

Continuance adoption of mobile-based payments in Covid-19 context: an integrated framework of health belief model and expectation confirmation model

Health belief
model

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Abstract

Purpose – Shifting to mobile-based banking transactions from physical banking transactions can be considered as a social distancing mechanism, which helps to prevent the spread of Covid-19 virus. As the spread of Covid-19 is expected to continue for long, the continued usage of mobile-based payment services as a strategy to maintain social distancing has to prevail. Hence, this study aims to propose an integrated framework of mobile payments adoption and its continuance intention by integrating health belief model (HBM) and expectation confirmation model (ECM) of information system continuance.

Design/methodology/approach – The subject of the study constitutes new adopters of mobile payments. A total of 654 respondents participated in the survey. The conceptual model was empirically validated using structural equation modeling and serial mediation analysis.

Findings – The study found that the HBM constructs, namely, perceived severity, perceived susceptibility and self-efficacy significantly influenced adoption/confirmation of mobile-based payment services. The continuance intention was significantly predicted by perceived usefulness and perceived satisfaction. Furthermore, the perceived health threat (comprising perceived severity and perceived susceptibility) indirectly affects continuance intention through confirmation, perceived usefulness and satisfaction.

Practical implications – There are short-term and long-term implications for the study. Short-term implications include triggering the HBM at policy levels, to adopt mobile payments/banking as a means of social distancing in the wake of the increasing threat of Covid-19 in India. Long-term implication for service providers is to convert adopters into loyal consumers by enhancing usefulness and satisfaction.

Originality/value – The study proposes a novel attempt to explain the adoption and continuance of mobile-based payment as a preventive health behavior to contain the spread of Covid-19 outbreak. The study proposes an integrated framework of HBM and ECM to explain pre-adoption and post-adoption behavior of consumers with respect to mobile-based payment services during Covid-19 context.

Keywords Continuance intention, Health belief model, Covid-19, Expectation confirmation model, Perceived health threat

Paper type Research paper



1. Introduction

Covid-19 pandemic has devastated the world economy and financial markets. To contain the spread and effect of Covid-19 outbreak, many countries including India have taken precautionary actions to mitigate the risk of Covid-19 including nation-wide lockdown and

social distancing policies. Lockdown has affected the Indian economy warranting a negative growth rate in the short-term. World Bank has estimated that the world economy is going to face massive recession; India among other countries to face the stint of degrowth (World Bank, 2020). This situation may continue for another year or longer till the invention of vaccine/medicine. Hence, it is necessary to continue with coping strategies including social distancing. The probability of getting infected with Covid-19 by touching virus infected object or surface is high. Hence, social distancing strategy can help in containing the spread of the disease by reducing the chances of face to face or close contacts with infected people and the contaminated surface (Chang *et al.*, 2020; Eikenberry *et al.*, 2020; Fong *et al.*, 2020). Physical cash handling can expedite the spreading of virus; hence the need of the hour will be to shift to digital payment mode as a means to adhere to social distancing norms. Further, lockdown situations have created business environments shift to the new normal, where e-commerce solutions tend to be plausible solutions to overcome physical barriers. Thus, people will tend to create new norms for social distancing apart from primary levels of actions such as avoiding physical contacts by distancing and hand sanitizing to secondary levels of action such as shifting to online behaviors in education, meetings, trade and payments.

Earlier, mobile-based payments were a medium of convenience; it appears to be a necessity due to Covid-19 pandemic background. Thus, Covid-19 is supposedly expected to enhance usage of mobile payments because of two factors. First, mobile-based payments can act as instruments of promoting social distancing policy, enabling people to make transactions during lock down and quarantine period. Second, most of the services have been offered through online platforms and the consumers are forced to explore the option of online payments. The central bank advisories to bankers and customers emphasize the usage of digital-based payments to avoid physical contact through the medium of currency/coins. Data released by the Bank for International Settlement indicated a sharp rise in the usage of contactless payments in major economies (Auer *et al.*, 2020). As Covid-19 virus infection is expected to continue for a couple of years (till the invention of vaccine/medicine) before wiping out, adoption of mobile-based payments can offer as a method to maintain social distancing, but continuous usage can be ensured by replacing physical banking transactions, provided the users are satisfied and convinced of its benefits. Hence, it would be appropriate to study the impact of Covid-19 on the adoption and continuance usage of mobile-based payments. So, the present study is intended to develop a research model, which explains the health belief model (HBM) affecting the expectation confirmation of mobile-based payment applications and there by developing a continuance intention to use mobile-based payments.

2. Literature review and conceptual framework

Management of COVID-19 pandemic primarily involves the adoption of social distancing norms and healthy behaviors in the prevailing situation of absence of preventive vaccines or medicine. Consumers may switch to contactless payments in view of the need for self-protection while continuing to transact for necessities of life. In view of the protection of consumers, replacement of paper currency, debit and credit cards and touch screen terminals with contactless technology is recommended by WHO (2020) and CDC (2020) in the event of the pandemic.

