



Why do people continue using mobile wallets? An empirical analysis amid COVID-19 pandemic

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Abstract

This paper aims to formulate and test a comprehensive model by integrating the strengths of the TAM and IS success model and the addition of two constructs, namely promotional offers and situational influence, to explain the continued usage intention of mobile wallets. Using an online survey, data were gathered from 588 mobile wallet users who had prior experience using mobile wallets for more than six months. The data were examined using the partial least square-structural equation modelling to investigate relationships between variables and test the hypothesised model. The proposed model disclosed 62.6% of the variance in continued usage intention. The situational influence of COVID-19 emerged as the strongest predictor, followed by satisfaction. This study offers valuable insights to service providers and policymakers involved in executing and deploying mobile wallet services. For academicians, this research presents a comprehensive framework that investigates the continued usage of mobile wallets.

Keywords Mobile wallets · Continuance intention · COVID-19 · Technology acceptance model (TAM) · Information systems success model

Introduction

Mobile wallets have become increasingly popular every year since their inception in India. The availability of smartphones at a bargain price coupled with low-cost Internet data plans paved the way for the mobile wallet revolution. India recorded more than 25 billion real-time remittances in 2020, the largest globally, beating even China (Chadha 2021). Further, unified payments interface (UPI) helped accelerate the adoption rate of mobile wallets, processing 38 billion transactions totalling 226 billion USD during the calendar year 2021 alone (Panda 2022). However, COVID-19 fuelled it to greater heights as social distancing became the norm and buyers and vendors favoured contactless payments.

Over time, the way people pay for goods and services has changed, and specific industries would not even exist if not for online payment solutions, particularly mobile wallets. A cashless society is safer from robberies as the retailers have less cash to keep on their premises, while the customer has the advantage of various ways to pay (Most Preferred Payment Methods in India 2022). Integrating mobile wallets into the payment infrastructure of e-commerce and online marketplaces enabled seamless and swift transactions (Monteiro 2021). These businesses offer a plethora of additional services through mobile wallets, such as loyalty schemes, discount coupons, and cash backs. Such promotional offers contribute to repeated shopping in online marketplaces and more customer engagement in mobile wallets (Pomford 2022).

Further, the Reserve Bank of India (RBI) has issued a framework to allow transactions of negligible value in offline mode, which will augment the number of transactions (Mundhra 2022) and mitigate the burden on a bank's system resources. The digital payments firm, Pine Labs, observed that the RBI had created robust structures and security controls to empower customers to use electronic remittance systems with trust (Faridi 2022). Secure online payments have become a critical issue, and safeguarding customers

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against cyber-attacks has become crucial for service providers, increasing the demand for payment solutions (Payment Security Market 2021). Likewise, a flexible and customer-centric service results in the large-scale adoption of mobile wallets (Pomford 2022). Secure and prompt service leads to customer trust, resulting in the continued usage of mobile wallets.

COVID-19 has had a devastating impact worldwide, including in India, and it is here to stay at least during the near future. Its repercussions are unfathomable, particularly in industries that rely on personal interactions, such as restaurants, entertainment, and accommodation. In this scenario, mobile wallets facilitate non-cash transactions through contactless payments, reducing consumers' anxiety (Saraswati et al. 2021). Consequently, mobile wallets can benefit both customers and merchants as it helps to avoid physical contact, which is the only strategy to help contain the spread of COVID-19. However, little empirical work has been done to assess the effects of COVID-19, promotional offers, and the mediating effect of trust on mobile wallet usage. Therefore, the study addresses three research questions. First, what is the extent to which the situational influence of COVID-19 affects the continuance intention of mobile wallets? Second, do promotional offers push users to use mobile wallets repeatedly? And finally, does trust mediate the relationship between continued usage intention and mobile wallets' security and service quality? Our objective is to examine how the constructs of technology adoption and the situational influence of COVID-19, promotional offers, and trust drive the continued usage intention of mobile wallets. Accordingly, we intend to formulate a comprehensive model founded on prior technology acceptance and newly identified constructs. Therefore, this research is a significant step in enabling service providers and policymakers to determine the elements that affect the continued usage of mobile wallets.

