

Determinants and Outcomes of Food Delivery App Engagement During COVID-19: A Study of Urban and Semi-Urban Customers

Abhilash Bhattacharjee, National Institute of Technology, Rourkela, India

Kunja Sambashiva Rao, National Institute of Technology, Rourkela, India

Nishad Nawaz, Kingdom University, Bahrain*

 <https://orcid.org/0000-0003-4781-7993>

ABSTRACT

With the expansion of internet penetration and the adoption of mobile apps, usage of food delivery applications has increased significantly during the pandemic. The study's main objective was to examine the antecedents and consequences of food delivery app engagement among urban and semi-urban customers in India during COVID-19. The data were collected from 269 semi-urban respondents and 301 urban respondents. The stimulus organism and response (SOR) model has been used to understand consumers' antecedents and consequences of food delivery app engagement during the pandemic. The study used the structural equation modelling method to test the relationship between the variables. The study's findings showed that the mobile application's perceived ease of use, enjoyment, and time convenience found a significant effect among urban and semi-urban customers. This study is limited to urban and semi-urban customers with cross-sectional survey data. The study has explored a few antecedents and consequences of mobile food delivery app engagement.

KEYWORDS

COVID-19, Customer Engagement, Food Delivery App, Purchase Intention

INTRODUCTION

The COVID-19 pandemic has significantly transformed people's lives and disrupted the Indian economy (Kumar Das & Patnaik, 2020). Government regulations and lockdowns have exacerbated the situation, leading to a shortage of essential resources among people (Sharma et al., 2020). Despite these challenges, the retail sector remains an important source of demand, playing a crucial role in e-commerce value chains by providing goods and services to households and serving as an outlet for

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*Corresponding Author

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upstream sectors (Debata et al., 2020; Harris et al., 2020). Retailers have seen product shortages and customer panic buying behaviours as a profitable opportunity to provide timely service during the pandemic (Eriksson & Stenius, 2020). In addition, urban and semi-urban customers have increasingly relied on online ready-to-eat and fresh food delivery services, resulting in significant growth rates in food sales through online platforms (Pantanoa et al., 2020). Nevertheless, the rise of online food delivery services culture during the pandemic has left a gap in our understanding of customer behaviours and the decision-making process. As many people were isolated at home and needed help accessing grocery stores or supermarkets, online food delivery services became a popular alternative for urban and semi-urban populations. Hence, understanding CE behaviour towards the mobile food delivery services applications during the pandemic is essential.

There have been some empirical consumer studies that have explored various aspects of CE with the mobile apps phenomenon, including on customer satisfaction with mobile FDA service, customer intention to use OFD services, the associated risk of OFDs, customer expectations and OFDs performance, consumer behavioural choices, and purchase intentions (Hong et al., 2021; Meena & Kumar, 2022; Poon & Tung, 2022; Prasetyo et al., 2021; Zvarikova et al., 2022). However, there was limited research on CE behaviour with reference to food delivery mobile apps during COVID-19. More specifically this study examines the factors that affect consumer behaviour in engaging food delivery service apps and their consequences in India during COVID-19. In addition, in an emerging country like India, the use of mobile apps and consumer behaviour varies from urban to semi-urban areas. It is also interesting to understand how sudden disruption affects adoption of technology and consumer behaviours. Specifically, this research investigates the antecedents and consequences of FDA adoption. The prior studies investigated variables like perceived innovativeness (Hwang et al., 2019), ease-of-use, enjoyment, app engagement (Tian et al., 2021), efficiency (Kim & Baek, 2018), and behavioural intention (Ali et al., 2021), and these studies were limited to traveling, service quality, banking, and digital payments (Ali et al., 2021; Shahid et al., 2022). None of the studies, however, specifically focused on antecedents and consequences of CE with food delivery mobile apps, and very limited studies have focused with a comprehensive model on online food retail mobile apps engagement from a pandemic perspective. Therefore, the present study examines the antecedents and consequences of mobile FDA engagement among urban and semi-urban customers with the COVID-19 scenario under the lens of the SOR framework. By addressing these gaps, the study contributes to the literature concerning CE with FDA services and their importance during emergencies. Further, the study finding will be helpful to the scholars and managers their interest in CE with mobile food retail delivery services and their importance during pandemic situations.

The rest of the paper is organized in the following manner: An overview of the theoretical and conceptual framework, hypotheses development, methodology employed, and data analysis and results. The implications, limitations, and recommendations for future research are presented.

THEORETICAL BACKGROUND

Online Food Delivery Mobile Apps Engagement During COVID-19

During the COVID-19 pandemic, customer involvement with online food delivery services and mobile apps significantly increased and influenced the food industry (Muangmee et al., 2021). CE with online food delivery services is a process through which individuals browse the menu, place the order, make the payment, receive confirmation, prepare food, deliver, and provide feedback. According to Apoorva and Tarush (2022), the Indian food delivery market through mobile apps saw growth in between 15 to 20% during the lockdown. As many people were staying at home to prevent the spread of the virus, they were ordering food online rather than going to grocery stores or convenience stores (Goolsbee & Syverson, 2021). As a result, there has been a notable increase in the demand for food delivery services, prompting many food delivery service providers to utilize mobile apps to maintain

their business operations and actively engage with customers during this difficult time (Hao et al., 2020). Customers are actively involved with FDA due to offered convenience, order real-time updates, estimated delivery times, delivery status, and safe options with minimizing contact with others during the pandemic Ratna Bhushan (2012). In addition, these service operators implemented various service options, such as a variety of food options, exclusive deals, and discounts for customers. In India, there were many online food delivery service providers through mobile apps, including Swiggy, Zomato, Food Panda, and Uber Eats (Amist et al., 2021). In addition, online food delivery platforms like Swiggy and Zomato witnessed a surge in registered and active users during the lockdown. These food delivery firms have gained significant acceptance among Indian customers, specifically during the COVID-19 lockdown due to their safety and convenience (Muangmee et. al., 2021). In addition to that, online food delivery service providers in India have also implemented safety measures such as contactless delivery, hygiene protocols, and temperature checks for delivery personnel to maintain the safety of both customers and employees. Furthermore, many of these apps offer loyalty programs and discounts, and they provide essential supplies like groceries and medicines (Jaiswal et al., 2020). These measures helped build customer trust and encouraged them to use the apps more frequently.