Use of mobile-based payments for transactions can be considered as preventive behavior (adoption of social distancing). The individuals' perceptions about the severity of the pandemic and his feelings of the extent of susceptibility to the disease can determine the adoption of preventive health behavior (adoption of social distancing by shifting from

physical banking to digital banking). The HBM explains how health-related behavior develops because of a perceived threat (comprising perceived susceptibility and perceived severity). However, HBM is not sufficient to explain the continuance intention to use mobile-based payments. After the adoption of mobile-based payments, continuance will depend on other factors (usage-related), which need to be explored. Hence, to explore this research problem in the context of existing threat of COVID-19, the current study intends to integrate the HBM and expectation confirmation model (ECM).

2.1 Health belief model

The HBM explains why people initiate preventive actions or actions to control a disease condition. The theory posits that people are likely to adopt an action overcoming the barriers, if such action is expected to have benefits that would reduce perceived susceptibility to illness that has severe consequences (Glanz *et al.*, 2008). According to HBM, perceived threat of disease, measured by perceived susceptibility and perceived severity, perceived benefits, perceived barriers along with perceived self-efficacy promotes development of health behavior among the affected population (Becker and Maiman, 1998). The HBM is a widely accepted model in health behavior research, which explains change and maintenance of health-related behavior for health-related interventions. In the context of current study, adoption or confirmation of mobile-based payment systems can be considered as a preventive health behavior, which helps to contain the chance of getting affected with Covid-19 virus. As the usage of remote payments is becoming inevitable in the context of pandemic, the study considers perceived threat including perceived susceptibility to and perceived severity of COVID-19 along with perceived self-efficacy as the antecedents of expectation confirmation of mobile payments adoption and usage. Perceived susceptibility is defined as “a persons’ view of the likelihood of experiencing a potentially harmful condition” and perceived severity is referred as “how threatening the condition is to the person” (Champion, 1984). Perceived self-efficacy is viewed as “the conviction that one can successfully execute the behavior required to produce the outcomes” (Bandura, 1997).

Researchers have used HBM to examine health-related behavior in various contexts. McArthur *et al.* (2018) confirmed ability of HBM constructs in predicting the body mass index among college students. While explaining the decision-making of women with respect to removal of ovaries that may cause cancer, Herrmann *et al.* (2018) confirmed that the HBM constructs, namely, perceived severity, perceived susceptibility, perceived barriers and perceived benefits significantly influence the decision.

The HBM has also been widely applied in technology adoption literature. Technology-based health behavior has been studied by many researchers by adopting the constructs of perceived threat (perceived susceptibility and perceived severity), including (Melzner *et al.*, 2014), who developed an integrated framework by combining HBM, unified theory of acceptance and use of technology (UTAUT) and theory of planned behavior (TPB) to explain factors explaining usage of mobile health applications. Wei *et al.* (2020) examined the factors affecting adoption of fitness mobile applications by integrating the HBM and UTAUT, confirmed the indirect impact of HBM constructs on usage intention through performance expectancy of the application. A meta-analysis study conducted by Zhao *et al.* (2018) confirmed significant impact of HBM constructs, namely, perceived severity and perceived vulnerability on adoption of mobile health application and the relationship was strong among middle aged old aged users. Zhang *et al.* (2019) extended the UTAUT model to study the factors affecting the

usage diabetes management applications and found significant effect of HBM construct of perceived health threat on adoption of technology.

3. Expectation confirmation model

The popular technology adoption theories such as technology acceptance model (TAM) (Davis, 1989), TPB (Ajzen, 1991), theory of reasoned action (Fishbein and Ajzen, 1977) and UTAUT (Venkatesh *et al.*, 2003) are used to explain the adoption behavior. Looking ahead of adoption, the ECM proposed by Bhattacharjee (2001) explains the continuance intention to use an information system (IS). This study explores the significance of continuance intention in mobile-based payments in the post-Covid period using ECM framework.

ECM is one of the seminal research studies, which conceptualized and tested the theoretical model of IS continuance that consider the distinction between IS acceptance and continuance behaviors. The ECM posits that three constructs, namely, expectation confirmation, perceived usefulness and satisfaction precede the continuance intention to use IS.

Confirmation is defined as “the realization of expected benefits from IS use” (Bhattacharjee, 2001).

Perceived usefulness is the extent to which individuals believe that using a particular Information Technology (IT) will enhance their job performance (Davis, 1989).

Oliver (1980) defined satisfaction as “the summary psychological state resulting when the emotion surrounding disconfirmed expectations is coupled with the consumers’ prior feelings about the consumption experience.” Continuance intention is defined as the “degree to which a user intends to continue using the IS (Bhattacharjee, 2001).”

Bhattacharjee (2001) argues that continuance decision is similar to consumers repurchase decision because “both decisions:

- follow an initial (acceptance or purchase) decision,
- are influenced by the initial use (of IS or product) experience and
- can potentially lead to ex post reversal of the initial decision.”

According to the ECM model, once the consumer decided to confirm the acceptance of online banking followed by its usage, they form a perception of the performance of the service. Once the perceived performance exceeds the initial expectations, it will form satisfaction and it leads to the formation of continuance intention to use the service. If the perceived performance is less than the initial expectation it leads to dissatisfaction and discontinuance of usage.

The ECM model and its extensions have been used by several researchers to study the IS continuance in various contexts. Chou *et al.* (2012) empirically validated the ECM model in medical tourism context. Chow and Shi (2014) in their e-learning adoption continuance study extended the ECM with tutor and peer interaction and course design. While investigating the continuance intention of digital book usage, Joo *et al.* (2017) incorporated perceived enjoyment in the ECM framework. Chen *et al.* (2013) and Leung and Chen (2019) integrated the technology readiness concept to ECM for probing mobile service continuance and e-health services continuance, respectively. Mobile data service continuance was studied by Kim (2010) by integrating ECM and TPB together with perceived enjoyment and perceived fee. A meta-analysis study conducted by Ambalov (2018) with 51 studies of ECM framework strongly supported all the ECM hypotheses.