The remaining sections of the paper are organised as follows. The second section consists of the theoretical background, followed by literature review, research hypotheses, and the proposed model in the third. The fourth section consists of research methodology, succeeded by presenting quantitative data in the fifth. The findings are scrutinised in the following section. The implications are outlined in the seventh section, and the final part discusses limitations and instructions for future researchers of the topic.

Theoretical background and terminology

The existing theories and models, in particular the diffusion of innovation (DOI), theory of planned behaviour (TPB), technology acceptance model (TAM) 1 and 2, and unified theory of acceptance and use of technology (UTAUT), are

widely used and have produced valuable insights into the behavioural responses of individuals towards a new, disruptive technology (Hillmer 2009). Further, DeLone and McLean (2003) revised the information systems (IS) success model, asserting that information quality (IQ), system quality (SYQ), and service quality (SQ) affect usage intention through satisfaction (SA). Though these models explained behavioural intention (BI) and usage exceptionally, Chandra et al. (2010) put forward a trust-theoretic model that integrated trust (TR) and its antecedents to the m-payment situation. Accordingly, the current study has employed the structural framework of prior models and expanded it, using promotional offers (PO) and situational influence (SI) as two new constructs.

TAM and UTAUT

TAM and UTAUT are two principal frameworks defining individuals' BI towards innovative technology. TAM, proposed by Davis (1989), suggests that perceived usefulness (PU) and perceived ease of use (PE) are fundamental determinants of user acceptance. Later, UTAUT was developed, which was further extended to create the UTAUT2 (Venkatesh et al. 2012). Among them, only PU and PE provided consistent results in adopting new technology. Social influence on BI was identified as inconsiderable in studies related to mobile wallets (Chopdar and Sivakumar 2019; Shin 2009; Singh and Srivastava 2018). Likewise, hedonic motivation, price value, and facilitating conditions were inconsequential in predicting the BI to adopt m-payments (Slade et al. 2015). Nevertheless, the explanatory power of PU and PE in TAM and UTAUT has been tested successfully all the same by adding relevant constructs such as TR (Shin 2009) and perceived security (PS) (Schierz et al. 2010; Swilley 2010) as extensions.

IS model

The IS success model, later updated, explains that SYQ, IQ, and SQ affect SA and usage intention, leading to a personal and organisational impact (DeLone and McLean 2003). It has been used substantially to predict the adoption of numerous novel technologies. Zhou (2013) integrated TR into the IS success model to investigate the continued usage intention (CUI) of mobile payment technologies, while Gao et al. (2015) performed an identical study in the context of mobile purchases. More recently, Alghamdi and Basahel (2021) used the IS success model to study the CUI of mobile payment by integrating COVID-19 as a moderating variable. Considering SYQ coincides with PE and IQ coincides with PU conceptually, it prompted us to integrate only SQ and SA into our model.



Mobile wallets and related terms

The critical component distinguishing mobile wallets from other payment methods is the mobile device, i.e. the smartphone used to transfer monetary value. Mobile payment represents all payment solutions using smartphones, such as mobile banking, NFC-enabled payments, and mobile wallets. In this study, we focus on mobile wallets only. We exclude mobile banking applications since they are a gateway to a customer's bank account. Most banks have their own independent mobile wallet application and mobile banking application.

A mobile wallet is a mobile payment application that has the functionality to replace a conventional wallet by making payments and storing membership, loyalty, and travel cards. They also store personal and sensitive information such as passport details, credit card information, online shopping accounts, and PIN codes in an encrypted form (Shin 2009). Customers can also use mobile wallets to make remote and proximity payments. While remote payments can be effected independent of the user's location, proximity payments are performed locally whereby the mobile device communicates with the point of sale terminal using near-field communication technologies or by scanning a QR code (Chandra et al. 2010).

Literature review and hypotheses development

Perceived usefulness and perceived ease of use

PU and PE are two of the most important predictors of BI. Davis (1989) defined PU from an organisational point of view as "the degree to which a person believes that using a particular system would enhance his or her job performance", while PE is defined as "the degree to which a person believes that using a particular system would be free of effort". He also suggested that PE may be more of a precursor to PU than a direct determinant of usage.