Food Delivery Mobile App Usage in Urban and Semi-Urban Areas

The adoption and usage of food delivery mobile apps in urban and semi-urban areas have significantly risen during the pandemic in India due to widespread lockdowns, and with social distancing measures many people have turned to online food delivery service applications as a safer and more convenient option for getting food (Puram et al., 2022). The demand for food delivery services apps skyrocketed in urban areas, as many people used stay-at-home or work-from-home options for employees during the lockdown (Srinivas, 2021). The situation has resulted in an increase in users and orders from mobile food service apps, and many restaurants also partnered with these mobile apps, including Swiggy, Zomato, Food Panda, and Uber Eats, to expand their customer base (Srinivasan, 2021). Also, these applications implemented better safety measures like hygiene protocols and contactless delivery, further boosting their popularity among users (Kim et al., 2023). On the other side, online FDA also continued to expand their services in semi-urban areas to cover more remote areas due to the COVID-19 pandemic lockdown (Ranjan, 2021). People were also partially dependent on essential services from FDA in these areas, those who were previously having limited access options for getting food (Thombre & Agarwal, 2021).

During the COVID-19 lockdown, several empirical studies explored the effect of the pandemic situation on the adoption and usage of online food delivery services apps in urban and semi-urban areas (Kumar et al., 2020; Puram et al., 2022; Ranjan, 2021). Prior studies have investigated factors such as customer satisfaction (Pal et al., 2022), food quality (Meena & Kumar, 2022), and customer emotions with FDA (Kumar & Shah, 2021) as well as the influence of in m-app service features such as contactless delivery and hygiene protocols on consumer behaviour. In addition, prior literature has demonstrated that mobile apps significantly impact consumer behavior and purchase intention (Hsu & Lin, 2016). Consumers are attracted to branded apps that offer them convenience and security, particularly during uncertain times (Chopdar et al., 2018). The COVID-19 pandemic has led to a shortage of resources, and customers are increasingly willing to order groceries through various FDA (Palaniappan, 2020). To ensure satisfaction and retention, marketers focus on customization and customer service, while FDA implement contactless ordering and delivery, adding value to their convenience and ease-of-use (Ratna Bhushan, 2012). Online FDA have become increasingly popular as they offer efficient and convenient delivery to caterers, restaurants, and customers alike. By April 2020, approximately 71.7 percent of customers had used these service apps for food delivery, and 41.6 percent preferred online services to offline services (Zhao & Bacao, 2020). There are two categories of FDA: ready-to-eat and fresh market, and several restaurants have also launched their own FDA, including KFC, Domino's, Pizza Hut, and Wow Momo (Ratna Bhushan, 2012). Although previous studies have examined consumers' intentions to adopt FDA in different contexts (Yuyang Zhao, 2020), the COVID-19 circumstances have

altered consumers' perceptions in terms of adoption and use of online FDA (Dsouza & Sharma, 2021). Further, the adoption and consumption patterns vary by demographics, such as in urban and semi-urban areas in India (Nijhawan & Dahiya, 2020). FDA are widely used due to the availability of resources and technology in these areas. In addition to that, during the pandemic, these branded food delivery services offered them convenience, ease-of-use, and safety (Pandey et al., 2022).

Conceptual Framework

The present research employs the SOR framework to examine the factors leading to and resulting from mobile app engagement in online food delivery services (Mehrabian & Russell, 1974). The investigation takes into account the influence of the COVID-19 pandemic on consumer adoption behaviour. Within the SOR framework, the adoption perspective explains how antecedents such as ease-of-use, compatibility, time convenience, and enjoyment serve as stimuli (S) that affect an individual's engagement with the mobile app as an organism (O), leading to outcomes such as brand attitude, brand commitment, and purchase intention as the response (R) (Mehrabian & Russell, 1974).

Stimulus Organism Framework

CE with mobile apps during COVID-19 can be effectively analysed using the SOR framework. This approach views external stimuli as factors that activate individuals' internal states and influence their inclination to adopt certain behaviours (Mehrabian & Russell, 1974; Zemin Tian, 2021). Further, the framework considers the psychological processes consumers go through when engaging with mobile applications offered by service providers (Mehrabian & Russell, 1974). As a result, it enables examining how consumers respond, including their attitudes toward the brand, commitment, and intentions to place online orders.

Stimulus

In today's context, stimuli refer to how customers react to various internal and external factors, including customer traits, the service provider's mobile app design, and situational cues (Mehrabian & Russell, 1974). This study identifies stimuli as the customer's perceived ease-of-use, compatibility, time convenience, enjoyment of the service provider's mobile app, and the COVID-19 pandemic external environment.

Organism

The organism is the process by which customers evaluate and interpret experiences (Mehrabian & Russell, 1974). In the present context, this is customers' cognitive function of engagement with technology, such as food delivery mobile apps.

Response

The consequences of engaging with service app technology in the form of customer response (Mehrabian & Russell, 1974), including brand attitude, commitment, and purchase intention, are collectively referred to as the response. Consequently, consumer engagement with food delivery services' mobile apps is uncommon during the COVID-19 pandemic. However, there currently needs to be more empirical evidence regarding customer behaviour in mobile applications for urban and semi-urban areas, as seen in Figure 1.

HYPOTHESIS DEVELOPMENT

Perceived Ease-of-Use

The perceived ease-of-use is essential for affecting technology adoption and usage behaviour. Perceived ease-of-use refers to the extent to which an individual believes that utilizing a specific system would require minimal effort and that it is easy to understand and operate (Davis, 1989). Previous researchers

also have established that the ease-of-use of technology is a crucial factor in determining its utility, which includes factors that influence consumer adoption and how effortlessly people can use it (Ko et al., 2009). This encompasses aspects such as learnability, interactivity, adaptability, and impact on consumer behaviour (Sarraf et al., 2016). While understanding how to use technology efficiently is important, the Technology Acceptance Model (TAM) is more effective at determining why an individual adopts a specific technology (McLean, 2018). The ease with which technology allows customers to perform tasks and increase their productivity, efficiency, and performance determines its ease-of-use (Rose, 2012). In addition to that, Hanjaya et al. (2019) indicate that perceived ease-of-use positively influences users' intention to use mobile apps. In the present perspective, in the COVID-19 pandemic, people are looking for convenience and accessibility, and online food delivery services aim to meet these needs through their features and services (Shah et al., 2021). These apps were offered during various pandemic situations so customers could easily navigate food options to fulfill their needs. Therefore, the ease-of-use of mobile apps during lockdown plays a crucial role in engaging customers from urban and semi-urban areas with food delivery services.