4. Hypotheses development

Scholars have identified various antecedents and factors of mobile payments adoption and continuance intention. In normal situations, (Ligon *et al.*, 2019) reported that demand side factors such as tax concerns and low requirements from the part of consumers to pay digitally are the major reasons for low adoption rate of digital payment services rather than the supply side factors in terms of cost, infrastructure and efficacy to use the technology. Siyal *et al.* (2019) identified, perceived usefulness, perceived benefits and perceived ease of use in conjunction with attitude as the determinants of mobile banking adoption. While understanding the acceptance of mobile payment technology with respect to restaurant transactions, (Ozturk *et al.*, 2017) confirmed the significant effect of utilitarian value, convenience and perceived privacy on the adoption intention. Yu *et al.* (2018) identified trust in mobile payments influence continuance intention through satisfaction. Though the above-mentioned factors are significant and important in predicting the adoption and continuance usage of mobile payments, in this new landscape we have to identify what actually motivate the people adopt the technology and its continuance. Hence, the current study attempts to identify the factors that induce people to adopt and continue mobile-based payments in the context of Covid-19 outbreak.

The study formulates hypotheses based on the integrated framework of HBM and ECM perspectives. Adoption of mobile-based payment can be regarded as preventive health behavior of people to save themselves from the possibility of getting affected with the pandemic through direct and face to face interactions with people. HBM posits that individuals' perceptions about susceptibility and severity of disease leads to initiating a particular course of preventive behavior. The protection motivation theory of Rogers (1975) stated that appraised severity, expectancy of exposure and belief in efficiency of coping strategies impacts adoption of a recommended response through an intervening variable protection motivation. While studying the acceptance of mobile health services, (Sun *et al.*, 2013) tested the effect of perceived vulnerability and perceived severity on technology adoption intention. The term perceived vulnerability is similar to perceived susceptibility in HBM.

Rogers (1995) conceive adoption in to various stages; first stage is the awareness stage and which is influenced by socio-economic characteristics, personnel factors and access to change agents. The second stage is the persuasion stage where the gained knowledge prompts the individual to make personnel judgment about the innovation followed by the decision stage in which the individual will decide to adopt or reject innovation. Finally, he decides to adopt (implementing his decision), which can be also conceived as confirmation, from where he continues his evaluation of innovation and further decides on continuance/discontinuance Rogers (1995). Further, the adoption theory defines adoption as "a choice to accept or reject an innovation" (Straub, 2009). In the similar fashion, confirmation is defined as "the realization of expected benefits from IS use" (Bhattacharjee, 2001). Expectation confirmation theory (Oliver, 1980) conceptualizes confirmation as "the post-decision deviations in meeting ones' expectation from the adoption level." Hence, adoption construct can be conceptualized as confirmation. Humbani and Wiese (2019) also stated that confirmation and adoption can be used as interchangeably because it conceptualizes the experiences after the initial consumption or usage of the product or services. In the present study, confirmation implies adopting of mobile banking services.

While exploring the factors impacting health-related internet usage (Ahadzadeh *et al.*, 2015) incorporated the perceived health risk dimensions, perceived susceptibility and perceived severity with the TAM. In addition to perceived threat, HBM recognizes self-

efficacy (capability to adopt preventive/curative actions) as a critical antecedent of health-related behavior. In this situation, if the individuals are not confident in using technology, technology adoption will not take place. The major technology adoption theories, namely, UTAUT and TPB identified self-efficacy as a crucial construct in technology adoption. Venkatesh *et al.* (2003) explains self-efficacy as the “ability of the individuals to accomplish a particular task.” The social cognitive theory put forwarded by Bandura (1997) states that “when people observe execution of a particular behavior and its consequences, they recollect the sequence of this particular behavior and use this information to guide subsequent behavior.” In the mobile payments context, self-efficacy is defined as “the judgment of ones’ ability to use mobile payments” (Luarn and Lin, 2005). Hence, the present study posits perceived susceptibility to and perceived susceptibility of Covid-19 and perceived self-efficacy to use the mobile payment applications leads confirmation or adoption decision of mobile-based payment applications.

Hence, the study postulates the first three hypotheses as:

- H1.* Perceived Susceptibility to Covid-19 has significant positive impact on adoption/confirmation of mobile-based payments.
- H2.* Perceived severity of Covid-19 has significant positive effect on adoption/confirmation of mobile-based payments.
- H3.* Perceived self-efficacy is positively associated with adoption or confirmation of mobile-based payments.

The people who believe that their health is in risk due to Covid-19, may form higher perception regarding the usefulness of mobile payments that it helps to prevent social contacts. To be more specific, mobile-based payments would help in avoiding physical cash transactions and thereby reduce the likelihood of Covid-19 infection. Dou *et al.* (2017) and Kim and Park (2012) confirmed the significant positive effect of perceived health threat on perceived usefulness of smartphone health technology and health IT for the management of chronic diseases. Hence, the study formulates the following hypotheses:

- H4.* Perceived susceptibility to Covid-19 has significant positive impact on perceived usefulness of mobile-based payments applications.
- H5.* Perceived severity of Covid-19 has significant positive impact on perceived usefulness of mobile-based payments applications.