PU is an essential determinant of continued information technology usage intentions (Thong et al. 2006). It was also found to positively affect the usage intentions in the mobile wallet framework in numerous contemporary studies (Chawla and Joshi 2019; Singh and Sinha 2020; Wu et al. 2017). Notwithstanding, PU affected SA in IT continuance (Thong et al. 2006) and mobile wallet usage (Kumar et al. 2018). If a mobile wallet is user-friendly, it is natural that it will increase its usefulness. PE was found to significantly affect PU in numerous and diverse fields of information technology, not to mention mobile wallets (Chawla and Joshi 2019). As a result, the ensuing theories are proposed:

H1: PE positively affects the PU of mobile wallets.

H2a: PU positively affects the SA of using a mobile wallet.

H2b: PU positively affects the CUI of mobile wallets.

Trust

Even in the face of considerable leaps in security technologies, numerous reports have revealed many frauds, leading many to distrust mobile wallets, thereby hindering their growth. TR is an emotional state where one trusts another subject to the satisfactory behaviour of the other (Singh and Sinha 2020). Wei et al. (2009) define TR as how individuals believe that using a particular technology is safe and poses no harm to privacy. Likewise, building trust in a service provider provides a compelling experience for mobile wallet users; lacking it can lead to an undermined experience (Zhou 2013).

Empirical studies have revealed that TR is an essential determinant of the inclination to use mobile data services (Lu et al. 2008), online shopping (Wen et al. 2011), m-banking (Hanafizadeh et al. 2014), m-commerce (Wei et al. 2009), Internet banking (Alalwan et al. 2015), and numerous other fields of technological innovations. Ondrus and Pigneur (2006) posit that as regards payment solutions, a high level of TR is an essential requirement since fraudulent activities are frequent and involve an element of financial risk. TR proved to be among the most important predictor of intention in the mobile wallet context (Chawla and Joshi 2019; Shaw 2014; Shin 2009; Singh and Sinha 2020; Zhou 2013). Likewise, TR was a significant determinant of SA in numerous studies associated with mobile wallets (Cao et al. 2018). Consequently, the following hypotheses are recommended:

H3a: TR positively affects the SA of using a mobile wallet.

H3b: TR positively affects the CUI of mobile wallets.

Service quality

SQ results from the consumer comparing expected service with perceived service. Accordingly, it examines the disparities between customer expectancies and actual service (Parasuraman et al. 1985). A customer will be satisfied if the service provided is superior to the expected benefit. Since service is intangible, it is arduous for a business to understand how consumers perceive their service. Unless a service provider can understand how a customer evaluates their service, they will not be able to influence these evaluations. The success of an e-commerce business is predominantly dependent on electronic SQ (George and Kumar 2014).



Gefen (2002) suggests that despite the lack of a human service provider, SQ leads to increased TR as regards e-commerce. Similarly, Gao et al. (2015) established that SQ significantly affected TR when purchasing through smartphones. Several researchers also suggested that SQ must be improved to ensure TR (Liu et al. 2011). As a result, we propose that SQ affects TR positively.

H4: SQ positively affects TR in mobile wallets.

Promotional offers

When launching a novel technology, most businesses offer PO as a sales incentive to cost-sensitive customers (Sunny and George 2018). The benefits provided for downloading and using mobile wallets, such as value-added services and other incentives, have a substantial effect on developing the users' attitudes towards mobile wallets and increasing the intention to use mobile wallets (Aydin and Burnaz 2016). The entry of new mobile wallet service providers has increased the competition in the mobile wallet scenario, and PO could become the main distinguishing factor (George and Sunny 2021).

Cashbacks and rewards, along with the absence of transaction fees, were found to be the primary rationale behind the adoption and usage of mobile wallets in a study conducted in the national capital of India (Bagla and Sancheti 2018). PO was found to considerably affect the adoption of m-shopping (Madan and Yadav 2018) and mobile wallets (Madan and Yadav 2016). As a result, the following hypothesis must be tested:

H5: PO positively affect the CUI of mobile wallets.

Perceived security

Shin (2009) defines PS in mobile payments as "the degree to which a customer believes that using a particular mobile payment procedure will be secure". Further, it is defined as how confident people feel that their valuables and personal information are safe when using a mobile wallet (Fan et al. 2018). PS is of utmost importance when transacting money through electronic mediums, and it was one of the fundamental stumbling blocks to mobile banking adoption (Singh and Srivastava 2018). A high-security perception instilled TR among students using mobile cloud storage services (Arpaci 2016). It was revealed that PS favourably affected TR while using e-government services (Alharbi et al. 2017).