Hypothesis 1

The perceived ease-of-use of food delivery mobile apps by urban and semi-urban customers during COVID-19 has a positive impact on the engagement level of mobile applications.

Perceived Time Convenience

Time convenience refers to the extent to which a customer perceives that mobile application innovation provides immediate and advantageous benefits (Kleijen, 2007). McLean (2018) suggested that mobile apps' convenience enhances customer engagement. Similarly, online food service apps enhance an order's delivery speed within a given timeline. For instance, during the pandemic, time convenience favourably affected the level of interaction with FDA (Brewer & Sebby, 2021). People often struggled to find time to prepare meals at home or go out to eat. FDA offered a convenient solution for customers by allowing users to order food from their favourite restaurants without leaving their homes and have it delivered to their doorstep (Holwitt, 2021). In the present context, convenience becomes a critical factor in the decision-making process for consumers using FDA. FDA like Domino's, Swiggy, Zomato and Pizza Hut offered services for efficient ordering and fast delivery times to attract and retain customers during this period (Gupta, 2019). Therefore, FDA's time convenience during COVID-19, such as providing accurate and fast delivery times, simplifying the ordering process, and offering easy payment options, positively influenced mobile app engagement.

Hypothesis 2

The time convenience provided by online food delivery services during the COVID-19 pandemic has a positive influence on the engagement level of urban and semi-urban customers with mobile applications.

Perceived Compatibility

The COVID-19 pandemic phenomenon significantly affected the food delivery industry, and FDA in urban and semi-urban areas have become increasingly popular (Puram et al., 2022). As a result, FDA provided compatibility by maintaining safety measures, which positively affected CE with these apps (Tran, 2021). For instance, some food delivery mobile apps provided compatible GPS-enabled location-tracking information (Singh et al., 2021), estimated time of delivery, and online payment options (Thamaraiselvan et al., 2019). With this note, we assume that the compatibility of FDA with COVID-19 safety measures has positively affected CE with these apps.

Hypothesis 3

The compatibility of the FDA with urban and semi-urban customers during COVID-19 has a positive effect on customer engagement.

Perceived Enjoyment

Enjoying the experience of using an online food delivery app during the COVID-19 pandemic is likely to influence CE positively (Habib et al., 2022). According to Xu et al. (2015), enjoyment is an emotion that accumulates in consumers after using a product or service. McLean (2018) suggests that if a customer is not intrinsically satisfied during their shopping experience, they will seek out alternative services. Intrinsic enjoyment is influenced by various factors, such as app navigation, presentation/graphics, content, safety, and post-use satisfaction, and marketers aim to provide a pleasant experience through customized services (Jun et al., 2022). McLean (2018) found that greater enjoyment of mobile apps results in increased interaction with the app. In the COVID-19 context, seamless and safe delivery among urban and semi-urban customers has a positive impact on engagement and satisfaction with mobile applications.

Hypothesis 4

Urban and semi-urban customers' enjoyment of FDA during the COVID-19 pandemic will have a positive impact on their level of engagement with these apps.

Brand Attitude, Relationship Commitment, and Purchase Intention

Constructs such as brand attitude, relationship commitment, and purchase intent are observable responses that individuals exhibit in response to stimuli, such as positive engagement with mobile apps (Kim & Baek, 2018). According to earlier studies, the technology acceptance model suggested that positive CE with mobile applications significantly impacts purchase intention. Huang et al. (2019) found that ease-of-use, usefulness, and positive experience with mobile shopping applications have a significant influence on customer behavioural intentions. Vahdat et al. (2021) also found that CE with shopping apps backed by social factors positively affects purchase intention. Prior studies noted that behaviour intentions are significantly determined by beliefs (Rao et al. 2021), attitude (Kunja et al. 2022) subjective norms (Rao and Rao 2019), and demographics (D'Souza et al., 2007). In addition to that, customer purchase intention varies according to demographics (Wang et al., 2020). Customers' purchasing behaviour via the mobile app varies from urban to semi-urban customers. Urban customers, for example, have better access to technology and resources that meet hedonic needs. However, in semi-urban areas, purchases are made to meet basic needs, in which case consumers use mobile grocery delivery apps for utilitarian needs (McLean, 2018; Suk Won Lee, 2019).

In addition, when customers actively engage with the mobile application it will positively affect favourable attitudes and relationship commitment brands. Therefore, in the COVID-19 pandemic, mobile food apps are more beneficial to remotely located customers (Jang et al., 2021). As app engagement benefits customers during the lockdown, customers prefer long-term relationships and favourable commitment to the app. Urban customers may have different attitudes towards FDA than semi-urban customers, affecting their purchase intentions and long-term commitment to these applications (Puram et al., 2022). For instance, urban customers may be more likely to use FDA due to the convenience and speed of delivery and the broader range of restaurants and food options available in urban areas (Tandon et al., 2021). On the other hand, semi-urban customers may have more limited access to food delivery services and may rely more on traditional food ordering and delivery methods (Khaled et al., 2022). Hence, based on the argument, we can infer that CE with mobile applications varies between urban and semi-urban customers in terms of brand attitude, purchase intentions, and long-term relationship commitment with food delivery applications.

Hypothesis 5

The engagement of urban and semi-urban customers with mobile FDA during COVID-19 will positively influence their attitudes toward the app brand.

Hypothesis 6

The engagement of urban and semi-urban customers with mobile FDA during COVID-19 will positively influence their relationship commitment toward the app brand.

Hypothesis 7

The engagement of urban and semi-urban customers with mobile FDA during COVID-19 will positively influence their purchase intention in the app brand.