Based on the ECM framework, the study posits the remaining hypotheses as:

- H6.* Extent of confirmation is positively associated with perceived usefulness of mobile-based payments.
- H7.* Extent of confirmation is positively associated with satisfaction of mobile payments.
- H8.* Perceived usefulness of mobile banking is positively associated with the level of satisfaction of mobile-based payments.
- H9.* Perceived usefulness of mobile banking is positively associated with continuance intention of mobile-based payments.
- H10.* Individuals’ level of satisfaction is positively associated with continuance intention of mobile-based payments.

4.1 Mediation hypothesis

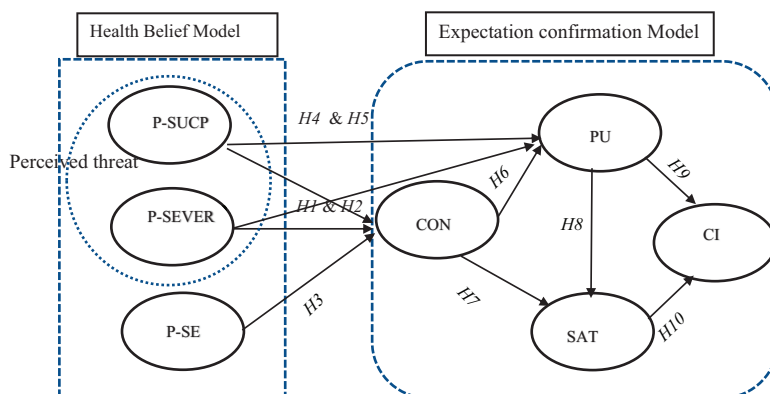
It is important to find whether adoption of mobile payments occurring as a result of perceived health threat could be sustained in long-run. Covid-19 is expected to last for a year or two depending upon the invention and widespread availability of the vaccine. While the threat gets deflated, world will return to daily lives switching to the “new normal,” however there can be lasting impressions that people experienced during the pandemic such as health consciousness/and adoption/continuation of digital modes of transactions inspired by its convenience and other factors. The study intends to verify the effect of threat to health on adoption of mobile payments and also looks into continuance intention via perceived usefulness and satisfaction after initial adoption. Serial mediation analysis was used to check the effect of perceived health threat, on continuance intention of mobile payments through the constructs of confirmation, perceived usefulness and satisfaction. To perform this mediation analysis, we conceptualize perceived susceptibility and severity as a single construct called “perceived health threat” (Figure 1).

H11. The effect of perceived health threat on continuance intention to use mobile-based payment services is sequentially mediated by confirmation, perceived usefulness and satisfaction.

5. Research methodology

5.1 Sampling and data collection

The target population of the study constitutes users of mobile payment services in India since March 2020, as COVID-19 was first detected in India. A self-administered questionnaire containing 25 items along with demographic information was sent to target respondents through online mode and in total 654 valid responses were collected. As the data were collected through online mode with forced entry, the missing data issues were



Notes: P-SUCP: Perceived Susceptibility; P-SEVER-Perceived severity; P-SE-Perceived self-efficacy; CON-expectation confirmation; PU-perceived usefulness; SAT: Satisfaction; CI-continuance intention; CB-Continuance behavior

Figure 1.
The proposed research model

eliminated. The subject of the study constitutes any of the mobile payment or mobile banking application users. Mobile payments are conceived as:

an application or platform, installed on a mobile device (a smart phone or tablet), is used to initiate, authorize and confirm a payment to complete a commercial transaction, such as transferring funds from a payer to a payee or to a merchant over the internet (Liu *et al.*, 2019).

Hence, the current study considers mobile banking, digital payments and digital wallets under the purview of mobile-based payments.

To confirm that the person is a new user, a qualifying question was included regarding the time of adoption of mobile banking/payments. Persons using mobile banking/payments before March 2020 were not included in the study. The time-frame of the study was from March 2020 to May 2020, during the period in which the outbreak of Covid-19 virus started and the country opted to lockdown.

5.2 Measures

The questionnaire of the study was designed in two parts; the first part concerned with demographic details of the respondents and the second part contained 25 items of theoretical constructs assessing the adoption and continuance intention of mobile-based payment applications. In the demographic details, questions on age, gender, education, occupation and pattern and purpose of mobile payment application were extracted. To establish the content validity, all the constructs and their respective items were adapted from the existing literature. The scale of perceived severity and perceived susceptibility to Covid-19 was measured with four items and three items, respectively adapted and modified from (Kim and Park, 2012). The four items measuring perceived self-efficacy was adapted from Boonsiritomachai and Pitchayadejanant (2017) and Venkatesh *et al.* (2003). The items of ECM constructs, namely, confirmation (three items), perceived usefulness (four items), satisfaction (four items) and continuance intention (three items) were adapted from Bhattacharjee (2001).

6. Results

To test the proposed research model, the present study applied structural equation modeling analysis using Amos-23 software. Before proceeding to structural model analysis, the demographic information of respondents is presented. Further, the normality assumption, confirmation of construct reliability and validity using measurement model and results of path analysis are detailed.

