



Understanding e-satisfaction, continuance intention, and e-loyalty toward mobile payment application during COVID-19: an investigation using the electronic technology continuance model

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Abstract

This research examined the determinants of e-satisfaction, continuance intention, and e-loyalty regarding the use of mobile payment applications (MPAs). It developed and validated the electronic technology continuance model (e-TCM) integrating a psychological factor (perceived threats), e-satisfaction, circumstantial factor (perceived anxiety), and the dimensions of quality. Using a questionnaire, data was collected from 455 respondents and analyzed using structural equation modeling. The influences of information quality, service quality, system quality, perceived usefulness, and confirmation on both e-satisfaction and continuance intention are found positive. However, perceived threats and perceived anxiety do not influence e-satisfaction but influence continuance intention. Moreover, e-satisfaction positively impacts continuance intention and e-loyalty; and continuance intention positively impacts e-loyalty. This research evidences the roles of perceived threat, e-satisfaction, perceived anxiety, and the dimensions of quality on customers' e-satisfaction, continuance intention and e-loyalty, using the integrated framework comprising the health belief model, expectation–confirmation model, and information systems success model. The findings of this research can guide MPA services providers, online businesses, industry analysts, suburban consumers, and respective government authorities when MPA usage is concerned during any unprecedented crisis such as the COVID-19 pandemic.

Keywords Mobile payment applications · Perceived threats · Health belief model · Expectation–confirmation model · Information system success model · COVID-19

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Introduction

Widespread use of smartphones and smart devices, improved network infrastructure, digital innovations, and financial technology (FinTech) have brought a revolution in this era of paperless transactions (Zhou and Lu 2011; Yang et al. 2012; Chatterjee and Bolar 2019). Despite the improvements in digital banking, about 31% of the world's population and 39% of the people in low and middle-income countries do not have any bank account, and about half of the adult population of Bangladesh is excluded from institutional financial services (The World Bank 2018). Mobile payment applications (MPAs) have revolutionized particularly economically underprivileged Bangladeshi people's lives through spreading financial transactions with the help of communication technologies and FinTech. This emergence of MPAs has been further intensified specifically in low-income, middle-income, and developing economies during the COVID-19 pandemic due to restrictions on physical



gathering and in-person banking as well as a shift toward cashless transactions (Bazarbash et al. 2020). Bangladesh has seen tremendous growth in MPAs, with millions of transactions through mobile phones every month, which are equivalent to more than BDT500 billion¹ (Bangladesh Bank 2021a). Consequently, it is obligatory to understand the major antecedents of customers' MPA usage behaviors during the COVID-19 pandemic.

Despite the prospect of MPAs, the impacts of psychological factors (perceived threats, susceptibility, and severity), situational factors (perceived anxiety), quality attributes (information quality, service quality, and system quality), confirmation of customers' expectations, and MPA usefulness on customer e-satisfaction, continuance intention, and loyalty have rarely been addressed in the existing literature that focuses on the perspectives of emerging economies during COVID-19 pandemic. The existing studies primarily focused on usage behavior (Malaquias and Silva 2020), behavioral intention or continuance intention (Abdul-Halim et al. 2021; Al Amin et al. 2022a, b; Talwar et al. 2020; Lew et al. 2020; Singh and Srivastava 2020), loyalty intention (Zhou et al. 2021; Yuan et al. 2020), digital banking adoption (Al-Qudah et al. 2022; Kaur et al. 2021; Rafidinal and Senalajari 2021), MPA enablers and inhibitors (Pal et al. 2020; Potnis et al. 2020), argument quality, valence, and consistency (Shankar et al. 2020), web-based and text-based mobile payment or banking adoption (Bailey et al. 2017; Al-Saedi et al. 2020; Putri et al. 2020), and customer pre-adoption and resistance perspectives (Laukkanen and Kiviniemi 2010). Some studies depicted mobile-based payment acceptance in developing countries (Malaquias and Silva 2020; Haq and Awan 2020; Revathy and Balaji 2020), and the increased usage of MPA services in the COVID-19 pandemic (Al Amin et al. 2022b; Khanra et al. 2021; Zhao and Bacao 2021). Despite a considerable focus on MPAs by existing literature, limited is known about the post-experience evaluations, continued use, and loyalty toward MPAs, particularly in emerging economies. There also exists a dearth of literature that focuses on the influence of predictors of MPA satisfaction, continued intention, and loyalty related to suburban people of Bangladesh during the COVID-19 pandemic. This research addresses these gaps in the existing literature.

To this end, MPAs can minimize customers' perceived anxiety and confirm social distancing which might protect the respective customers from being infected by COVID-19 (Al Amin et al. 2021a, b). The perceived anxiety of COVID-19 may work as a motivator that can eventually lessen the

feeling of risk when MPA is adopted which helps people avoid traditional in-person banking. Only a limited number of studies focused on identifying issues in the context of MPA use behavior in an emerging country. Besides, health belief model (HBM) implies that psychological factors (perceived threats) are directly related to the severity, susceptibility, and catastrophic outcomes of a pandemic and the resulting consequences facing humanity (Becker et al. 1977). The use of MPAs can lessen the perceived threats of COVID-19 transmission since customers can conduct transactions without physical interactions with others and hence can utilize cashless transactions (Berg and Lin 2020). However, the literature on MPA could not incorporate the influence of these phenomenal cues, particularly in determining the suburban customers' MPA loyalty amid the COVID-19 outbreaks in Bangladesh.

Moreover, MPA benefits both banks and consumers with location-independent mobile-based financial transactions. Specifically, the unbanked suburban people in Bangladesh benefitted considerably from the multipurpose use of this application (Bangladesh Bank 2021a, b, c, d). Existing studies emphasize that the information, service, and system quality provided through such applications are crucial for customers (Gao et al. 2015). Nevertheless, very few studies ruminate on the customer's perceived value from different quality attributes—including information, service, and system—using the information system success model (ISSM) (Delone and McLean 2003). Although the ISSM was applied to explore customers' e-satisfaction and continued intention to use different forms of mobile banking (Cidral et al. 2018; Gao et al. 2015; Tam and Oliveira 2016), the influence of customers' perceived quality attributes on their loyalty to use MPA is yet to be studied.

In the long term, organizations generally aim at ensuring continued use, repeated use, or loyalty to a particular service (Bhattacharjee 2001). In this respect, e-satisfaction is essential to form the continued use of customer loyalty (Kim et al. 2009). Taking into account the expectation–confirmation model (ECM), suburban customers are satisfied when their expectations are met where the expectations include user-friendliness, versatility, and the richness of information (Bhattacharjee 2001). However, hardly any study has paid attention to the roles of usefulness and confirmations of expectations, incorporating the ECM and ISSM while analyzing e-satisfaction, customers' continuance intention, and loyalty toward MPAs. Thus, this research aims to unveil dominant determinants regarding Bangladeshi suburban customers' MPA loyalty during the COVID-19 pandemic. In this respect, it has two research objectives:

- (a) to examine the influence of direct determinants of suburban customers' e-satisfaction, continuance inten-

¹ Equivalent to 5.9 billion USD as per the 4 March 2021 exchange rate of USD1 = BDT84.73.

(retrieved from: <https://www.bb.org.bd/econdata/exchangerate.php>).



tion, and e-loyalty toward MPA during the COVID-19 pandemic and

(b) to validate an integrated model, namely the electronic technology continuance model (e-TCM), that incorporates HBM, ISSM, and ECM relating to the contexts of the suburban customers of Bangladesh.

This research contributes to enriching related literature with multiple perspectives. Firstly, it develops and validates an integrated model, namely electronic technology continuance model (e-TCM), incorporating HBM, ISSM, and ECM with a situational cue—perceived anxiety. Secondly, it analyzes the role of perceived threats, perceived anxiety, quality attributes (in terms of information quality, service quality, and system quality), confirmation of customers' expectations, and MPA usefulness as the direct determinants of e-satisfaction, continuance intention, and loyalty to use MPAs. Finally, it provides a rich understanding of the phenomenon in the context of an emerging economy that is not widely represented in mainstream literature (Mehra et al. 2022).

In the following sections, a review of related literature, conceptual framework, hypotheses development, research methodology, results, discussions, theoretical contributions, and practical implications are presented. The concluding section includes discussions on limitations and further research scopes.

