives greater value, this automatically leads to an improved attitude and continuous intention to use the food delivery app (Pham et al., 2018). This finding is also consistent with those of Cho et al. (2019) in the context of FDAs. Moreover, in the context of O2O commerce, the perceived value gained from the quality of the mobile application stimulates consumers to opt for better products (Magrath & McCormick, 2013).

In addition, the results of the present study show that the element of service recovery is only beneficial in terms of leading to a positive attitude among the consumers, but it is not an important factor to enhance continuous use intention. In other words, the study confirmed that service recovery develops a positive attitude towards FDAs. The previous literature has indicated that service recovery positively affects loyalty and retention (K.-C. Hu, Lu, Tu, & Jen, 2013; Steyn et al., 2011; Vázquez-Casielles, Iglesias, & Varela-Neira, 2012). However, the findings of the present study showed that in the context of FDAs, service recovery does not necessarily motivate consumers to continuously use the app. The outcomes further suggest that positive consumer attitudes enhance consumers' continuous intentions to use food delivery apps. Similar results have also been observed before (Blasco Lopez, et al., 2018; Cho et al., 2019; Kapoor & Vij, 2018).

## 5.2 Managerial implications

This study proposes important and meaningful insights for the restaurant industry regarding the introduction or maintenance of strategies to fulfill the demands of consumers through food delivery apps. The study reveals the importance of service recovery in creating a positive attitude among food delivery consumers. Based on the observed results, this study suggests some vital guidelines to achieve a positive attitude and continuous intentions to use food delivery apps among consumers. Firstly, the results suggest that managers of a restaurant need to focus on an attractive and appealing design for their food delivery app. For this purpose, the assistance of technology experts is required, which can not only help to improve the design, but the level of convenience as well. The aspects of quality control, minimum lead time, smooth transactions, and quick responsiveness are also vital for the achievement of trust among consumers. Ray et al. (2019) highlighted that ease-of-use and usability are the critical factors behind the success of FDAs. Trust can be raised by providing timely and up-to-date information related to menus and pricing (Cho et al., 2019). Furthermore, it is advisable to offer multiple food items to consumers as more variety tends to attract more consumer segments. Finally, another important factor that should be included in the overall strategy is the implementation of a pricing strategy that actually provides value to the consumer. Operators and food app suppliers must focus on maximizing the ease of service, utility, and product attributes of their food apps, which consumers deemed most significant (Cho et al., 2019).

Taking all of the above into consideration, it should be achievable for the managers of restaurants

to increase the perceived value among the consumers of food delivery apps through providing convenience, trustworthiness, good prices, design, and various food choices. These characteristics require close attention from managers when formulating their policies related to food delivery apps in Pakistan and in general, as mobile apps are a powerful tool for businesses to reach potential customers (Cho et al., 2019).

By nurturing these characteristics, positive perceived value will be achieved, which subsequently helps to improve attitudes and continuous intention to use food delivery apps. This study also emphasizes the importance of service recovery. Better service recovery can be achieved through quick responsiveness, satisfied employees, better compensation policies, and taking responsibility for uncertainty. In a way, through outstanding service recovery, the service provider takes the risk away from the customer. If this practice is consistent, it will unquestionably enhance positive attitudes, which ultimately increase the continuous intention of consumers to use a food delivery app. It was noted that customers that received an outstanding service recovery even became so-called apostles of the brand, or loyal customers determined to recommend the brand to members of their referent group.

### 5.3 Future research recommendations

To achieve the purpose of the research, the current study follows the quantitative approach. In future research, we recommend using a qualitative approach to detect all of the possible dimensions and gain a deeper understanding of the phenomenon of consumers' attitudes and intentions regarding mobile food apps and similar technologies. Furthermore, it would be beneficial to observe the moderation of word-of-mouth (WOM) or service quality between the measured relationships. Also, it is important to keep in mind that the characteristics of mobile applications are highly correlated with technological aspects. Thus, the mediation or moderation of technological barriers or disruptions between an application's attributes and its perceived value might provide some important knowledge. In the future, studies could also consider specific FDAs when determining attitudes and continuous use intention. It might be that different FDAs and types of FDAs affect behavioral intentions differently. Finally, we advise extending the sample to test and increase the robustness of the theory and generalizability of the conclusions.

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