Hypothesis 8

A positive attitude towards the food delivery app brand during COVID-19 will have a favourable impact on relationship commitment among urban and semi-urban customers.

Hypothesis 9

A positive attitude toward the food delivery app brand during COVID-19 will have a favourable purchase intention in the app brand among urban and semi-urban customers.

PROPOSED RESEARCH MODEL

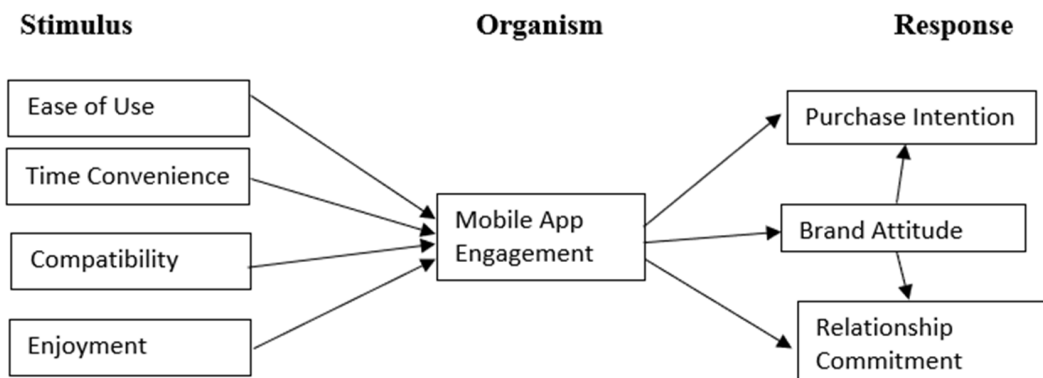
RESEARCH METHODOLOGY

The research methodology employed in this study involved testing proposed hypotheses derived from theory and literature (Saunders et al., 2009). A positivist perspective was adopted to collect and analyse data, and appropriate statistical techniques were used as Bryman (2016) suggested. The study utilized a deductive approach for conducting the survey and statistical analysis. First, the authors measured the convergent and divergent validity of the proposed measurement model using confirmatory factor analysis. Finally, all the hypotheses were tested using SEM via IBM-SPSS software.

Sample and Survey Administration

A cross-sectional survey approach was used in this study to collect data from active users of FDA in urban and semi-urban areas in India. The study collected data from respondents using a purposive sampling method, and screening questions were included to ensure that respondents had used FDA during the COVID-19 pandemic. All contacted respondents agreed to participate and were assured of anonymity. The study obtained 589 responses, of which 19 were excluded during screening, and used 570 responses for the final analysis. The data analysis was conducted on the urban (301) and semi-urban (269) samples, meeting the minimum statistical power requirements and evaluating the proposed model. Hoelter (1983) specified that a minimum of 200 samples is necessary for statistical power

Figure 1. Research model



analysis. Accordingly, the present study's sample from two groups meets the minimum requirements and is suitable for data analysis. The respondents' demographic information is given in Table 1.

Measurement Instrument Development

The questionnaire was structured into three sections. Firstly, two screening questions were included to ensure that only respondents who had utilized FDA during the COVID-19 could participate. The second section collected demographic data of the respondents, while the third section contained questions related to the constructs. For the constructs, the study used measurement scales that were based on prior research. The ease-of-use items were adapted from McLean (2018), perceived convenience-related items were taken from Kang et al. (2015), and compatibility items were adapted from Kang et al. (2015) and Kim and Baek (2018). The study also utilized McLean's (2018) scale of enjoyment, Ajzen's (1991) attitude scale, and Sung and Campbell (2009) and Kim and Baek's (2018) relationship commitment scale. The purchase intention construct items were adapted from both Ajzen (1991) and Zemin Tian (2021). All scales used a five-point Likert-type scale. The study ensured that all the construct items had item-loading and reliability greater than 0.70, in line with Fornell and Larcker's (1981) recommendation, as shown in Table 2.

Table 1. Demographic details of the respondents

Demographic Details of Urban and Semi-Urban Area Sample Details							
Semi-Urban	N= 269	Frequency	Percent	Urban	N= 301	Frequency	Percent
Gender	Male	212	75.8	Gender	Male	214	71.1
	Female	65	24.2		Female	87	28.9
Age	18-25	59	21.9	Age	18-25	68	22.6
	25-35	128	47.6		25-35	180	59.8
	35-45	35	13		35-45	39	13
	45-55	32	12.9		45-55	9	3
	Above 55	15	5.6		Above 55	5	1.7
Frequency of App Use	Zomato	126	46.8	Frequency of App Use	Zomato	120	39.9
	Swiggy	128	47.6		Swiggy	137	45.5
	Domino's	15	5.6		Domino's	29	9.6
					Pizza Hut	12	4
					Food Panda	3	1
App Usage per Month (average)	3-5 Hrs	266	98.9	App Usage per Month (average)	3-5 Hrs	231	76.7
	10-20 Hrs	3	1.1		10-20 Hrs	70	23.3
Internet Usage per Month (average)	10-20 Hrs	117	43.5	Internet Usage per Month (average)	10-20 Hrs	159	52.8
	20-30 Hrs	152	56.5		20-30 Hrs	121	40.2
					20-30 Hrs	21	7
Occupation	Students	65	24.2	Occupation	Students	87	28.9
	Govt. Employee	27	10		Govt. Employee	25	8.3
	Business	31	11.5		Business	47	15.6
	Private Employee	146	54.3		Private Employee	142	47.2

RESULTS

Measurement Model

Before conducting hypothesis testing, the study performed confirmative factor analysis (CFA) with IBM-AMOS software to determine the convergent and divergent validity of the variables. The measurement model was evaluated using maximum likelihood estimation (MLE). The measurement model fit indices indicate that the proposed model is an acceptable fit, as follows: Semi-Urban: CMIN/DF = 2.863, CFI = 0.939, RMSEA = 0.079, as seen in Table 6 and Urban: CMIN/DF = 1.917, CFI = 0.945, RMSEA = 0.058, P Close = 0.02, as seen in Table 8. The composite reliability results indicate that all the constructs had high internal consistency. As Hair et al. (2010) suggested, all proposed constructs should have a more significant association with the assigned measurement items than with other divergent constructs. Table 3 and 4 demonstrate convergent validity, while Tables 5 and 7 demonstrate divergent validity, as diagonal values represent the square root of the extracted average variance (AVE). All constructs met the minimum internal consistency criteria. Overall, the findings denote that the processed model's convergent and divergent validity met the recommended minimum criteria. Additionally, the study used the Harman single factor test to determine the bias in the data, and the results indicated that the data was free of bias (Podsakoff, 2003).