Literature review and conceptual framework development

Mobile payment applications (MPA)

MPA is a mobile phone-based application used for making financial transactions with the help of communication technologies, which facilitates peer-to-peer money transfers, remittances, utility bill payments, payments for online purchases, and receiving microcredit (Zhou et al. 2021; Abdul-Halim et al. 2021; Bangladesh Bank 2021a, b, c, d). After Bangladesh Bank permitted mobile financial services in 2010, different MPA service providers such as Bkash, Rocket, mCash, uCash, and Nagad initiated their operations. In Bangladesh, 16 banks offer MPA services, and over 94.7 million (more than half the total population) people use the service (Bangladesh Bank 2021a, b, c, d). This context resulted in research focusing on FinTech, mobile payment, and mobile banking or digital wallet (please see the summarized view of relevant MPA literature in Table 1) that mainly concentrated on usage behavior (Malaquias and Silva 2020), behavioral intention (Al Nawayseh 2020; Lew et al. 2020; Singh and Srivastava 2020), loyalty intention (Zhou et al. 2021; Yuan et al. 2020), continuance intention

(Abdul-Halim et al. 2021; Talwar et al. 2020), digital banking adoption (Al Amin 2022; Al Amin et al. 2022b; Al-Qudah et al. 2022; Kaur et al. 2021; de Luna et al. 2019; Rafdinal and Senalasar 2021), and sustainable use of contactless mobile payment technologies (Al-Sharafi et al. 2021). Some researchers explored the increased usage of MPA services during the COVID-19 pandemic (Al Amin 2022; Al Amin et al. 2022b; Sreelakshmi and Prathap 2020; Liu et al. 2020; Aji et al. 2020; Revathy and Balaji 2020; Khanra et al. 2021; Zhao and Bacao 2021). Existing literature mostly focuses on developed countries including the USA (Jung et al. 2020) and UAE (Al-Qudah et al. 2022); and developing countries including India (Singh and Srivastava, 2020; Kaur et al., 2021), Malaysia (Leong et al. 2019), Sri Lanka (Samsudeen et al. 2020), Indonesia (Rafdinal and Senalasar 2021), and Jordan (Al Nawayseh 2020). However, these studies overlooked the roles of perceived threats, perceived anxiety, quality attributes (in terms of information quality, service quality, and system quality), confirmation of customers' expectations, and MPA usefulness on e-satisfaction, continuance intention, and e-loyalty of MPA usage in Bangladesh. This research addresses this gap and incorporates the unprecedented realities related to these aspects specifically during the COVID-19 pandemic.

Conceptual framework development

Recent studies explored the antecedents of MPA using customers' post-usage experience intention, satisfaction, and customer loyalty based on IT adoption theories including ISSM (Yuan et al. 2020; Talwar et al. 2020), ECM (Sreelakshmi and Prathap 2020; Al-Sharafi et al. 2021), unified theory of acceptance and use of technology (Al Nawayseh, 2020; Jung et al. 2020), theory of reasoned action (de Luna et al. 2019), technology acceptance model (TAM) (Malaquias and Silva 2020; Singh and Srivastava 2020; Kaur et al. 2021; Rafdinal and Senalasar 2021; Al Amin et al. 2021a, b), theory of planned behavior (de Luna et al. 2019), technology continuance theory (Abdul-Halim et al. 2021), protection motivation theory (PMT) (Al-Sharafi et al. 2021), and HBM (Sreelakshmi and Prathap 2020). Among these theories, ISSM—used in this research—is one of the prominent models which analogized the hypothesized relationship among information quality, system quality, service quality, system use intention, customer satisfaction, and net system benefits. ISSM is adopted and expanded by a wide range of information systems research in different contexts including mobile government, internet banking, and online shopping (Wang and Teo 2020; Rahi and Ghani 2019; Aldholay et al. 2018). Another well-established model ECM—also used in this research—explains post-consumption behavior based on expectation–confirmation theory (Oliver 1980). It is argued that suburban customers' continuance intention



Table 1 The relevant recent literature on mobile payment applications (MPAs)

Authors and Years	Context	Model	Sampling techniques, size, and respondents	Methods	Country	Outcome variables	Independent variables
Al-Qudah et al. (2022)	MPA adoption during COVID-19	TAM	422 apple m-wallet users, snowball sampling	SEM, online survey	United Arab Emirates	Intention to use MPA	Skillfulness, convenience of system, perceived risk, and perceived usefulness
Lee and Chen (2022)	Artificial intelligence mobile banking applications	S-O-R	451 AI mobile, banking app users, convenience sampling	PLS-SEM,		AI mobile banking app adoption	Task technology fit, perceived risk, perceived cost, trust
Upadhyay et al. (2022)	MPA adoption during COVID-19	UTAUT	adopters of mobile payment services, convenient sampling technique	SEM-PLS, self-administered questionnaire	India	Adoption intention	performance expectancy, effort expectancy, perceived severity, consumers' attitude, and self-efficacy
Migliore et al. (2022)	MPA adoption	UTAUT2; IRT	346 from Italians and 320 from Chinese participants, non-probabilistic self-selection sampling method	SEM, web-based, self-administered survey	China & Italy	Behavioral intention	performance expectancy, social influence, facilitating conditions, hedonic motivation, and price value, value barrier, risk barrier, tradition barrier, effort expectancy
Zhou et al. (2021)	Service quality and loyalty intention in mobile banking	SERVQUAL	224 mobile banking users from a mobile bank, random sampling	PLS-SEM, face-to-face interviews, online survey with a web link	China	MB loyalty intention	MB interface design, system quality, service quality, security assurance
Abdul-Halim et al. (2021)	E-wallet continuance intention	TCT	Malaysian e-wallet users, purposive sampling technique	PLS-SEM, an online survey	Malaysia	Intention to continue	Confirmation, perceived usefulness, perceived ease of use, satisfaction, attitude, price benefit, trust, habit, operational constraint
Kaur et al. (2021)	Adoption of digital banking channels	TAM	Bank executives from public and private sector banks, purposive sampling technique	Content analysis, in-depth semi-structured interview	India	Digital banking adoption	Computer self-efficacy, branch service quality, trust in bank, perceived ease of use, trust in e-banking, and perceived usefulness



Table 1 (continued)

Authors and Years	Context	Model	Sampling techniques, size, and respondents	Methods	Country	Outcome variables	Independent variables
Rafimal and Senalasar (2021)	MPA adoption	TAM & TRI	400 MPA users	SEM-PLS	Indonesia	Intention to use	Perceived usefulness and perceived ease of use, exception of discomfort, and attitude
Al-Sharafi et al. (2021)	Sustainable use of mobile payment contactless technologies	PMT & ECM	523 contactless payment technologies users	Hybrid (SEM-ANN), web-based survey	Malaysia	Sustainable use of MPA	protection motivation theory (PMT) and the expectation-confirmation model (ECM), extended with perceived trust (PT)
Malaquias and Silva (2020)	Mobile banking	TAM	115 Farm owners, Pen and pencil method	SEM, structured questionnaire	Minas Gerais, Brazil	Perceived usefulness	Perceived ease of use, perceived usefulness, trust, social influence, age, use, gender, and price value
Lew et al. (2020)	Mobile wallet use in the hospitality industry	MTAM, SEM, CMT, FT	413 M-wallet users who were dining out in restaurants and cafes in the Perak state, purposive sampling technique	PLS-SEM, self-administered questionnaire	Malaysia	Behavioral Intention	Mobile usefulness, mobile ease of use, perceived critical mass, perceived enjoyment, mobile self-efficacy, technology self-efficacy
Singh and Srivastava (2020)	Intention to use mobile banking	TAM	420 online bank customers	PLS-SEM	India	Behavioral intention	Perceived ease of use, perceived security, mobile self-efficacy, social influence and customer support
Yuan et al. (2020)	MPA loyalty	ISSM & S-O-R	China mobile and china Unicom service center users, random sampling	SEM, questionnaire	China	M-payment loyalty	Information quality, system quality, service quality, satisfaction, trust, and intimacy
Talwar et al. (2020)	MPA continuance intention	ECT, ISSM,ITCM, & TCET	Cross-sectional data of 954 first-time mobile wallet users, convenience sampling	SEM, questionnaire	North India	M-payment continuance intention	Initial trust, and post-adoption factors, such as confirmation, perceived usefulness, satisfaction
Jung, Kwon and Kim (2020)	MPA usage	UTAUT	Undergraduate students, convenience sampling technique	Multiple-regression, online survey via Qualtrics	USA	Intention to use	Performance expectancy, social influence, compatibility, knowledge, and trust



Table 1 (continued)

Authors and Years	Context	Model	Sampling techniques, size, and respondents	Methods	Country	Outcome variables	Independent variables
Samsudeen, et al. (2020)	The intention to use mobile Islamic banking services	UTAUT-2	582 Islamic banking customers in Sri Lanka	SEM-PLS, questionnaire survey method	Sri Lanka	Intention to use	performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation and habit
Sreelakshmi and Prathap (2020)	MPA adoption during COVID-19	HBM & ECM	654 users of mobile payment services	SEM and SMA, self-administered questionnaire	India	Continuance intention	Perceived severity, perceived susceptibility and self-efficacy, perceived usefulness and perceived satisfaction, confirmation
Al Nawayseh (2020)	Intention to use FinTech applications	UTAUT	500 potential FinTech users	SEM-PLS, an online survey	Jordan	Intention to use	Social influence, perceived benefits, risks, trust
Leong et al. (2019)	Mobile wallet resistance	IRT	M-wallet user judgmental sampling	SEM-ANN, mall intercept survey	Malaysia	Mobile wallet resistance	Age, education, income, usage barrier, value barrier, risk barrier, tradition barrier, image barrier, perceived novelty
de Luna et al. (2019)	MPA adoption	TPB, TRA, & TAM	MPA user, quota sampling method	PLS-SEM, Self-administered questionnaire	N/A	Intention to use	Subjective norm, perceived usefulness, perceived ease of use, attitude, perceived security

MTAM, Mobile technology acceptance model; SEM, self-efficacy model; CMT, critical mass theory; FT, flow theory; TCT, technology continuance theory; IRT, innovation resistance theory; TPB, theory of planned behavior; TRA, theory of reasoned action; TRI, technology readiness index; ECT, expectation-confirmation theory; ISSM, information system success model; TCET, transaction cost economics (TCE) theory; ITCM, IT continuance model; UTAUT, unified theory of acceptance and use of technology; HBM, health belief model, SEM-PLS, structured equation modeling and partial least square; SMA, serial mediation analysis; PMT, protection motivation theory; hybrid (SEM-ANN), hybrid structural equation modeling-artificial neural network (SEM-ANN) technique

to use information systems including MPA services can be determined by their satisfaction and usefulness (Bhattacharjee 2001; Susanto et al. 2016; Al-Sharafi et al. 2021). This research also used HBM, a well-recognized model that is used to monitor health promotion and disease prevention programs, that explains and predicts customers' changes in health behaviors related to a particular technology (Becker et al. 1977; Sreelakshmi and Prathap 2020).