6.1 Demographic profile of the respondents

A total of 654 valid questionnaires were completed by mobile banking consumers. Of the total sample size, 54% of the respondents are male and 46% are female. Majority of the respondents belonged to the age group of 25–35 years (35%) followed by the age group of 35–45 years (33%). With reference to the educational qualification, 55% of the respondents are graduates and 38% are postgraduates. With regard to the internet knowledge and experience, cent percent were observed to have sufficient knowledge in internet applications and all of them accessed internet for messaging and social media usage. About 35% of the respondents are using mobile banking at least twice in a week and 29% are frequently using the mobile banking for meeting variety of requirements. Cent percent of the respondents are using mobile banking for online recharge, as well as balance enquiry and mini statement. Among the respondents 99% are using it for fund transfer using real-Time gross settlement system, National Electronic Fund Transfer or Immediate Money Payment Scheme. More

than 50% of the respondents are using mobile banking for online shopping activities and 89 % are using it for online bill payments.

6.2 Data normality

Proceeding with the normality checks, a precondition of structural equation modeling (Anderson and Gerbing, 1988; Byrne, 2016), the study found that skewness and kurtosis of all items used in the research model are within the recommended boundaries of three and eight, respectively, as recommended by Kline (2011).

6.3 Reliability and validity of the measurement model

The construct reliability and validity of the measures was tested using confirmatory factor analysis. Cronbach’s α was used to examine the internal consistency and reliability and standardized regression loadings, composite reliability (CR) and average variance extracted (AVE) were used to assess the convergent validity. To confirm the discriminant validity, the inter-construct correlations and square root of AVE were compared.

Table 1 indicates the value of Cronbach’s α of all the constructs are greater than 0.70 thereby ensuring construct reliability. All items of the constructs are having significant standardized regression coefficients of greater than 0.50; the AVE of all constructs are greater than the threshold limit of 0.5 ranging from 0.583 for satisfaction to 0.813 for self-efficacy; and CR values are higher than the cut-off value of 0.70 and the highest value was obtained for perceived self-efficacy (0.946) and the least value was posted by the construct

Factor	Item	Standardized loading	Cronbach’s α	AVE	CR
Perceived susceptibility	PSCP1	0.763	0.819	0.614	0.826
	PSCP2	0.876			
	PSCP3	0.702			
Perceived severity	PSEV1	0.819	0.897	0.688	0.898
	PSEV2	0.814			
	PSEV3	0.834			
	PSEV4	0.850			
Confirmation	CON1	0.824	0.862	0.678	0.863
	CON2	0.852			
	CON3	0.794			
Perceived usefulness	PU1	0.859	0.860	0.631	0.869
	PU2	0.891			
	PU3	0.823			
	PU4	0.560			
Satisfaction	SAT1	0.701	0.842	0.583	0.848
	SAT2	0.821			
	SAT3	0.819			
	SAT4	0.705			
Continuance intention	CI1	0.841	0.905	0.762	0.905
	CI2	0.899			
	CI3	0.841			
Self-efficacy	SE1	0.907	0.945	0.813	0.946
	SE2	0.938			
	SE3	0.888			
	SE4	0.872			

Table 1.
Construct reliability and convergent validity

perceived susceptibility (0.826) as insisted by Anderson and Gerbing (1988) and Hair (2014) indicating acceptable level of convergent validity.

While comparing the square root of AVE with inter-construct correlation coefficients, it was observed that all the bi-variate correlations are less than the square root of AVE, and hence, establishing the discriminant validity (Fornell and Larcker, 1981) (Table 2).

Finally, the measurement model was evaluated as recommended by Hair (2014). Accordingly, the recommended threshold value of fit indices, namely, goodness of fit index (GFI), comparative fit index (CFI), normed fit index (NFI) and Tucker-Lewis fit index (TLI) should be greater than 0.90 and the cut off level of root mean square error of approximation (RMSEA) and the ratio of χ^2 to degrees of freedom are less than 0.08 and 3, respectively (Anderson and Gerbing, 1988; Hair, 2014). The results of the proposed measurement model revealed a ratio of χ^2 to degrees of freedom = 2.168 ($\chi^2 = 550.792$, $df = 254$); GFI = 0.935; AGFI = 0.917; CFI = 0.973; TLI = 0.968; NFI = 0.951; and RMSEA = 0.042 indicating an acceptable level of model fit for the measurement model.

6.4 Structural model

After examining the measurement model in terms of construct reliability, validity and model fitness, we assessed goodness of fit of structural model using the various fit indices followed by path analysis. The fit indices estimated for the structural model are within their respective boundaries as recommended by Anderson and Gerbing (1988), Hair (2014) and they are as follows: Ratio of χ^2 to degrees of freedom = 2.143 ($\chi^2 = 724.323$, $df = 338$); GFI = 0.925; AGFI = 0.910; CFI = 0.969; TLI = 0.965; NFI = 0.943; and RMSEA = 0.042 indicating that the conceptualized model is adequately fit with the observed data (Table 3).