Table 2. Reliability of the constructs

Constructs (Semi-Urban Area)	Reliability	Constructs (Urban Area)	Reliability
PEU	0.973	PEU	0.972
TC	0.897	TC	0.934
ENJ	0.782	ENJ	0.947
COM	0.857	COM	0.953
CE	0.924	CE	0.928
ATT	0.878	ATT	0.974
RC	0.866	RC	0.969
PI	0.864	PI	0.778

Table 3. Convergent validity for semi-urban area customers

Variables	Composite Reliability	Average Variance Extracted	Maximum Shared Variance	Maximum Reliability
EOU	0.974	0.881	0.213	0.983
ATT	0.878	0.589	0.236	0.879
RC	0.866	0.618	0.236	0.867
CE	0.925	0.805	0.275	0.932
TC	0.898	0.746	0.13	0.91
PI	0.865	0.682	0.275	0.867
COM	0.86	0.673	0.022	0.876
ENJ	0.783	0.545	0.107	0.783

Table 4. Convergent validity for the urban area customers

Variables	CR	AVE	MSV	MaxR(H)
EOU	0.973	0.877	0.192	0.978
ATT	0.975	0.885	0.232	0.98
RC	0.969	0.886	0.28	0.972
CE	0.929	0.814	0.168	0.936
TC	0.934	0.825	0.205	0.941
PI	0.784	0.549	0.28	0.8
COM	0.954	0.874	0.238	0.964
ENJ	0.947	0.857	0.238	0.952

Table 5. Divergent validity for semi-urban area customers

Variables	EOU	ATT	RC	CE	TC	PI	COM	ENJ
EOU	0.939							
ATT	0.270***	0.768						
RC	0.461***	0.485***	0.786					
CE	0.264***	0.261***	0.295***	0.897				
TC	0.245***	0.360***	0.258***	0.284***	0.864			
PI	0.163*	0.283***	0.252***	0.525***	0.137*	0.826		
COM	0.124†	0.094	0.129†	0.137*	0.099	-0.004	0.82	
ENJ	0.155*	0.263***	0.313***	0.317***	0.328***	0.166*	0.147†	0.73

Note. Correlations; Bold values = Square root of AVE; † $p < 0.100$ * $p < 0.050$ ** $p < 0.010$ *** $p < 0.001$

Table 6. Measurement model fit indices for semi-urban area customers

Measure	Estimate	Threshold	Interpretation
CMIN	668.931	--	--
DF	349	--	--
CMIN/DF	1.917	Between 1 and 3	Excellent
CFI	0.945	>0.95	Acceptable
SRMR	0.042	<0.08	Excellent
RMSEA	0.058	<0.06	Excellent
PClose	0.02	>0.05	Acceptable

Note. Significance of Correlations: † $p < 0.100$ * $p < 0.050$ ** $p < 0.010$ *** $p < 0.001$

HYPOTHESIS TESTING

The study utilized SEM to test all proposed hypotheses. The findings indicate that the connection between perceived ease-of-usefulness of FDA and CE (H1) was significant among both semi-urban ($\beta=0.19$, $t=3.39$, $p=***$) and urban customers ($\beta=0.113$, $t=2.191$, $p=0.028$). Similarly, the association

Table 7. Divergent validity for urban area customers

Variables	EOU	ATT	RC	CE	TC	PI	COM	ENJ
EOU	0.937							
ATT	0.263***	0.941						
RC	0.439***	0.482***	0.941					
CE	0.210***	0.308***	0.314***	0.902				
TC	0.152*	0.299***	0.259***	0.296***	0.908			
PI	0.335***	0.202**	0.530***	0.248***	0.194**	0.741		
COM	0.254***	0.285***	0.253***	0.373***	0.452***	0.134*	0.935	
ENJ	0.188**	0.314***	0.323***	0.409***	0.388***	0.248***	0.488***	0.926

Note. Correlations; Bold values = Square root of AVE; † p < 0.100 * p < 0.050 ** p < 0.010 *** p < 0.001

Table 8. Measurement model fit indices for urban area customers

Measure	Estimate	Threshold
CMIN	999.178	--
DF	349	--
CMIN/DF	2.863	Between 1 and 3
CFI	0.939	>0.95
SRMR	0.031	<0.08
RMSEA	0.079	<0.06
P-Close	0	>0.05

between time convenience and food delivery app engagement (H2) was significant among both semi-urban (b=0.19, t=2.866, p=0.004) and urban (b=0.104, t=1.97, p=0.049) customers. In contrast, H3, the relationship between compatibility and food delivery app engagement, was found to be insignificant among semi-urban customers (b=0.047, t=1.093, p=0.274), indicating that semi-urban customers did not find the app compatible. However, among urban customers, the relationship was significant (b=0.175, t=3.248, p=0.001). H4, the relationship among enjoyment and food delivery app engagement, was found to be significant among both semi-urban (b=0.223, t=3.441, p=***) and urban (b=0.286, t=5.017, p=***) customers. Additionally, H5, the connection between mobile food delivery app engagement and brand attitude towards the app brand, was significant among both semi-urban (b=0.255, t=3.948, p=***) and urban (b=0.311, t=5.162, p=***) customers. H6, the relationship between CE with the app and relationship commitment, was found to be significant among both semi-urban (b=0.177, t=2.938, p=0.003) and urban (b=0.192, t=3.357, p=***) customers. H7, the relationship between mobile food delivery app engagement and purchase intention, was found to be significant among both semi-urban (b=0.439, t=7.196, p=***) and urban (b=0.192, t=2.992, p=0.003) customers. Furthermore, H8, the relationship between brand attitude towards the app brand and purchase intention, was found to be significant among both semi-urban (b=0.149, t=2.389, p=0.017) and urban (b=0.115, t=2.026, p=0.043) customers. Finally, H9, the association between brand attitude and relationship commitment, was found to have a positive relationship among both semi-urban (b=0.424, t=6.133, p=***) and urban (b=0.395, t=7.525, p=***) customers. All hypothesis details are provided in Table 9 (semi-urban) and Table 11 (urban).