Integrating multiple models in a single study is a recognized approach. For instance, Al-Sharafi et al. (2021) incorporated ECM and PMT into a single framework to examine the sustainable use of contactless technologies in mobile payments in Malaysia; de Luna et al. (2019) integrated TRA and TAM to assess the determinants of mobile payment adoption; Al-Sharafi et al. (2021) integrated PMT and ECM to evaluate the sustainable use of contactless mobile payment technologies. According to the reviewed literature on IT adoption theories, only one or a few constructs are considered as the direct or indirect predictors in examining the determinants that influence behavioral intention, e-loyalty, and adoption of new technology in different contexts (Dwivedi et al. 2017). For instance, Lew et al. (2020) analyzed the influence of mobile usefulness, mobile ease of use, perceived critical mass, perceived enjoyment, mobile self-efficacy, and technology self-efficacy on behavioral intention in the context of Malaysian m-wallet customers integrating mobile TAM, self-efficacy model, critical mass theory, and flow theory in a single study.

Existing studies assessed the influences of trust (Malaquias and Silva 2020; Abdul-Halim et al. 2021; Kaur et al. 2021; Yuan et al. 2020; Talwar et al. 2020), usefulness, ease of use, enjoyment or confirmation of expectation (Lew et al. 2020; Malaquias and Silva 2020; Talwar et al. 2020), quality dimensions (Yuan et al. 2020; Zhou et al. 2021), protection motivation intention (Al-Sharafi et al. 2021), and perceived health threat in terms of perceived severity and perceived susceptibility (Sreelakshmi and Prathap 2020). Existing literature suggests that consumers' behavioral intentions are influenced by situational factors (Hand et al. 2009; Muhammad et al. 2016) and psychological variables (Al Amin et al. 2022a, b). However, no study integrated ECM, HBM, and ISSM in a single framework incorporating the roles of situational variables that shape MPA usage, particularly during crises such as the COVID-19 pandemic in an emerging economy such as Bangladesh. Particularly, it is yet to explore the determinants of customer e-satisfaction, continued intention, and e-loyalty, given customers prefer to avoid physical interactions with others and are eager to transact cashless amid the COVID-19 outbreaks (Berg and Lin 2020). In this context, this research develops and validates a comprehensive model incorporating ECM, HBM, and ISSM with situational variable (perceived anxiety) to assess the determinants of Bangladeshi suburban consumers'

e-satisfaction, continuance intention, and e-loyalty regarding MPA usage. However, perceived benefits and perceived barriers are not included in this research since these two variables are less likely to determine consumers' motives to use MPA (Hao et al. 2020; Sreelakshmi and Prathap 2020). The structural relationships among the constructs and the hypotheses are demonstrated in Fig. 1.

Information quality, e-satisfaction, and continuance intention

Information quality (IQ) reflects "information relevance, sufficiency, accuracy, and timeliness" (Gao et al. 2015: 254). In the context of MPAs, IQ might significantly impact both e-satisfaction (e-SAT) and continuance intention (CI) because customers always expect to receive accurate, relevant, and up-to-date information from MPAs and foster long-term relationships upon receiving quality information (Cidral et al. 2018; Gao et al. 2015). Existing studies confirm that IQ creates positive impacts on e-SAT in the context of MPA services (Franque et al. 2021), mobile commerce (Gao et al. 2015), and online shopping (Fang et al. 2011). Since high-quality information can improve customer experience, reduce operational difficulties, and strengthen long-term relationships, the effects of IQ on CI should be tested in this respect. During the COVID-19 pandemic, MPA served as a creative solution for maintaining COVID-19 health protocol while fostering MPA customers' satisfaction and continuous intention by providing access to relevant information in real time. Hence, the following hypotheses are developed.

H_{1a} Information quality has a positive impact on e-satisfaction toward MPA during the COVID-19 pandemic.

H_{1b} Information quality has a positive impact on CI toward MPA during the COVID-19 pandemic.

Service quality, e-satisfaction, and continuance intention

Service quality (SRQ) refers to the extent to which an information system (IS)-based application (such as MPA) can ensure reliability, responsiveness, assurance, and personalization (Delone and McLean 2003; Zhou 2013). SRQ is considered the vital antecedent of customer satisfaction and continuous intention (CI) since highly responsive and personalized services bring added value to customers as they are based on customers' preferences and priorities, (Sharma et al. 2017; Zeithaml et al. 1996). Existing studies tested and validated the impacts of SRQ on e-satisfaction (e-SAT) in the context of mobile banking (Tam and Oliveira 2016) and internet banking (Rahi and Ghani 2019); as well as the impacts of SRQ on CI in the context of e-learning



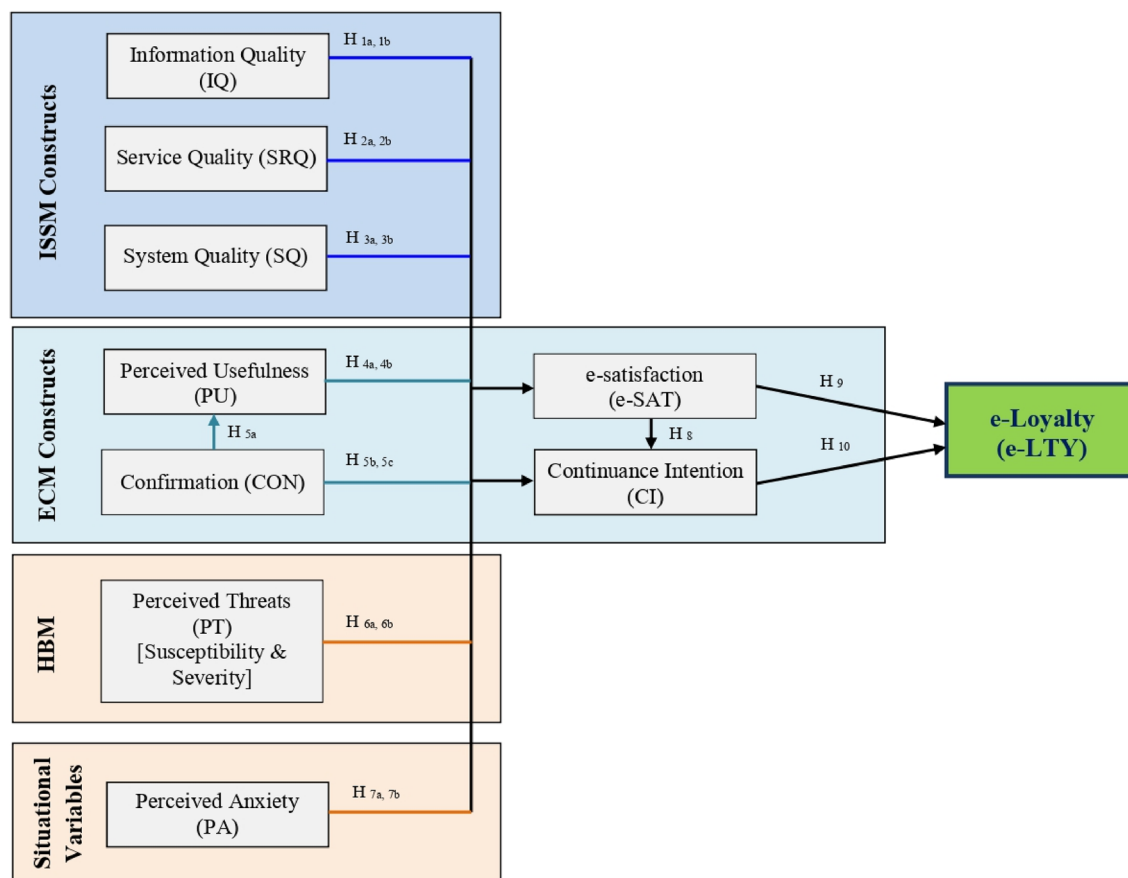


Fig. 1 Proposed research model. Source: Authors' construct

(Sharma et al. 2017). Therefore, it can be argued that amid the COVID-19 pandemic, the SRQ of an MPA may lead to increased e-SAT and CI. Thereby, the following hypotheses are developed.