PS was found to affect TR positively, signifying that when users have a favourable impression of mobile wallet security, they are likely to TR mobile wallets (Fan et al. 2018). It was empirically tested and proved to be factual from the perspective of an Indian mobile wallet user asserting the

significance of security on TR (Kumar et al. 2018). Therefore, this research argues that PS affects TR positively.

H6: PS positively affects TR in mobile wallets.

Situational influence

Ross and Robertson (2003) define situational factors as "all factors that do not relate to the decision-maker as an individual or to the decision alternatives" (Nguyen et al. 2020). Such factors play an essential role in moulding the actions of an individual. These factors can increase or decrease the usage of mobile wallets. In this context, COVID-19 seems to be a situational factor affecting the use of mobile wallets ("COVID-19 accelerates mobile wallet adoption" 2021). Accordingly, this is an opportune moment to research this matter under discussion.

Internal and external situational factors can influence a person's decision-making process. The SI of COVID-19 had a significant and positive impact on buying books on the Internet (Nguyen et al. 2020). The pandemic has affected how people transact with others, and "contactless" has become the norm, especially while making payments, as transacting using physical cash can transmit the contagious virus. Hence, the following hypothesis must be tested:

H7: SI positively affects the CUI of mobile wallets.

Satisfaction

Generally, customer SA is a feeling or judgement by customers towards a product or service when they have used it. In service industries, it has been addressed in two ways: as a function of disconfirmation and perception (Mohammed and Ward 2006). A consumer's SA level depends on the consumer's initial expectations of a product or service and the disparity between the assumptions and the performance of that product or service (Thong et al. 2006). The anticipation of a customer based on information available online or from word of mouth, or based on others' experience and the extent to which it is met can be referred to as the process of evaluation. SA is crucial in establishing long-term customer relationships apart from winning repeat business (Lee et al. 2008).

SA positively impacts the intention to shop using mobile phones (Agrebi and Jallais 2015; Natarajan et al. 2017) and use mobile banking (Srivastava and Vishnani 2021). It was discovered to be an important factor in explaining the CUI of mobile wallet services in China (Cao et al. 2018), not to mention in India (Singh et al. 2017). Kumar et al. (2018) found SA positively affects mobile wallet CUI from a developing country perspective. Hence, we recommend testing the positive effect of SA on CUI:



H8: SA positively affects the CUI of mobile wallets.

The mediating function of trust and satisfaction

Empirical tests have revealed that TR is a mediator between PS and intention to use Govt. services on the Internet (Alharbi et al. 2017). It was also established that the relationship between SQ and CUI is mediated by TR (Gao et al. 2015; Zhou 2013).

H9a: TR positively mediates the relationship between PS and CUI of mobile wallets.

H9b: TR positively mediates the relationship between SQ and CUI of mobile wallets.

Though many studies have modelled PU and TR as antecedents of SA and CUI, the mediation effect of SA between the two constructs of PU and TR and CUI is scant in the literature. We assert that if a mobile wallet user perceives it as useful and trustworthy, it will positively affect SA, resulting in greater CUI. Hence, the following hypotheses must be tested:

H9c: SA positively mediates the relationship between PU and CUI of mobile wallets.

H9d: SA positively mediates the relationship between TR and CUI of mobile wallets.

Continued usage intention

The survival of information technology depends on its adopters’ CUI of that technology. If the excitement deteriorates following the initial adoption, that technology will undergo decreased usage and subsequently fall into disuse (Thong et al. 2006). Accordingly, CUI is postulated to measure how strongly users believe they will re-use mobile wallet services

or post-adoption behaviour. Premised on the relationships established in the previous sections, we tender a research model as outlined in Fig. 1 to be tested solely against mobile wallet usage.