The 10 hypotheses under study was collectively tested using structural equation modeling analysis. The path analysis revealed that the health belief constructs, namely, perceived severity ($\beta = 0.349$, $SE = 0.039$, $p = 0.000$), perceived susceptibility ($\beta = 0.328$, $SE = 0.049$, $p = 0.000$) and perceived self-efficacy ($\beta = 0.160$, $SE = 0.025$, $p = 0.000$) significantly impacts adoption or confirmation of mobile banking usage and these three constructs together explain 44% variation in adoption or confirmation. Perceived susceptibility ($\beta = 0.125$, $SE = 0.056$, $p = 0.026$) and perceived severity ($\beta = 0.165$, $SE = 0.046$, $p = 0.000$) also influence perceived usefulness. The study further validates and confirms all the ECM hypotheses. The confirmation/adoption influences the perceived usefulness ($\beta = 0.434$, $SE = 0.058$, $p = 0.000$) along with perceived susceptibility to disease and

Latent constructs	CI	PSEV	PSUCP	CON	PU	SAT	SE
CI	<i>0.873</i>						
PSEV	0.296	<i>0.829</i>					
PSUCP	0.229	0.314	<i>0.784</i>				
CON	0.418	0.538	0.458	<i>0.824</i>			
PU	0.415	0.418	0.339	0.540	<i>0.794</i>		
SAT	0.609	0.430	0.351	0.606	0.550	<i>0.764</i>	
SE	0.284	0.325	0.263	0.423	0.331	0.354	<i>0.902</i>

Table 2. Discriminant validity

Notes: Diagonal values in italic are square root of AVE; off-diagonal values are inter-construct correlation coefficient

perceived severity of disease and R^2 value extracted for perceived usefulness is 32.9%. The confirmation ($\beta = 0.390$, $SE = 0.043$, $p = 0.000$) and perceived usefulness ($\beta = 0.242$, $SE = 0.038$, $p = 0.000$) together predicts customer satisfaction ($\beta = 0.390$, $SE = 0.043$, $p = 0.000$) and the R^2 value extracted for satisfaction was 45.1%. Ultimately, the continuance intention to use mobile banking was significantly predicted by perceived usefulness ($\beta = 0.132$, $SE = 0.053$, $p = 0.013$) and satisfaction ($\beta = 0.789$, $SE = 0.076$, $p = 0.000$) and they collectively explain 38.4% variance in continuance intention (Figure 2).

6.5 Mediation analysis

To test the indirect effect of perceived health threat on continuance intention (H11), a serial mediator model with three mediators was proposed. In this model, confirmation, perceived usefulness and satisfaction in sequence acted as mediators for the effect of perceived health threat on continuance intention. The direct effect of perceived health threat on continuance intention was found insignificant, while the indirect effect was significant, which suggests the presence of full mediation. The results are presented in Table 4 and Figure 3 depicts the validated serial mediation model.

The serial mediator model tested seven indirect effects and all are significant except for path, which contains the indirect effect of perceived health threat on continuance intention through confirmation/adoption. The serial mediation effect of perceived health threat on continuance intention through confirmation and satisfaction posted the highest indirect effect ($\beta = 0.1058$, $SE = 0.0209$, $CI95 [0.0676$,

Table 3. Results of path analysis

Hypothesis	β	SE	CR	P value	Decision
Perceived severity → confirmation	0.349	0.039	8.96	0.000	Supported
Perceived susceptibility → confirmation	0.328	0.049	6.73	0.000	Supported
Perceived self-efficacy → confirmation	0.159	0.026	6.19	0.000	Supported
Perceived severity → perceived usefulness	0.165	0.046	3.58	0.000	Supported
Perceived susceptibility → perceived usefulness	0.125	0.056	2.23	0.026	supported
Confirmation → perceived usefulness	0.434	0.058	7.54	0.000	Supported
Confirmation → satisfaction	0.390	0.043	9.03	0.000	Supported
Perceived usefulness → satisfaction	0.242	0.038	6.45	0.000	Supported
Perceived usefulness → continuance intention	0.132	0.053	2.50	0.013	Supported
Satisfaction → continuance intention	0.789	0.076	10.4	0.000	Supported

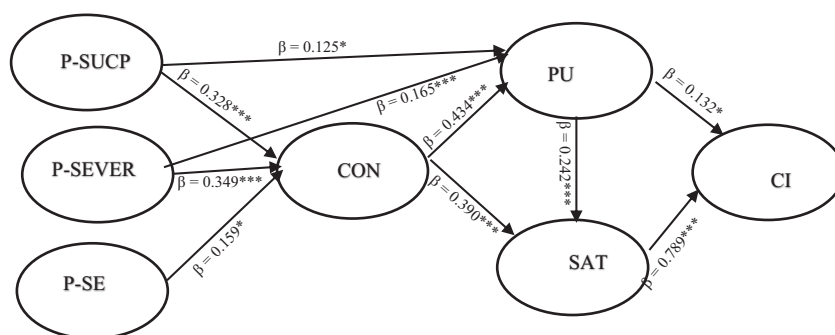


Figure 2. Validated research model

0.1500]. Further, indirect effect of perceived health threat on continuance intention through three mediators, namely, confirmation, perceived usefulness and satisfaction in series is also found significant ($\beta = 0.0318$, $SE = 0.0091$, $CI95 [0.0170, 0.0521]$). The results conclude that peoples' perception regarding probable health threat leads to adoption of mobile-based payment applications and once they started using the service, they form perceptions regarding service performance. The perceived usefulness of the service effects customer satisfaction and ultimately creates continuance intention to use the service.