H_{2a} Service quality has a positive impact on e-satisfaction toward MPA during the COVID-19 pandemic.

H_{2b} Service quality has a positive impact on CI toward MPA during the COVID-19 pandemic.

System quality, e-satisfaction, and continuance intention

System quality (SQ) refers to the extent to which an information system (IS)-based application (such as MPA) offers ease of use, user-friendly navigation, suitable access speed, and visually appealing design (Delone and McLean 2003; Zhou 2013). It is considered one of the critical factors affecting customers' e-satisfaction (e-SAT) and subsequent continuance intention (CI) because customers always expect to adopt and continue using good-quality IS-based applications (Sharma et al. 2017; Zhou 2013). Existing studies found

positive impacts of SQ on e-SAT in the context of mobile payments (Zhou 2013), mobile banking (Tam and Oliveira 2016), and mobile commerce (Gao et al. 2015); as well as positive impacts of SQ on CI in the context of e-learning (Sharma et al. 2017). On the other hand, poor interface design and bugs in the system negatively affect customers' experiences and curtail long-term orientations. Therefore, it can be argued that higher SQ leads to increased e-SAT and CI toward MPA, and thereby the following hypotheses can be developed.

H_{3a} Service quality has a positive impact on e-satisfaction toward MPA during the COVID-19 pandemic.

H_{3b} Service quality has a positive impact on CI toward MPA during the COVID-19 pandemic.

Perceived usefulness, e-satisfaction, and continuance intention

Perceived usefulness (PU) can be defined as customers' perception of the expected benefits of using a particular technology for financial transactions (Bhattacharjee 2001; Davis et al. 1989). In the context of MPA, customers'



perceived benefits can influence their e-satisfaction (e-SAT) and continuance intention (CI). Existing studies found positive influences of PU on e-SAT and CI in the contexts of mobile payments (Lim et al. 2019; Sreelakshmi and Prathap 2020), online shopping applications (Al Amin et al. 2022a), and e-learning (Lee 2010) due to the resulting favorable attitude derived from perceived utilities of the systems. Therefore, it can be argued that PU is a key to generating customers' e-SAT and CI during the COVID-19 pandemic, and thereby, the following hypotheses are developed.

H_{4a} Perceived usefulness has a positive impact on e-satisfaction toward MPA during the COVID-19 pandemic.

H_{4b} Perceived usefulness has a positive impact on CI toward MPA during the COVID-19 pandemic.

Confirmation, perceived usefulness, e-satisfaction, and continuance intention

Confirmation (CON) can be defined as customers' perception of the congruence between the expectation of technology use and its actual performance (Bhattacharjee 2001). It occurs when perceived performance derived from a given service meets the initial expectations held by the respective customers that might significantly influence perceived usefulness (PU), e-satisfaction (e-SAT), and continuance intention (CI) (Bhattacharjee 2001; Franque et al. 2021). Existing studies found positive influences of CON on PU and e-SAT in the context of mobile payment (Franque et al. 2021; Singh 2020), mobile FinTech payment services (Lim et al. 2019), and smartphone banking (Susanto et al. 2016). CON may positively affect PU since customers' perceptions of IS instrumentality can be adjusted by their extent of CON which means the utilities of MPA can be better perceived after having a confirmation experience (Bhattacharjee 2001). Moreover, realizing the benefits, effectiveness, and performance of MPA can ensure customers' e-SAT and CI (Bhattacharjee 2001). Therefore, it can be argued that CON of customers' expectations is a key to building greater PU, e-SAT, and CI during the COVID-19 pandemic, and thereby, the following hypotheses can be developed.

H_{5a} Consumers' confirmation has a positive impact on the perceived usefulness of MPA during the COVID-19 pandemic.

H_{5b} Consumers' confirmation has a positive impact on e-satisfaction toward MPA during the COVID-19 pandemic.

H_{5c} Consumers' confirmation has a positive impact on CI toward MPA during the COVID-19 pandemic.

Perceived anxiety, e-satisfaction, and continuance intention

Perceived anxiety (PA) refers to a sentiment illustrated by an unfriendly state of inner turmoil and includes subjectively unpleasant moods of fear over projected events (Bults et al. 2011). The COVID-19 pandemic has created subjectively unpleasant moods, a challenge persisting for more than a year. The high-context culture creates scopes of higher possibility of COVID-19 transmission which has been worrying people even more (Ahorsu et al. 2020; Lin 2020). Since the beginning of this pandemic, people have been suffering from higher anxiety and lower credibility in the information provided by the respective governments. It can be argued that this anxiety about COVID-19 influences customers' attitudes and consumption behaviors (Bults et al. 2011). In the case of MPAs, customers can minimize their anxiety related to this crisis because MPAs enable customers to purchase products or services while staying at home. This anxiety can be considered a significant determinant that impacts consumers' attitudes toward accepting innovative technology by changing their views or beliefs. It can be argued that the influence of PA on e-SAT and CI to use MPAs can foster cashless transactions and lessen the possibility of COVID-19 spread. Thus, the following hypotheses can be developed.

H_{6a} Perceived anxiety has a positive impact on e-satisfaction toward MPA during the COVID-19 pandemic.

H_{6b} Perceived anxiety has a positive impact on CI toward MPA during the COVID-19 pandemic.

Perceived threats, e-satisfaction, and continuance intention

According to the HBM, perceived threats (PT) are the combination of susceptibility and severity associated with a disease, which can be perceived as a construct that is more relevant to the resulting health-related behaviors rather than an individual consideration of either of these factors (Berg and Lin 2020; Cho et al. 2019; Weitkunat et al. 2003; Jeong and Ham 2018; Rosenstock 1990). Suburban consumers' protective health behavior during the COVID-19 pandemic indicates their inclination toward maintaining safe social distance using different operational alternatives to physical interactions to reduce the threats of COVID-19 transmission. MPAs are found as the most promising operational alternative which can lessen the chance of being infected by COVID-19 (Mehroliya et al. 2020). Consumers are satisfied with MPAs, and they continue to use these during



this pandemic. However, there is a shortage of literature on the influence of PT on e-SAT and CI. Hence, the following hypotheses are developed.

H_{7a} Perceived threats have a positive impact on e-satisfaction toward MPA during the COVID-19 pandemic.

H_{7b} Perceived threats have a positive impact on CI while using MPA during the COVID-19 pandemic.

E-satisfaction and continuance intention

E-satisfaction (e-SAT) can be defined as the customer's contentment concerning prior usage experience with a given MPA service (Anderson and Srinivasan, 2003). A satisfied customer is more likely to strengthen the relationship with a given service provider, whereas a dissatisfied customer is more likely to redefine the existing relationship and look for alternatives (Anderson and Srinivasan 2003; Cao et al. 2018). Existing studies in the contexts of IS-based services (Bhattacharjee 2001; Lee, 2010), mobile payments (Cao et al. 2018; Franque et al. 2021; Singh 2020), mobile Fin-Tech payment services (Lim et al. 2019), and food delivery application (Al Amin et al. 2020; Al Amin et al. 2021b) evidence that e-SAT promotes CI since satisfied customers held favorable attitude toward the service provider and consider switching to the alternatives as less worthwhile. Hence, based on e-SAT and e-loyalty theory, the following hypothesis is developed.

H₈ Consumers' e-satisfaction has a positive impact on MPA during the COVID-19 pandemic.

E-satisfaction and e-loyalty

E-loyalty (e-LTY) refers to customers' favorable attitude toward MPAs, resulting in consistent repeat usage over time (Anderson and Srinivasan 2003). E-satisfaction (e-SAT) is considered the natural antecedent to e-LTY since satisfied customers hold positive emotional attachments to the service they consume repeatedly (Anderson and Srinivasan 2003). Moreover, increased e-SAT leads to increased e-LTY in the contexts of e-commerce (Anderson and Srinivasan 2003), online shopping (Lin and Sun 2009), and e-banking (Haq and Awan 2020). Hence, the following hypothesis is developed based on e-SAT and e-LTY theories.

H₉ Consumers' e-Satisfaction has a positive impact on e-loyalty toward MPA during the COVID-19 pandemic.

Continuance intention and e-loyalty

Continuance intention (CI) toward MPA indicates customers' intention to continue using the services in the future, whereas loyalty expresses customers' favorable attitude and deeply held commitment to make repeated use of MPA (Anderson and Srinivasan 2003; Bhattacharjee 2001). Therefore, customers' CI can be argued to have a significant impact on building e-loyalty (e-LTY) since the outcome of CI is repeat buying behavior over time. Furthermore, loyal consumers also possess a favorable attitude toward a brand that results in repeated purchases (Keller 1993). Therefore, it can be argued that customers who have CI to use MPA ultimately form e-LTY toward that service due to positive emotional attachments. Thus, the following hypothesis can be proposed.

H₁₀ Consumers' continuance intention positively impacts e-loyalty toward MPA during the COVID-19 pandemic.