Table 9. Testing of hypothesis for the semi-urban sample

Hypothesis	IV		DV	Estimate	S.E.	C.R.	P	Decision
H1	PEU	--->	CE	0.19	0.056	3.39	***	Accepted
H2	TC	--->	CE	0.19	0.066	2.866	0.004	Accepted
H3	COM	--->	CE	0.047	0.043	1.093	0.274	Not Accepted
H4	EJ	--->	CE	0.223	0.065	3.441	***	Accepted
H5	CE	--->	ATT	0.255	0.065	3.948	***	Accepted
H6	CE	--->	RC	0.177	0.06	2.938	0.003	Accepted
H7	CE	--->	PI	0.439	0.061	7.196	***	Accepted
H8	ATT	--->	PI	0.149	0.062	2.389	0.017	Accepted
H9	ATT	--->	RC	0.424	0.069	6.133	***	Accepted

Note. * $p < 0.050$ ** $p < 0.010$ *** $p < 0.001$

Table 10. Structural model fit indices for the semi-urban area customers

Measure	Estimate	Threshold
CMIN	784.499	--
DF	368	--
CMIN/DF	2.132	Between 1 and 3
CFI	0.929	>0.95
SRMR	0.118	<0.08
RMSEA	0.065	<0.06
P-Close	0	>0.05

Table 11. Testing of hypothesis for urban area customers

Hypothesis				Estimate	S.E.	C.R.	P	Decision
H1	PEU	--->	CE	0.113	0.052	2.191	0.028	Accepted
H2	TC	--->	CE	0.104	0.053	1.97	0.049	Accepted
H3	COM	--->	CE	0.175	0.054	3.248	0.001	Accepted
H4	EJ	--->	CE	0.286	0.057	5.017	***	Accepted
H5	CE	--->	ATT	0.331	0.064	5.162	***	Accepted
H6	CE	--->	RC	0.192	0.057	3.357	***	Accepted
H7	CE	--->	PI	0.192	0.064	2.992	0.003	Accepted
H8	ATT	--->	PI	0.115	0.057	2.025	0.043	Accepted
H9	ATT	--->	RC	0.395	0.052	7.525	***	Accepted

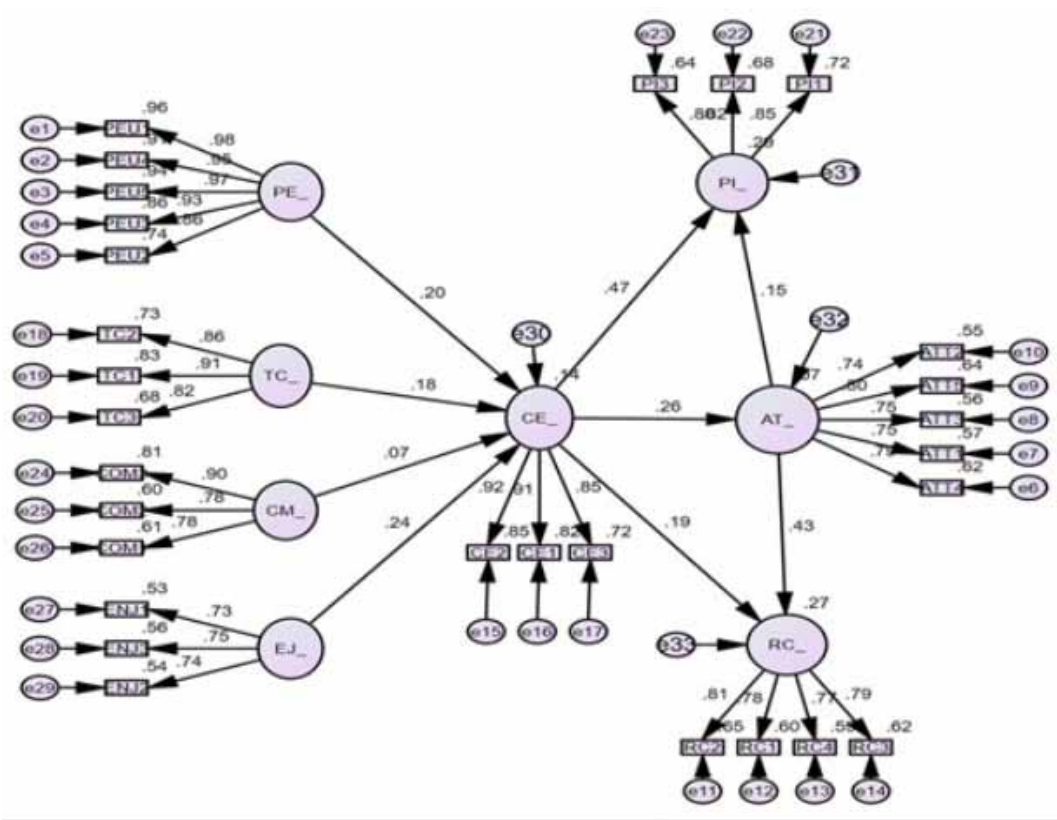
Note. * $p < 0.050$ ** $p < 0.010$ *** $p < 0.001$

The study found that the structural model fit indices met the minimum criteria overall. For semi-urban customers (Figure 2), the CMIN/DF was 2.132 (between 1 and 3), the CFI was 0.929 (>0.95), the RMSEA was 0.065 (<0.06), and the P-Close was 0.001 (>0.05), as seen in Tables 9 and 10. For