7. Discussions

7.1 Major findings

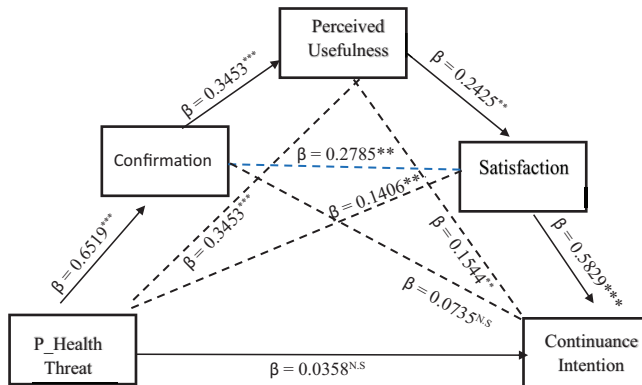
The current research validates an integrated framework of HBM and ECM to explain the adoption of mobile payments/banking as social distancing mechanism during the outbreak of a pandemic and furthering of continuance intention to use confirming the usefulness and satisfaction. The statistical analysis and empirical findings supported all hypotheses proposed under study.

All the associations related to HBM constructs, *H1*, *H2* and *H3* hypothesizing the association of perceived susceptibility, perceived severity and self-efficacy on confirmation/ adoption of mobile-based payment services were supported. These three factors together

Table 4. Serial mediating effect of confirmation, perceived usefulness and satisfaction on the relationship between perceived health threat and continuance intention

Effect	B	SE	CI 95
Total effect of PHT on CI	0.4158***	0.0515	[0.3148, 0.5169]
Direct effect of PHT on CB	0.0358 ^{N.S.}	0.0553	[-0.0728, 0.1443]
Total indirect effect (Bootstrap)	0.3801***	0.0592	[0.2644, 0.4958]
Indirect effect paths	β (SE)	CI95	Mediation Supported?
PHT → CON → CI	0.0479 (0.0338)	[-0.0192, 0.1140]	Not supported
PHT → PU → CI	0.0406 (0.0169)	[0.0105, 0.0774]	Full mediation
PHT → SAT → CI	0.0819 (0.0334)	[0.0212, 0.1532]	Full mediation
PHT → CON → PU → CI	0.0348 (0.0150)	[0.0088, 0.0678]	Full mediation
PHT → CON → SAT → CI	0.1058 (0.0209)	[0.0676, 0.1500]	Full mediation
PHT → PU → SAT → CI	0.0372 (0.0111)	[0.0179, 0.0614]	Full mediation
PHT → CON → PU → SAT → CI	0.0318 (0.0091)	[0.0170, 0.0521]	Full mediation

Figure 3. Indirect effect of perceived health threat on continuance intention through confirmation, perceived usefulness and satisfaction



explained 46% variation in confirmation of adoption of mobile based payments payments. The magnitude of effect of HBM constructs on adoption/confirmation was highest for perceived severity followed by perceived susceptibility and self-efficacy. Possible reason for the high level of perceived severity among the people is the effect of information of Covid-19 from across the world, particularly regarding its massive spread and death toll. Further, complete lockdown imposed in India for 51 days has created a disturbing perception of the severity of the disease among the people. Lockdown in varied levels continue to impose depending on the social spread of the disease. The severity of Covid-19 and high level of susceptibility leads to adoption of mobile payment services that help in avoiding handling of physical cash while performing a transaction, which may restrict the spread of the virus. The finding confirms that during this pandemic period, the perceptions regarding the health threat or health risk along with the self-efficacy leads to adoption of mobile-based payments, as it is viewed as a preventive health behavior in the Covid-19 context. As the Covid-19 is a recent occurrence, a study of the effect of HBM on mobile payments adoption and continuance intention in the context of Covid-19 outbreak is novel. [Dou et al. \(2017\)](#) also come up with similar finding that perceived severity and perceived susceptibility together with self-efficacy influence technology adoption in the mobile health adoption context.

Simultaneously, the relationship between perceived severity and perceived susceptibility to the perceived usefulness of mobile payments were also confirmed as hypothesized in *H4* and *H5*. People who perceive greater benefits from mobile payments may believe that adoption of the same would help them in preventing the probability of getting affected with Covid-19 disease by replacing the physical banking and cash transactions. The findings are in consistent with [Wei et al. \(2020\)](#), who found that perceived threat of weight loss induce higher level of usefulness among people to use mobile fitness applications.

The results of path analysis are in accordance with the ECM that continuance intention is significantly predicted by satisfaction and perceived usefulness, which is, in turn, predicted by confirmation of expectation about mobile-based payments. The results further indicated satisfaction as the strongest predictor of continuance intention ($\beta = 0.789$, $SE = 0.076$, $p = 0.000$) followed by perceived usefulness ($\beta = 0.0.132$, $SE = 0.053$, $p = 0.012$). The satisfaction and continuance intention link has been validated by prior researchers such as [Pereira et al. \(2015\)](#), [Rahi et al. \(2019\)](#) and [Silic and Ruf \(2018\)](#) in internet banking context, e-learning contexts and financial advisory services, respectively. However, the findings contradict the result of [Talwar et al. \(2020\)](#), who could not confirm the empirical relationship between dissatisfaction and continuance intention to use mobile payments. From the result, it could be inferred that, the confirmation of consumers' expectation enhances the perceived usefulness and consumer satisfaction with respect to mobile-based payments. The study also established the significant positive relationship of perceived usefulness and satisfaction ($\beta = 0.242$, $SE = 0.038$, $p = 0.000$) in contrast with the studies of [Bhattacharjee et al. \(2008\)](#), [Bhattacharjee and Lin \(2015\)](#) that failed to establish this relationship. However, the meta-analysis study of [Ambalov \(2018\)](#) validated the effect of perceived usefulness on satisfaction substantiating the result of current research. The level of satisfaction would be high among the consumers who perceive mobile banking is highly useful. These perceptions of usefulness induce the user to derive satisfaction leading to continuance intention, thus, resulting in continuance in mobile banking usage. Hence, we validate the next five hypotheses (ECM hypotheses) of the study, *H6* to *H10*. It is to be noted that among the ECM