Methodology

Research design

The research was conducted based on data collected from five suburban areas of Bangladesh—(i) Bhabanipur, Rajapur, Dhaganbhuiya, Feni, (ii) South Guthuma, Baks Mohammad, Porshuram, Feni, (iii) Sripur, Munshirhat, Fulgazi, Feni, (iv) Shodordi, Bhanga, Faridpur, and (v) Gobra, Gopalganj Sadar, Gopalganj. Suburban respondents at 18 years old or above were selected who stayed at home deliberately during the COVID-19 pandemic and used e-commerce and/or m-commerce platforms and at least one of the MPA services—including bKash, Nagad, uCash, and mCash for financial transactions. The reasons behind choosing suburban respondents are: (a) most of the MPA literature focuses only on urban dwellers (Kumar et al. 2018; Gupta and Arora 2019; Liu et al. 2020), evidencing a dearth of literature on suburban realities; (b) suburban dwellers receive fewer traditional banking opportunities; (c) suburban areas are experiencing higher growth of MPA services, and (d) MPA services are fostering financial inclusion in suburban areas with the help of pervasive internet and mobile phone technologies.

The purposive sampling method was used to select the respondents to match the required nature and quality of data required by this research, as well as to avoid the risks of collecting poor-quality data (Etikan et al. 2016). Several technology adoption studies utilized the same method (Haryani and Motwani 2015; Arif et al. 2020; Mombeuil 2020; Hong et al. 2017) while choosing respondents from selected areas to give a better representation of the



population. Moreover, this approach was also shaped by researchers' related knowledge and experience, which align with the rationale behind choosing purposive or judgmental sampling and ensuring the samples represent the population (Bernard 2002; Etikan et al. 2016). Thus, purposive sampling facilitated the selection of well-informed respondents resulting in good-quality data, while a large number of respondents ensured rigor (Cresswell and Plano Clark 2011).

A questionnaire survey was used where the first part was designed for collecting demographic information while the other part was for measurement-related information. Originally, the questionnaire was written in English, later it was translated into Bengali following the back-translation method, given that people in suburban areas prefer Bengali for communication (Brislin 1976). Two university professors were involved in validating the translation. In addition to this, a pilot test on a sample of 25 respondents was conducted to check for the suitability and efficacy of the questionnaire. The measurement items are derived with the help of the existing literature (see Appendix A) and comprise a 5-point Likert Scale (5 for strongly agree to 1 for strongly disagree). As perceived anxiety (PA) and perceived threats (PT) are new to MPA literature, exploratory factor analysis (EFA) was conducted to check for dimensionality. We found that PA explained 76.81% and PT explained 74.31% variances.

Data collection

Primary data was collected from early April to the end of September 2020. A team of 17 local field facilitators was selected and trained over a virtual platform named Zoom. They used their social networks and collected email addresses/contact information and particulars of the respondents who agreed to participate in the survey voluntarily. The team used messaging and voice call services to conform to the COVID-19 health protocols. An email/message (for those who preferred Facebook messenger) was sent to some respondents, with a cover letter detailing this research, along with a link to the questionnaire for their responses to be submitted within four weeks. After that, a reminder email/message and later a subsequent follow-up email/message were sent. For the digitally excluded respondents, the paper-based questionnaire was used though no significant difference between online and paper-based surveys was identified, resonating with similar claims made by related literature (Chatterjee et al. 2002; Hall and Hall 2008; Dillman 2011). A total of 663 respondents were initially contacted, but 470 responded to the questionnaire. After careful screening, 455 responses (68.66%) were retained. Among the

Table 2 Demographic profile of the respondents. Source: Primary research data

Variables	Number	Percentage
<i>Gender</i>		
Male	270	59.34
Female	185	40.66
<i>Age</i>		
18–25	115	25.27
25–40	254	55.82
40–55	86	18.91
<i>MPAs</i>		
bKash	273	60.00
Rocket	67	14.73
Nagad	60	13.19
SureCash	49	10.77
Others	06	1.31
<i>Educational qualification level</i>		
Secondary level	55	12.09
Higher secondary level	100	21.98
University level	259	56.92
Others	41	9.01

respondents, 270 (59.34%) were male, and 185 (40.66%) were female. Most of them were between 25 and 40 years old (55.82%). Table 2 shows the demographic profile of the respondents.

Statistical analysis

The structural equation modeling (SEM) technique is used for data analysis. SEM helps to measure a series of dependent variables, causal models, and/or equations simultaneously (Chin 1998; Wang et al. 2019). Among the two categories of SEM—CB-SEM (covariance-based SEM) and PLS-SEM (partial least square-SEM)—CB-SEM examines the fit among the observed variables based on the covariance matrix, whereas PLS-SEM examines the dependent and independent variables to maximize the explained variances based on the estimation (Hair et al. 2016). In this study, PLS-SEM is used to estimate the degree of changes in endogenous constructs due to a set of exogenous constructs, using Smart PLS software, to measure confirmatory factor analysis and structural relationships among the variables. A listwise obliteration technique in SPSS is used to deal with missing data before formal data analysis (Allison 2003). To check for normality, skewness and kurtosis tests were performed. Skewness values ranged between -1.758 and $+0.891$ and kurtosis values ranged between -1.882 and $+1.041$, resembling how the data is normally distributed (Kline, 2005).



Common method variance

The chance of common method variance (CMV) encompasses determining both dependent and independent variables based on the perceptions of the same group of respondents. Several statistical and practical remedies have been taken before and after the data collection to reduce the possible variances. Harman's single-factor test and marker variable technique have been used to determine CMV. Harman's single-factor reports the problematic CMV if the first factor of exploratory factor analysis (EFA) explains more than 50% of the variance among the study variables (Podsakoff and Organ 1986). Our EFA results report that ten identified constructs with more than 1.00 eigenvalues explain 81.95% variance of total variances, whereas the first factor accounts more only 26.59% of the total variance which is within the tolerable limit (Harman 1967; Podsakoff and Organ 1986; Brannick et al. 2010; Fuller et al. 2016).

Results

Measurement model

In this research, construct reliability is confirmed by evaluating rho_A, Cronbach's alpha, and composite reliability (CR) to ensure internal consistency. Similarly, convergent validity is confirmed by evaluating average variance extracted (AVE) and cross-loading; however, the discriminant validity is confirmed by evaluating the Fornell and Lacker criteria and Heterotrait-Monotrait ratio (HTMT).

Construct reliability

Hair et al. (2016) recommend that construct reliability (CR), Cronbach's alpha, and rho_A must be greater than 0.7 and less than 0.95 ($0.95 < CR > 0.7$; $0.95 < \alpha > 0.7$; $0.95 < \rho_A > 0.7$) to confirm the internal consistency of the items in the scale, while the value greater than 0.95 stands for redundancy or duplication of items, respectively. All criteria—Cronbach's alpha, rho_A, and CR—are met for all eight constructs that are presented in Table 3.

Convergent validity

A construct is responsible for more than 50% of the items included in a research model if the value of average variance extracted (AVE) is greater than 0.5 (Hair et al. 2016). Table 3 represents the cross-loading of the constructs and AVE, and shows that all the criteria (AVE and factor

loading) are met, proving the construct reliability of the proposed model.

Discriminant validity

The measurement model is validated by discriminant validity. Table 4 presents the Heterotrait-Monotrait (HTMT) ratio of correlations which needs to be less than 0.85 ($HTMT < 0.85$) for favorable validity (Henseler et al. 2015; Hair et al. 2016). Table 5 shows the Fornell and Lacker criteria in which all diagonal values (square root of AVE) are greater than the values of the off-diagonal values (correlations among the variables). Therefore, all the criteria—HTMT and Fornell–Lacker—are met which is required to prove the discriminant validity of the model.

Structural model

The coefficient of determinations (R^2), the strength of the effect (f^2), and the significance level of the path coefficient can validate a structural model (Hair et al. 2016). We tested all the hypotheses through the bootstrap with 5000 resamples and measured t-statistics for testing the path coefficient, following the guidelines suggested by Henseler et al. (2016).

Coefficient of determinations

We analyzed the squared multiple correlations in Table 6 where the coefficient of determinations (R^2) for perceived usefulness (PU) is 0.640 which means that 64% of the changes in PU are the result of the changes in confirmation (CON), whereas the R^2 value for e-satisfaction (e-SAT) is 0.681 which means that 68.1% of the variation in e-SAT is due to the changes in the seven direct determinants—information quality (IQ), service quality (SRQ), system quality (SQ), perceived usefulness (PU), CON, perceived anxiety (PA), and perceived threats (PT). Moreover, R^2 explains 73.6% of continuance intention (CI) changes due to the changes in eight direct predictors—IQ, SRQ, SQ, PU, CON, PA, PT, and e-SAT. Finally, e-loyalty (e-LTY) is changed by 78.3%, due to changes in CI and e-SAT in the proposed model. We have also fixed the predictive capability of the parameter using PLS-SEM through cross-validated redundancy (Q^2) in Table 6. Our results exceed the cutoff value ($Q^2 > 0$) recommended by Hair et al. (2016).