Table 12. Structural model fit indices for urban customers

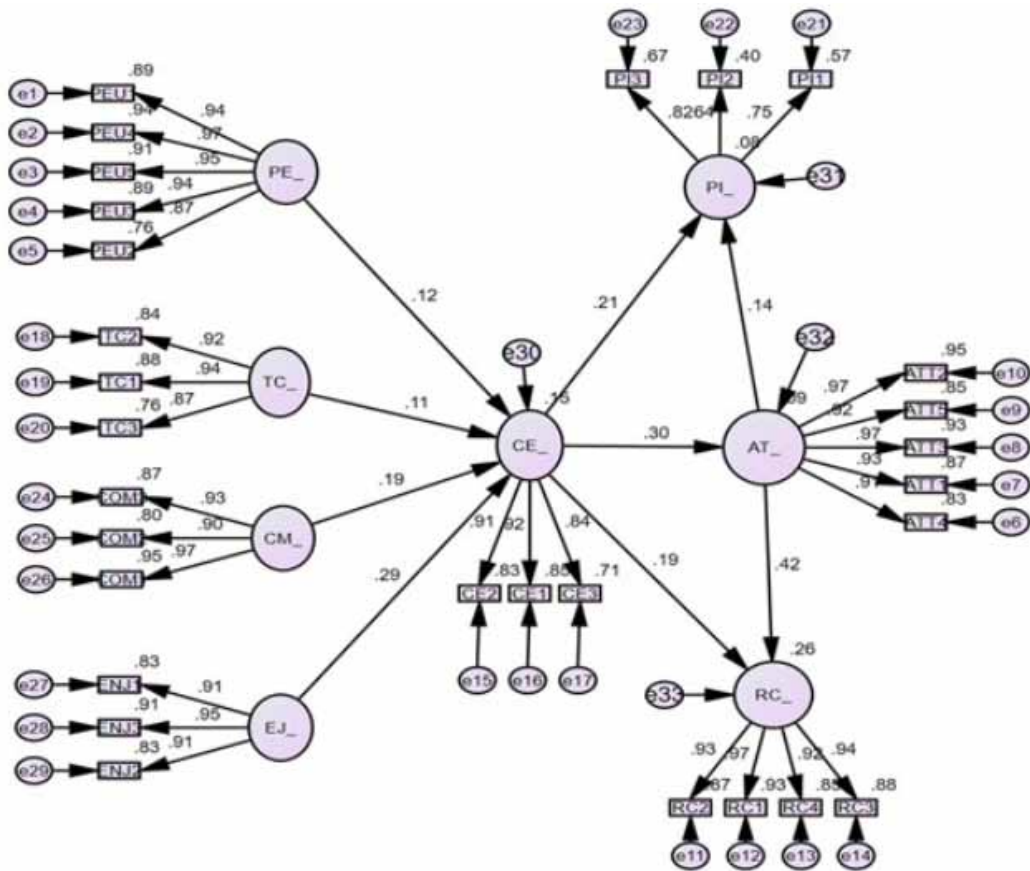
Measure	Estimate	Threshold
CMIN	1308.028	--
DF	368	--
CMIN/DF	3.554	Between 1 and 3
CFI	0.912	>0.95
SRMR	0.192	<0.08
RMSEA	0.092	<0.06
P-Close	0	>0.05

Figure 2. Structural model of semi-urban customer sample



urban customers (Figure 3), the CMIN/DF was 3.554 (between 1 and 3), the CFI was 0.912 (>0.95), the RMSEA was 0.092 (<0.06), and the P-Close was 0.01 (>0.05), as seen in Tables 11 and 12. The multiple squared variances (R²) of the two structural models were as follows: for semi-urban customers, Customer Engagement=0.14, Brand Attitude=0.07, Purchase Intention=0.28, Relationship Commitment=0.27; and for urban customers, Customer Engagement=0.15, Brand Attitude=0.09, Purchase Intention=0.08, Relationship Commitment=0.26.

Figure 3. Structural model of urban customer sample



This indicates that FDA have become a convenient solution for customers who wish to order food from their favourite restaurants without leaving their homes. Moreover, convenience has become a crucial factor for consumers when using online retailers' apps to make their purchasing decisions. FDA such as Domino's, Swiggy, Zomato, and Pizza Hut have offered services that prioritize efficient ordering and fast delivery times to attract and retain customers during this period (PJ et al., 2020). Accordingly, the time convenience provided by these apps during COVID-19, including accurate and fast delivery times, simplified ordering processes, and easy payment options, has positively influenced mobile app engagement. Significant findings were observed between compatibility and CE of the FDA amidst COVID-19 among urban customers, while results among semi-urban customers were deemed insignificant (H3). The study suggests that the pandemic had a noteworthy impact on the food delivery industry in urban areas, resulting in an upsurge in the popularity of FDA. These apps provided compatibility by implementing safety measures, which positively affected customer engagement. For instance, some FDA offer GPS-enabled location-tracking information, estimated delivery times, and online payment options (Singh et al., 2021; Thamaraiselvan et al., 2019). Conversely, online food delivery services in semi-urban areas may face limitations such as restricted delivery services, inadequate marketing efforts, lower internet penetration, preference for traditional methods, and limited restaurant options. The success of online food delivery services in urban areas depends on convenience, user-friendliness, and accessibility, whereas services in semi-urban areas may be more multifaceted and intricate. The COVID-19 pandemic has significantly impacted urban and semi-urban region customers in terms of using and enjoying online food delivery services. The analysis results indicate that the proposed relationship significantly affects urban and semi-urban areas (H4). Based on the findings, we infer that online food delivery services have increased availability and capacity during the pandemic, offering a safety measure to minimize the risk of virus exposure and introducing contactless delivery options, timesaving, and convenience. Hence, it is reasonable to assume that indulgence positively impacts the app's engagement in food delivery.