Research methodology

Population and sample of the study

A structured questionnaire was devised using Google forms and distributed among mobile wallet users in Kerala. Snow-ball sampling approach was used since it helps achieve a large sample size in a relatively small time frame (Kosinski et al. 2015). The data were accumulated for two months over the course of COVID-19 pandemic, from August 2020 to September 2020. The link to access the survey was sent through e-mail and other social media channels. The initial respondents were urged to forward it to as many as possible to obtain a large sample size. A total of 650 responses were received, among which 62 respondents had a mobile wallet usage experience of fewer than six months. The remaining 588 responses were used for the present study while assuring the respondents of the confidentiality of their feedback. The sample size in this study comfortably exceeded the rule of thumb of ten times the largest number of structural paths directed at a specific construct in the structural model (Hair et al. 2014). The descriptive statistics are given in Table 1.

Measures

The questionnaire was prepared in English and had two sections. Section 1 consisted of demographic questions, while Sect. 2 consisted of several items to measure the constructs of the study. The research includes nine constructs, each being measured using multiple items adapted from the

Fig. 1. Research model

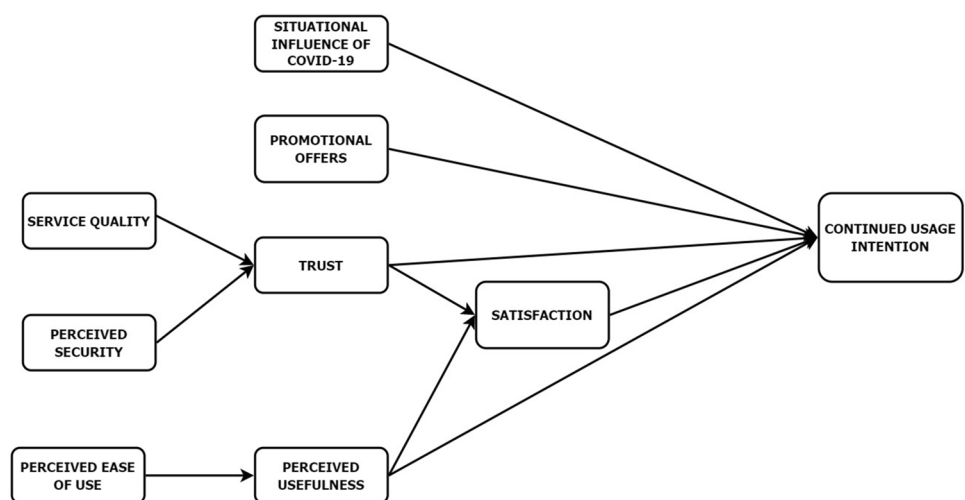


Table 1 Descriptive statistics of respondents. *Source:* Authors' survey

Demographic variable	Groups	Frequency	Percentage
Gender	Male	332	56.5
	Female	256	43.5
Age	18–28	298	50.7
	29–39	190	32.3
	40–50	68	11.6
	51 and above	32	5.4
Highest level of education	Undergraduate	183	31.1
	Professional Degree	195	33.2
	Post-graduate	210	35.7
Profession	Student	136	23.1
	Self-employed	152	25.9
	Employee	236	40.1
	Business	64	10.9
Monthly income	Up to 30,000	288	49
	30,001–60,000	140	23.8
	60,001 and above	160	27.2

extant literature and modified to fit the context. The study was conducted in two stages, with stage 1 being a pilot study to refine the questionnaire to remove any issues regarding clarity or understandability. Few items were modified based on the comments received after the pilot study. Also, the survey adopted a five-point Likert scale ranging from “1” signifying “strongly disagree” to “5” meaning “strongly agree”. Appendix documents the measurement items and their respective sources.

Data analysis and procedure

PLS-SEM

Structural equation modelling (SEM) is a statistical technique for testing and assessing causal relations and has the potential to distinguish between structural and measurement models. Partial least square-structural equation modelling (PLS-SEM) employing Smart-PLS 3 was used in this study as it is a variance-based technique. It is also proficient in testing mediation by employing the bootstrapping approach. PLS-SEM is not sensitised to small sample sizes, and the thumb rule proposed by Gefen et al. (2000) is considered to determine the adequate sample size. Social sciences research employs PLS-SEM to efficiently handle sample size and normality concerns while testing complicated structural models (Hair et al. 2014). It also includes the twofold investigation of the measurement and structural models (Sahibzada et al. 2020a, b).