Strength of effect

In contrast to the R^2 value, the strength of effect sizes, f^2 , is tested to know the representative influence of different constructs/variables in one single model (Henseler et al. 2015). Chin (1998) and Henseler et al. (2015) suggest f^2 value of



Table 3 Construct reliability. Source: Primary research data

Constructs	Items	Loadings	Cronbach's alpha	rho_A	CR*	AVE**
Information quality (IQ) (Zhou 2013; Motiwalla et al. 2019)	IQ1	0.811	0.873	0.820	0.908	0.711
	IQ2	0.835				
	IQ3	0.853				
	IQ4	0.872				
Service quality (SRQ) (Zhou 2013; Motiwalla et al. 2019)	SRQ1	0.865	0.791	0.795	0.844	0.576
	SRQ2	0.836				
	SRQ3	0.790				
	SRQ4	0.891				
System quality (SQ) (Zhou 2013; Motiwalla et al. 2019)	IQ1	0.738	0.761	0.701	0.883	0.654
	IQ2	0.813				
	IQ3	0.826				
	IQ4	0.854				
Perceived usefulness (PU) (Bhattacharjee et al. 2008; Yeo et al. 2017)	PU1	0.910	0.709	0.831	0.897	0.744
	PU2	0.859				
	PU3	0.817				
Confirmation (CON) (Bhattacharjee 2001; Joo and Choi 2016)	CON1	0.721	0.765	0.801	0.881	0.650
	CON2	0.823				
	CON3	0.873				
	CON4	0.801				
Perceived threats (PT) (Yoon and Kim 2016; Kim and Cooke 2020)	PT1	0.732	0.819	0.841	0.852	0.593
	PT2	0.707				
	PT3	0.741				
	PT4	0.886				
Perceived anxiety (PA) (Bults et al. 2011)	PA1	0.798	0.746	0.796	0.858	0.669
	PA2	0.821				
	PA3	0.834				
e-Satisfaction (e-SAT) (Anderson and Srinivasan 2003; Alalwan 2020)	e-SAT1	0.774	0.773	0.738	0.879	0.592
	e-SAT2	0.792				
	e-SAT3	0.801				
	e-SAT4	0.726				
	e-SAT5	0.753				
Continuance intention (CI) (Bhattacharjee et al. 2008; Cho et al. 2019)	CI1	0.827	0.765	0.814	0.859	0.671
	CI2	0.801				
	CI3	0.829				
e-Loyalty (e-LTY) (Zeithaml et al. 1996; Anderson and Srinivasan 2003)	e-LTY1	0.801	0.757	0.730	0.895	0.630
	e-LTY2	0.843				
	e-LTY3	0.792				
	e-LTY4	0.825				
	e-LTY5	0.701				

*CR, Composite reliability; **AVE, Average variance extracted

0.02 as a small effect, 0.15 as the medium effect, and 0.35 as a large effect. Table 6 shows that f^2 value ranges from 0.109 to 2.410.

We have tested the fit indices of the research model presented in Table 7. The recommended value of SRMR < 0.08 and RMS_theta < 0.1 (Hair et al. 2019), RMSEA value < 0.05 is a close fit, and that < 0.08 is reasonable (Browne and Cudeck 1993), CFI, TLI, and NFI > 0.95 (Hu

and Bentler 1999). Table 7 shows that the model fits indices and satisfies the required cutoff values for both the measurement model and structural model of the research.

Hypotheses testing

The routine bootstrapping with 5000 resamples is used to test the 18 proposed hypotheses. The path coefficient



Table 4 Heterotrait-Monotrait (HTMT) ratio. Source: Primary research data

	IQ	SRQ	SQ	PU	CON	PT	PA	e-SAT	CI	e-LTY
IQ	–									
SRQ	0.356	–								
SQ	0.756	0.387	–							
PU	0.129	0.561	0.418	–						
CON	0.098	0.601	0.190	0.053	–					
PT	0.037	0.391	0.054	0.971	0.028	–				
PA	0.041	0.801	0.781	0.742	0.459	0.231	–			
e-SAT	0.658	0.457	0.723	0.256	0.184	0.439	0.609	–		
CI	0.591	0.239	0.431	0.328	0.391	0.718	0.659	0.129	–	
e-LTY	0.095	0.310	0.105	0.716	0.541	0.759	0.461	0.791	0.504	–

Table 5 Fornell and Lacker criteria. Source: Primary research data

	IQ	SRQ	SQ	PU	CON	PT	PA	e-SAT	CI	e-LTY
IQ	0.843									
SRQ	0.571	0.758								
SQ	0.751	0.438	0.809							
PU	0.088	0.428	0.470	0.862						
CON	0.678	0.319	0.601	0.375	0.806					
PT	0.541	0.281	0.507	0.659	0.671	0.770				
PA	0.735	0.275	0.704	0.580	0.491	0.541	0.818			
e-SAT	0.197	0.765	0.793	0.729	0.407	0.755	0.367	0.769		
CI	0.452	0.491	0.540	0.728	0.603	0.620	0.065	0.710	0.819	
e-LTY	0.793	0.438	0.238	0.591	0.437	0.056	0.650	0.657	0.170	0.793

The diagonal bold elements represent the square root of AVE

and t -statistics are used to validate the structural model. Table 8 shows that e-satisfaction (e-SAT) ($\beta=0.561$, t -statistics = 3.300, $p < 0.001$) and continuance intention (CI) ($\beta=0.336$, t -statistics = 3.862, $p < 0.001$) are influenced by information quality (IQ) in a positive way. Hence, H_{1a} and H_{1b} are supported. As per H_{2a} and H_{2b} , it is found that the impact of service quality (SRQ) on e-SAT ($\beta=0.283$, t -statistics = 4.797, $p < 0.003$) and CI ($\beta=0.319$, t -statistics = 7.089, $p < 0.002$) is positive which results in supporting H_{2a} and H_{2b} . In addition to this, as per H_{3a} and H_{3b} , system quality (SQ) expressively influences e-SAT ($\beta=0.210$, t -statistics = 4.884, $p < 0.003$) and CI ($\beta=0.500$, t -statistics = 5.263, $p < 0.001$). It is also found that as per H_{4a} and H_{4b} , the influence of perceived usefulness (PU) on e-SAT ($\beta=0.276$, t -statistics = 3.632, $p < 0.003$) and CI ($\beta=0.393$, t -statistics = 2.312, $p < 0.002$) is positive. Thus, H_{4a} and H_{4b} are also supported.

According to H_{5a} , H_{5b} , and H_{5c} , the influence of confirmation (CON) on PU ($\beta=0.360$, t -statistics = 3.871, $p < 0.002$), e-SAT ($\beta=0.483$, t -statistics = 3.927, $p < 0.002$), and CI ($\beta=0.538$, t -statistics = 6.256, $p < 0.003$) is also positive which support H_{5a} , H_{5b} , and H_{5c} , respectively. Moreover, in the case of H_{6a} , e-SAT ($\beta=0.254$,

t -statistics = 1.468, $p < 0.054$) is not influenced by perceived anxiety (PA) while in case of H_{6b} , CI ($\beta=0.432$, t -statistics = 3.273, $p < 0.002$) is influenced by PA, which evidence that while H_{6a} is not supported but H_{6b} is supported. On the other hand, in the case of H_{7a} , perceived threat (PT) does not influence e-SAT ($\beta=0.242$, t -statistics = 1.582, $p < 0.064$) while in case of H_{7b} , PT influence CI ($\beta=0.371$, t -statistics = 3.989, $p < 0.004$). Hence, H_{7a} is not supported but H_{7b} is supported. H_8 and H_9 are also supported by the statistics where the influences of e-SAT on CI ($\beta=0.296$, t -statistics = 2.650, $p < 0.005$) and e-loyalty (e-LTY) ($\beta=0.670$, t -statistics = 6.411, $p < 0.003$) are evident. Finally, it is found that CI influences e-LTY ($\beta=0.540$, t -statistics = 10.387, $p < 0.006$) which evidence that H_{10} is supported.

To examine the lateral collinearity effect before validating the structural model, we analyzed the variance inflation factor (VIF) value. Hair et al. (2016) recommend that the ideal VIF value might be less than 3.00 or close to 3.00 and the acceptance value should be below 5.00. In our model, the VIF value ranges from 1.341 to 2.871 (Table 8), which resembles no lateral VIF issues in the research. The structural model of the research has been depicted in Fig. 2.



Table 6 Coefficient of determination (R^2) and strength of effect. Source: Primary research data

Component	f^2	Effect size
<i>Effect of PU</i>		
CON->PU	0.250	Moderate
<i>Effect of e-SAT</i>		
IQ->e-SAT	0.465	Large
SRQ->e-SAT	0.231	Moderate
SQ->e-SAT	0.140	Small
PU->e-SAT	2.410	Large
CON->e-SAT	0.236	Moderate
PA->e-SAT	0.651	Large
PT->e-SAT	0.109	Small
<i>Effect of CI</i>		
IQ->CI	0.139	Small
SRQ->CI	0.301	Moderate
SQ->CI	1.010	Large
PU->CI	0.410	Large
CON->CI	0.127	Small
PA->CI	0.210	Moderate
PT->CI	0.678	Large
<i>Effect of e-LTY</i>		
e-SAT->e-LTY	0.361	Large
CI->e-LTY	1.230	Large

N.B. Coefficient of determination (R^2), PU=0.640, e-SAT=0.681, CI=0.736, e-LTY=0.783. Blindfolding-based cross-validated redundancy (Q^2), e-SAT=0.573, CI=0.691, e-LTY=701

Table 7 The results of model fit

Model fit indices	Measurement model	Structural model
CFI	0.981	0.959
TLI	0.967	0.961
RMSEA	0.051	0.047
SRMR	0.058	0.049
RMS_theta	0.091	0.085
NFI	0.976	0.963

CFI, Comparative fit index; TLI, Tucker–Lewis index; NFI, normative fit index; SRMR, standardized root mean square residual; RMSEA, root mean square error of approximation

Discussions

The research validated a comprehensive framework to examine Bangladeshi suburban customers’ e-satisfaction (e-SAT), continued intention (CI), and e-loyalty (e-LTY) toward MPAs. It integrated the roles of perceived anxiety with the psychological factors of HBM (Becker et al. 1977), quality attributes of ISSM (Delone and McLean 2003), and expectations confirmation and usefulness of ECM (Bhattacharjee

2001) in reforming the suburban customers’ e-SAT, CI, and e-LTY toward MPAs. The research findings inform existing literature with both practical and managerial implications that are presented below.