hypotheses, the strongest relationship was observed between satisfaction and continuance intention ($\beta = 0.789$) while the perceived usefulness and continuance intention path exhibited the weakest beta coefficient ($\beta = 0.132$). Several researchers including [Mouakket \(2015\)](#), [Oghuma et al. \(2016\)](#) validated similar result in ECM framework in various contexts such as facebook and mobile instant message. In addition, a meta-analysis study conducted by [Ambalov \(2018\)](#) strongly supported and validated all the ECM hypotheses.

To understand the indirect effect of perceived health threat on continuance intention to use mobile-based payments, we tested and validated a serial mediation hypothesis, which states that perceived threat indirectly influence continuance intention through expectation confirmation, perceived usefulness and satisfaction in sequenc was also supported. The mediation results indicate that the direct effect of perceived health threat on continuance intention is insignificant while the indirect effect is significant implies full mediation, and thus, support hypothesis *H11*. From the empirical results, it could be inferred that though perceived health threat of Covid-19 leads to adoption of mobile-based payment services to reduce physical cash dealings, it is not sufficient enough to create continued usage of the service. Continuance intention depends on service performance and if performance is as expected, the customer will be satisfied and further develops an intention to continue the usage of mobile payment services.

7.2 Implications to practice

The current study integrated the HBM and ECM to explain how the policymakers can induce people to adopt and continue the usage of mobile-based payments as an alternate to physical cash and bank transactions to prevent the spread of Covid-19 virus. The study identified and confirmed the effect of perceived severity, perceived susceptibility and perceived self-efficacy on the confirmation or adoption of mobile-based payment services. In the event of increasing spread of the disease in post-lockdown, health workers could organize awareness campaigns to boost adoption so as to maintain social distancing. Service providers should focus on mechanisms to enhance the self-efficacy of consumers to induce the adoption and usage.

As the disease spread is expected to continue for a quite long period, to maintain the social distancing by evading physical cash transactions, the continued usage of the mobile-based payments has to be ensured. The study identified and confirmed the ECM factors as the motivators of continuance intention to use mobile-based payments. Hence, the confirmation of consumers' expectation about the mobile payment services may create better perception about the service performance. If the performance is as expected or higher, it leads to customer satisfaction and intention to continue the usage. So, by enhancing the usefulness of mobile payments by including more features and services, the service providers including bankers and payment companies can influence customer satisfaction and thereby develop continued usage of the service.

To widen the coverage of mobile payments as a preventive health behavior in the Covid-19 context, the banks and other service providers can frame strategies on the basis of the findings of the current study. It helps the bankers and payment companies to enhance the service adoption rate and retain the consumers by nurturing continuance intention.

7.3 Limitations and future research

The scope of the current study is limited to the Covid-19 context or related chronic diseases in which social distancing and avoidance of physical contacts remains as major preventive mechanisms.

Second, prior researchers (Chiu *et al.*, 2017; Lin *et al.*, 2014; Lu *et al.*, 2011; Yu *et al.*, 2015) have found that trust in mobile-based financial transactions such as online banking, mobile payments and mobile banking are crucial in determining the adoption of mobile payment transactions. Trust in mobile-based payment transactions is significant because it needs the involvement of a third party in the financial transactions between banker and the customer. Hence, trust is considered as a significant predictor of adoption and continuance intention. As the current research did not capture the construct trust, a direction to future research is to incorporate the trust in mobile payments into the present research model.

8. Conclusion

The present study supported the existing literature of HBM that perceived threat of Covid-19 comprising perceived susceptibility and perceived severity in conjunction with perceived self-efficacy can operate as determinants of adoption of a preventive behavior. Covid-19 pandemic has created unprecedented concerns among the public in relation to the virus transmission through exchange of cash and plastic money including debit and credit cards. In this situation, use of contactless payments including mobile-based payment system helps in prevention of pandemic, and hence, adoption of mobile payment is considered as a preventive health behavior. By integrating HBM and ECM, the current research provided and insight that the perceived severity and susceptibility can induce mobile payments adoption. Further this can be converted to continuance intention through perceived usefulness and satisfaction. The study recommends conducting awareness campaigns on health threats of Covid-19 disease for promoting the role of mobile payments in containing the disease spread by adopting preventive health behavior. The study reiterates the need for nurturing self-efficacy among consumers to use the service through online financial literacy programs and other promotion programs. Finally, to develop continuance intention to use mobile payment services, the study suggested for enhancing the service performance by adding more features and services in a single platform.

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