Measurement model assessment

Assessment of the measurement model ensures that the constructs exhibit acceptable indicator loading, convergent validity (CV), composite reliability (CR), and discriminant validity (DV) and are feasible for further analysis (Sahibzada et al. 2020a, b). The primary step is to examine the loadings of the indicators, and all 41 loadings in this study were higher than the suggested threshold value of 0.60 (Hair et al. 2014). CV is the extent to which the various items under each construct are measuring the same concept and is tested by assessing the CR and the average variance extracted (AVE) for the measures (Chandra et al. 2010; Hair et al. 1998). The CR and AVE of all the constructs are more significant than the recommended values of 0.70 (Field 2005) and 0.50 (Wong 2013), respectively, establishing reliability and CV (Table 2). Moreover, the acceptable limit of Cronbach's alpha (CA) of a construct of 0.7 (Bagozzi and Yi 1988) was also fulfilled. All the constructs had a CA of 0.83 or more, indicating internal consistency and reliability.

Further, DV is established by confirming the guidelines proposed by Fornell and Larcker (1981), wherein the square root of each factor's AVE should be greater than the correlation coefficients between the factor under consideration and other factors. Table 3 exhibits the results of DV. In conclusion, the outcomes of the measurement model indicate that the model qualifies for structural assessment.

Structural model assessment

Following the validation of the measurement model, the proposed hypotheses were tested. The significance of the path coefficients was calculated using a bootstrapping procedure with 5000 samples. Table 4 shows the outcome of the direct relationships between the constructs. The VIF (variance inflation factor) values in Table 2 were below 5, implying the absence of collinearity issues in the data. The R^2 values for SA, TR, and CUI were 0.335, 0.495, and 0.626, respectively. The R^2 values support the model's in-sample predictive power (Sarstedt et al. 2014) since it is above 0.10 (Falk and Miller 1992). The results reveal that the proposed model successfully predicts the CUI of mobile wallets. The findings indicate that all hypotheses barring H1 were supported. SI ($\beta=0.358$, $p<0.001$) was found to have the most significant effect on the CUI of mobile wallets among all constructs. The model is outlined in Fig. 2. Table 5 reports the R^2 values and the predictive relevance of the endogenous variables. The blindfolding technique was used to procure Stone–Geisser's Q^2 values, and the results convey that the model has adequate predictive relevance since the Q^2 values are greater than zero.



Table 2 Item loadings, VIF, reliability, and convergent validity. *Source:* Authors' survey

Constructs	Indicator	Loading	VIF	α	CR	AVE
Perceived ease of use	PE1	0.895	2.329	0.909	0.925	0.712
	PE2	0.792	2.188			
	PE3	0.880	2.974			
	PE4	0.872	2.869			
	PE5	0.772	2.517			
Perceived usefulness	PU1	0.814	2.144	0.879	0.912	0.675
	PU2	0.816	2.591			
	PU3	0.894	3.332			
	PU4	0.801	1.960			
	PU5	0.778	1.946			
Trust	TR1	0.815	2.547	0.916	0.935	0.708
	TR2	0.873	3.671			
	TR3	0.918	4.561			
	TR4	0.875	3.156			
	TR5	0.821	2.285			
	TR6	0.736	1.868			
Promotional offers	PO1	0.871	2.241	0.871	0.920	0.794
	PO2	0.905	2.451			
	PO3	0.896	2.257			
Satisfaction	SA1	0.888	2.241	0.846	0.907	0.765
	SA2	0.821	1.757			
	SA3	0.912	2.606			
Situational influences	SI1	0.881	2.970	0.922	0.941	0.762
	SI2	0.871	2.759			
	SI3	0.874	3.012			
	SI4	0.887	3.115			
	SI5	0.850	2.491			
Service quality	SQ1	0.804	2.336	0.830	0.886	0.661
	SQ2	0.828	2.412			
	SQ3	0.836	1.832			
	SQ4	0.783	1.622			
Perceived security	PS1	0.821	2.011	0.877	0.910	0.670
	PS2	0.700	1.591			
	PS3	0.869	2.476			
	PS4	0.866	2.478			
	PS5	0.826	2.249			
Continued usage	CU1	0.847	2.478	0.909	0.932	0.733
	CU2	0.860	2.592			
	CU3	0.852	2.519			
	CU4	0.879	2.993			
	CU5	0.842	2.477			

Mediation effects

Bootstrapping in PLS-SEM was performed to ascertain the mediating effects since it could be applied to minimal sample sizes despite making no assumption about the sampling distribution (Hair et al. 2014). Table 6 establishes that hypotheses H9a and H9b are supported with full mediation, while hypotheses H9c and H9d are supported with partial mediation.