Theoretical contribution

The three quality attributes—information, service, and system—of ISSM jointly epitomize an essential determinant of suburban customers’ post-experience e-satisfaction (e-SAT), and continued intention (CI) to use MPAs. The finding is consistent with the positive relationship between information quality (IQ) and post-experience e-SAT, and CI to use MPAs. This analogy is also supported by previous studies (Cidral et al. 2018; Franque et al. 2021; Zhou 2011), attributed to the accurate, relevant, and timely information provided by the MPA to Bangladeshi suburban customers during the COVID-19 pandemic. Suburban customers’ post-experience e-SAT and CI were further intensified since MPAs simplified operations, offered effortless transactions, enhanced customer confidence, built long-term relationships, and assisted to conform to the COVID-19 health protocol. The positive influence of service quality (SRQ) on e-SAT and CI is evidenced by related literature in the case of mobile banking (Tam and Oliveira 2016; Rahi and Ghani 2019; Sharma et al. 2017) since MPA equipped suburban customers with valued and personalized services—24/7 customer supports, online coupons, quick response-time services, and long-term relationships—despite the challenging realities of the pandemic. The system quality (SQ) impacted e-SAT and CI simultaneously which is consistent with the existing literature (Zhou 2013; Sharma et al. 2017). As MPAs offer user-friendly interfaces, error-free financial transactions, visually appealing interfaces, easy navigation systems, and fast and secured payments; suburban customers are satisfied which results in the continued use of the MPA services over time.

As per HBM, the research found that although the influence of perceived threat (PT) on suburban customers’ post-experience e-SAT is negative, it has significant impacts on CI to use MPAs during COVID-19. Consequences, severity, susceptibility, and catastrophic outcomes of the COVID-19 pandemic have been lessened since MPAs ensures financial transaction without physical interactions.

The two original ECM determinants have significant impacts on e-SAT and CI use that can also be supported by existing literature (Humbani and Wiese 2019; Sreelakshmi and Prathap 2020). Customers’ expectations related to avoiding COVID-19 transmission were confirmed by the useful features of MPA—paperless and contactless transactions—which assisted them to maintain COVID-19 health protocol. Positive usage experiences might have changed customers’ perception of the usefulness of MPA



Table 8 Path coefficient and hypotheses test results. Source: Primary research data

Hypotheses	Relationship	Path coefficient	SD	T-statistics	VIF	P values	Remarks
H _{1a}	IQ-> e-SAT	0.561	0.170	3.300	1.529	0.001	Supported
H _{1b}	IQ-> CI	0.336	0.087	3.862	1.871	0.001	Supported
H _{2a}	SRQ-> e-SAT	0.283	0.059	4.797	2.310	0.003	Supported
H _{2b}	SRQ-> CI	0.319	0.045	7.089	2.368	0.002	Supported
H _{3a}	SQ-> e-SAT	0.210	0.043	4.884	1.872	0.003	Supported
H _{3b}	SQ-> CI	0.500	0.095	5.263	1.341	0.001	Supported
H _{4a}	PU-> e-SAT	0.276	0.076	3.632	2.870	0.003	Supported
H _{4b}	PU-> CI	0.393	0.170	2.312	2.815	0.002	Supported
H _{5a}	CON-> PU	0.360	0.093	3.871	1.519	0.002	Supported
H _{5b}	CON-> e-SAT	0.483	0.123	3.927	1.427	0.002	Supported
H _{5c}	CON-> CI	0.538	0.086	6.256	2.871	0.003	Supported
H _{6a}	PA-> e-SAT	0.254	0.173	1.468	1.901	0.054	Not supported
H _{6b}	PA-> CI	0.432	0.132	3.273	2.134	0.002	supported
H _{7a}	PT-> e-SAT	0.242	0.153	1.582	2.491	0.064	Not supported
H _{7b}	PT-> CI	0.371	0.093	3.989	2.761	0.004	Supported
H ₈	e-SAT-> CI	0.296	0.112	2.650	2.663	0.005	Supported
H ₉	e-SAT-> e-LTY	0.670	0.105	6.411	2.210	0.003	Supported
H ₁₀	CI-> e-LTY	0.540	0.052	10.387	1.653	0.006	Supported

and thereby contributed to customers' MPA-related e-SAT and CI.

Customers' perceived anxiety (PA) has a meaningful contribution to the CI to use MPAs over ECM, HBM, and ISSM. This can be argued because the research findings are aligned with the reduction of wariness and fears or trepidation of a person related to COVID-19 infection during the pandemic.

E-SAT is crucial to determine MPA customers' CI and e-loyalty (e-LTY) which is consistent with existing literature (Sreelakshmi and Prathap 2020; Haq and Awan 2020). However, CI is significant for increasing customers' e-LTY toward MPAs. This research suggests that CI is primarily determined by the performance of MPAs that motivates customers to develop CI to use MPAs in this pandemic. Particularly, with the spirit of financial inclusion, suburban customers experienced satisfactory, fast, and secured payment services that also safeguard them from COVID-19 infections. Thus, MPA technology, through its safer payment opportunities, can ensure consumers' e-LTY to use MPA for financial transactions during the COVID-19 pandemic.

This research develops and applies a validated comprehensive integrated model based on HBM, ECM, and ISSM to provide the first assessment of suburban MPA customers' perceptions of post-purchase-experience, emotions, e-satisfaction, continuance intention, and e-loyalty in an emerging economy, which has been a consistent gap in related literature.

Practical implications

This research offers practical implications for marketers and policymakers about the underlying factors in designing and promoting MPAs amid the pandemic and in the new normal. Using the insights provided by this research, respective stakeholders can accommodate the changing consumer behavior that the COVID-19 pandemic has transformed.

MPA services providers should enhance service quality along all dimensions while designing their systems. They need to focus on offering reliable and personalized services to create a consistent position in the market. MPA developers should pay emphasis on the quality of information and content, user-friendly design, and reflection on customer reviews and feedback. This research implies that MPAs can effectively convince suburban customers to search for relevant information during a crisis period, given all the dimensions of service quality conform to the expected standard. However, MPA service providers need to take further steps to offer customized services to suburban customers.

MPA adoption reduces psychological stress and customers' circumstantial cues such as anxiety and threats related to COVID-19. In addition, MPA, as an operational alternative to cash-based traditional transactions, ensures contactless transactions and can aid suburban consumers in developing countries like Bangladesh to purchase online and get the delivery dropped at a safe distance.

During the pandemic, the banking industry faced challenges with low liquidity and financial profit due to limited in-person banking. Hence, MPA can be the only