According to H5, the level of engagement with mobile applications significantly impacts the brand attitude of urban and semi-urban customers towards food delivery services during the COVID-19 pandemic. It indicates that due to the pandemic and restrictions on dining out, many people resorted to food delivery services for their meals. Consequently, these online platforms enhanced their benefits and experienced a surge in customer usage. The app engagement during COVID-19 provided a distinctive experience that influenced the brand attitude of customers in urban and semi-urban areas. Further, this variable's relationship has no significant geographic difference. Customers who had a positive experience during the pandemic are more likely to continue using the app in the future and are committed to these brands. Further study also found that positive engagement with the food delivery app brands among urban and semi-urban customers during COVID-19 was strongly associated with relationship commitment with the brand, as indicated by H6. Despite the pandemic's impact, customers in various geographic locations perceived food delivery services as dependable, trustworthy, and attentive to their needs, resulting in increased brand commitment. Customers' loyalty to the brand remained consistent across all regions, despite the challenging circumstances, and they continued to utilize its services. According to H7, customer engagement with mobile food delivery apps significantly influences purchase intention. Factors such as the availability of resources and demographic conditions influence purchase capacity and willingness to buy (Suk Won Lee, 2019). During the COVID-19 pandemic, the availability, convenience, and safety of ordering food through these apps have made them a popular choice for consumers. Additionally, studies have shown that greater engagement with mobile apps is associated with higher purchase intention (Tandon et al., 2021). Consequently, higher levels of mobile app engagement during the lockdown positively impact purchase intention among urban and semi-urban customers. Hypothesis H8 suggests that a positive attitude towards the brand can favour relationship commitment, which is supported by the study results. These findings indicate the importance of service applications in the food delivery industry, enabling customers to easily place orders, track their delivery, and communicate with the delivery driver.

Mobile applications offer several options for active engagement, such as product browsing, purchasing, reviewing submissions, and loyalty program participation, which contribute to cultivating a positive brand attitude and fostering a strong commitment among customers (Wang et al., 2019). Through active engagement with the mobile application, customers receive personalized recommendations, promotions, and rewards, elevating their overall experience and fostering brand loyalty.

The study supports hypothesis H9, which suggests that a favourable attitude toward the food delivery app brand can increase purchase intentions. Moreover, the research findings indicate that a person's positive perception of the food app brand can influence their level of involvement and the likelihood of making future purchases (Das & Ramalingam, 2022). As the COVID-19 pandemic has prompted a greater demand for contactless delivery options, consumers may be more inclined to select a food delivery app that provides such choices (Abbu et al., 2021). Consequently, a positive attitude towards a food delivery app brand that offers contactless delivery could heighten purchase intentions among consumers. In the pandemic, active mobile application engagement is even more crucial, as it helps build trust and reliability with customers concerned about their health and safety. For example, food delivery companies can use their mobile application to provide real-time updates on delivery times and safety measures being taken to minimize the risk of infection. Therefore, a positive engagement with online food delivery services during the pandemic among urban and semi-urban area customers influences a favourable attitude and commitment toward online food delivery service brands, and it can increase consumer loyalty.

Theoretical and Managerial Implications

The COVID-19 pandemic has significantly affected the food delivery industry, with more people relying on FDA to order their meals due to social distancing guidelines and restaurant closures. Conducting research on food delivery app engagement among urban and semi-urban customers during COVID-19 can have several theoretical and managerial implications for businesses operating in this industry. The research examined the determinants of food delivery app engagement, including ease-of-use, compatibility, time convenience, and enjoyment. These findings can help researchers develop theories to explain customer behaviours in adopting and using digital platforms during crises, which can inform the design and development of more user-friendly and convenient apps. Next, the study explored the outcomes of food delivery app engagement, such as brand attitude, relationship commitment, and purchase intention, which can contribute to developing customer loyalty and retention-related theories. Although this study looked at the variable relationships from an SOR framework and technology acceptance model perspective, future researchers can develop new theoretical frameworks that explain how online food delivery applications' engagement on digital platforms influences customer behaviours in terms of decision-making, such as food safety, delivery regulations, and customer satisfaction during the pandemic. Furthermore, the study shed light on the factors that induce the adoption and engagement of FDA among customers in India during COVID-19. Future researchers can use this information to understand how people in different regions and demographic groups perceive and use specific technology during crises. Additionally, studies can examine CE theories in the usage of food delivery applications, such as the frequency of use, the types of orders placed, and so on. These research findings can assist businesses in designing effective engagement strategies that meet customers' needs. The study also will inform marketing managers to develop FDA to enhance the user experience with accurate delivery times, better order tracking, and more reliable customer service. As more people rely on food delivery services during the pandemic, businesses may consider expanding their delivery options to reach more customers. Research on this topic can help identify areas where businesses can expand their delivery options, including new geographic areas or delivery times.

Limitations and Future Work

The scope of this study was limited to examining the relationships between a few variables, such as ease-of-use, convenience, compatibility, and mobile application engagement, and their consequences on

attitude, buying intention, and relationship commitment of customers towards FDA. Future researchers could explore other variable relationships, such as the influence of individual personality and social factors on food delivery app adoption during the pandemic. Additionally, this study considered only certain regions within the country due to movement restrictions, and future studies could expand to other regions, countries, and cultural dimensions. Methodologically, this study utilized a survey-based quantitative approach, and future researchers could consider inductive approaches to gain a deeper understanding of consumer behaviour. As the food industry continues to grow, future studies could also investigate the emotional dimension of app adoption. The emergence of new platforms for FDA and technological advancements could also be considered as additional aspects for future research.

CONCLUSION

The pandemic is a rare occurrence that has had a significant influence on customer behaviour. The objective of this study was to examine how customers in urban and semi-urban areas accepted food delivery services through mobile apps and to examine the resulting consequences. The study found that during COVID-19, mobile app engagement had a considerable impact on customer behaviours. Furthermore, this research can aid researchers and managers in comprehending how different populations adopted FDA during the pandemic.

COMPETING INTERESTS STATEMENT

The authors declare they have no financial interests.

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Abhilash Bhattacharjee is an MBA student at the School of Management Studies, National Institute of Technology Rourkela. His research interests are consumer behaviour, digital marketing, and retailing.

Kunja Sambashiva Rao is an Assistant professor at the School of Management Studies, National Institute of Technology Rourkela. He has published in international peer-reviewed journals. His research interests are electronic word of mouth (eWOM), consumer behaviour, social media marketing, and retailing.

Nishad Nawaz is an Associate Professor at the College of Business Administration at the Kingdom University, Kingdom of Bahrain. His research interests include human resources management, human resource information systems, knowledge management, organizational behaviour, management information system, enterprise resource planning and artificial intelligence has been published in international peer-reviewed journals.