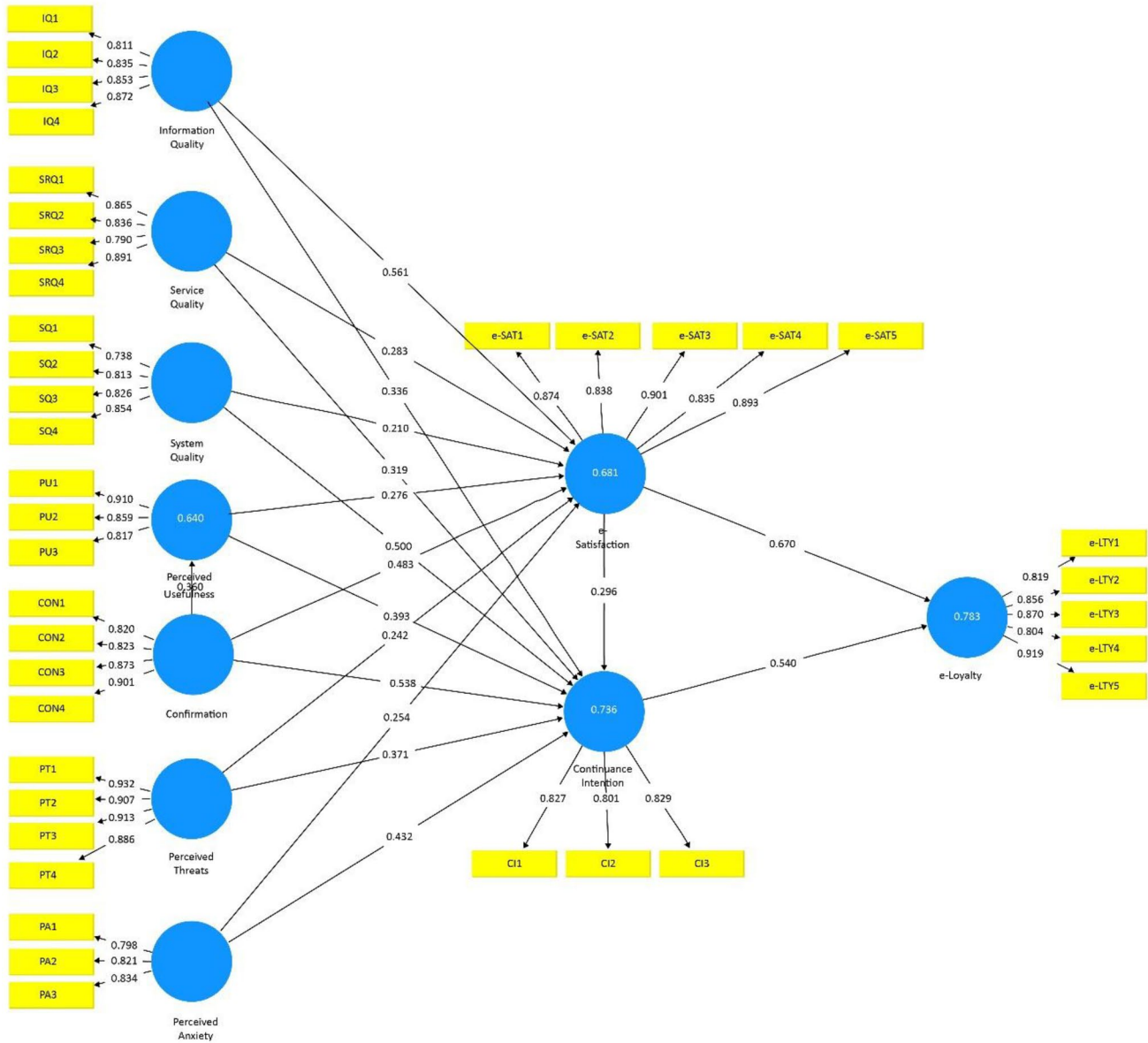


Fig. 2 Structural model

alternative to benefit related stakeholders even if people avoid in-person banking during the COVID-19 pandemic. For example, MPA facilitates customers to pay utility bills, tuition fees, credit card bills, and other unavoidable regular financial transactions. Furthermore, MPA service providers can collaborate with food delivery organizations and restaurants to provide respective services and related information, thereby adding superior value. MPA services providers can expand their service provisions to include other sectors. For instance, they can incorporate transport sectors to sell tickets to let customers maintain the COVID-19 health protocol. These additional values will reassure the suburban customers and increase their involvement and satisfaction in maintaining social distance. As a result, they

will be able to overcome the anxiety and threats related to this pandemic.

MPAs can include different ratings, recommendations, and review options on their apps that can significantly increase the number of new customers because potential customers search for the opinions of genuine MPA customers on the respective services, on virtual platforms. MPA services providers should introduce different loyalty schemes based on recommendations and/or purchase volume, to make existing consumers satisfied and stay loyal.



Concluding remarks

This research has validated e-TCM, an integrated theoretical framework, which can examine the determinants of e-satisfaction and continuance intention to measure the Bangladeshi suburban consumers' post-consumption adoption behavior when MPA services are concerned.

In this research, we encountered a few limitations. Firstly, since the study utilized the cross-sectional research design using PLS-SEM, it is prone to be methodologically biased. Thus, the causality among the variables studied needs to be ensured cautiously. Future studies may undertake longitudinal research to investigate the relationships among the variables over time and confirm the causality of the variables utilizing CB-SEM, to examine the fit among the observed variables based on the covariance matrix. Secondly, the data was collected during the COVID-19 pandemic, which may limit the generalization of the research results compared to the generalization that could have been achieved if it were conducted in a normal situation. Future studies may replicate this research in different contexts to validate the generalization of the results across wider geographical regions and to measure possibly unobserved heterogeneity in the population. As MPA is still growing and relatively new to suburban customers, customer judgments might often vary by a group based on unidentified referents. There is a possibility that some subgroups of opinions about MPAs are left unobserved. Thus, understanding this growing MPA sector and its customers is essential through further research to continuously redefine the service offerings and respective managerial implications. Finally, since the data was collected from a single category (MPA customers) of respondents, the common method variance might have impacted the outcomes. However, the results of this research validate that common method variance is not an issue in this research.

Appendix A: Measurement items

Constructs and sources	Measurement items
Information quality (IQ) (Zhou 2013; Motiwalla et al. 2019)	IQ1: Mobile payment applications (MPAs) provide me with information relevant to my needs IQ2: Mobile payment applications (MPAs) provide me with sufficient information IQ3: Mobile payment applications (MPAs) provide me with accurate information IQ4: Mobile payment applications (MPAs) provide me with up-to-date information

Constructs and sources	Measurement items
Service quality (SRQ) (Zhou 2013; Motiwalla et al. 2019)	SRQ1: Mobile payment applications (MPAs) provide me quick response-time services SRQ2: Mobile payment applications (MPAs) provide me professional services SRQ3: Mobile payment applications (MPAs) provide me personalized services SRQ4: Mobile payment applications (MPAs) can provide me with uninterrupted connectivity and communication
System quality (SQ) (Zhou 2013; Motiwalla et al. 2019)	SQ1: Mobile payment applications (MPAs) can provide me with accurate and consistent information SQ2: Mobile payment applications (MPAs) are easy to use SQ3: Mobile payment applications (MPAs) are easy to navigate SQ4: Mobile payment applications (MPAs) are visually attractive
Perceived usefulness (PU) (Bhattacharjee et al. 2008; Yeo et al. 2017)	PU1: I will find the mobile payment applications (MPAs) to be useful in ordering foods PU2: Mobile payment applications (MPAs) would enable me to accomplish shopping more quickly than using traditional approaches PU3: Using mobile payment applications (MPAs) services would enhance my effectiveness in shopping or information seeking
Confirmation (CON) (Bhattacharjee 2001; Joo and Choi 2016)	CON1: My experience with using mobile payment applications (MPAs) was better than what I expected CON2: The service level provided by mobile payment applications (MPAs) was better than what I expected CON3: Overall, most of my expectations from using mobile payment applications (MPAs) were confirmed CON4: The expectations that I have regarding mobile payment applications (MPAs) were correct
Perceived threat (PT) (Yoon et al. 2016; Kim and Cooke 2020)	PT1: The COVID-19 pandemic is very severe PT3: The COVID-19 pandemic is creating serious the threat for us PT3: COVID-19 will have consequences for me or my family PT4: COVID-19 was to lead to catastrophic outcomes



Constructs and sources	Measurement items
Perceived anxiety (PA) (Bults et al. 2011)	PA 1: I am worried about COVID-19 PA 2: I fear COVID-19 PA 3: I think about COVID-19 often
e-Satisfaction (e-SAT) (Alalwan 2020; Anderson and Srinivasan 2003)	e-SAT1: I am generally pleased to use mobile payment applications (MPAs) e-SAT2: My choice to use mobile payment applications (MPAs) was a wise one e-SAT3: I am very satisfied to use mobile payment applications (MPAs) e-SAT4: I am satisfied with the way mobile payment applications (MPAs) have carried out online payment systems e-SAT5: I think I did the right thing by using mobile payment applications (MPAs)
Continuance intention (CI) (Bhattacharjee et al. 2008; Amoruso and Ogawa 2011; Cho et al. 2019)	CI1: I intend to use mobile payment applications (MPAs) CI2: If I have an opportunity, I will take services from mobile payment applications (MPAs) CI3: I intend to keep ordering food through mobile payment applications (MPAs)
e-Loyalty (e-LTY) (Anderson and Srinivasan 2003; Zeithaml et al. 1996)	e-LTY1: I seldom consider switching to any alternative to MPA e-LTY2: As long as the present service continues, I doubt that I would switch to any alternative to MPA e-LTY3: I try to use the MPA whenever I need to make a purchase e-LTY4: When I need to make a purchase, MPA is my first choice e-LTY5: I like using this Web site

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Author Contribution Statements This research contributes to the respective literature by developing and validating the proposed electronic technology continuance model (e-TCM) built on the expectation–confirmation model (ECM), health belief model (HBM) and IS success model (ISSM). The e-TCM can determine suburban customers' mobile payment application (MPA) adoption behavior and e-loyalty intention, specifically in the context of an emerging economy like Bangladesh and during a crisis period like the COVID-19 pandemic. The research also reveals the roles of perceived threat, e-satisfaction, perceived anxiety, e-satisfaction, and dimensions of quality on customers' e-satisfaction, continuance intention and e-loyalty regarding MPA usage. In terms of practical implications; respective stakeholders, including suburban consumers, MPA services providers, marketers, industry analysts, and government authorities, can find guidelines on how to combat a crisis period and adopt a new normal reality effectively for any MPA.

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