Discussion

This study is intended to investigate the relationships in mobile wallet usage using the CUI framework in the Indian context. The SI of the COVID-19 pandemic was the most significant predictor of the CUI of mobile wallets. This is consistent with the findings of Ali et al. (2021) and Nguyen et al. (2020), which prove that the SI of COVID-19 drives



Table 3 Discriminant validity (Fornell and Larcker criterion). *Source:* Authors' survey

	CU	PE	PO	PS	PU	SA	SI	SQ	TR
CU	0.856								
PE	-0.057	0.844							
PO	0.487	-0.010	0.891						
PS	0.427	-0.099	0.324	0.819					
PU	0.581	-0.065	0.314	0.298	0.822				
SA	0.590	-0.043	0.405	0.426	0.464	0.875			
SI	0.659	-0.033	0.289	0.377	0.670	0.405	0.873		
SQ	0.453	-0.035	0.370	0.441	0.383	0.352	0.416	0.813	
TR	0.580	-0.082	0.363	0.651	0.437	0.515	0.494	0.527	0.841

Bold elements are the square root of the AVE for each construct

Table 4 Structural model results/outcome of hypothesis (direct relationships). *Source:* Authors' survey

Hypotheses	Relationship	β	SD	<i>t</i> -value	<i>p</i> -value	Decision
H1	PE → PU	-0.065	0.065	0.999	0.159	Not supported
H2a	PU → SA	0.294	0.038	7.713	0.000***	Supported
H2b	PU → CU	0.091	0.040	2.290	0.011**	Supported
H3a	TR → SA	0.387	0.034	11.468	0.000***	Supported
H3b	TR → CU	0.168	0.041	4.059	0.000***	Supported
H4	SQ → TR	0.297	0.033	8.981	0.000***	Supported
H5	PO → CU	0.192	0.031	6.238	0.000***	Supported
H6	PS → TR	0.520	0.033	15.970	0.000***	Supported
H7	SI → CU	0.358	0.045	7.929	0.000***	Supported
H8	SA → CU	0.236	0.036	6.481	0.000***	Supported

*** $p < 0.01$; ** $p < 0.05$

online businesses. Businesses reluctant to accept mobile wallet services were forced to adopt such services to receive contactless payments.

Although there have been numerous studies integrating the TAM and IS frameworks to study the BI to adopt mobile wallets, the integrated framework in this research provides a greater understanding of CUI during the course of COVID-19. Fear of contracting COVID-19 will have a major impact on technology adoption (Al-Marroof et al. 2020), while Rafdinal and Senalasar (2021) established that if the mobile wallet applications are useful, they will result in easy adoption during a pandemic. The significant impact of PU in adopting mobile wallets and their CUI during the pandemic is established in the study adhering to the findings of Daragmeh et al. (2021). Moreover, PU was a substantial determinant of SA, which conforms to the findings of Humbani and Wiese (2019) and Chaveesuk et al. (2022).

SA emerged as a critical factor in predicting the CUI of mobile wallets, signifying that a satisfied mobile wallet user will continue using it, consistent with the findings of Alghamdi and Basahel (2021). Mobile wallet service providers should integrate different payment scenarios such

as QR code payments, UPI payments, recharges, bill payments, and toll payments to enhance the user experience. Further, partnerships with different brands can increase usage of the application and the number of transactions. By providing a broad avenue to make payments for various use cases, the users will not feel the need to use cash anymore. Consequently, the users will be satisfied, and a satisfied user will form positive assessments resulting in CUI. Also, the mediation analysis results in Table 6 indicate that TR fully mediates the relationships between CUI and mobile wallets' PS and SQ. Likewise, SA partially mediated the relationship between CUI and mobile wallets' TR and PU.

Implications

Theoretical contributions

Having studied the various factors influencing the CUI of mobile wallets during the course of COVID-19, our research presents several significant contributions to the existing knowledge. Often, the users sign up for mobile wallet usage



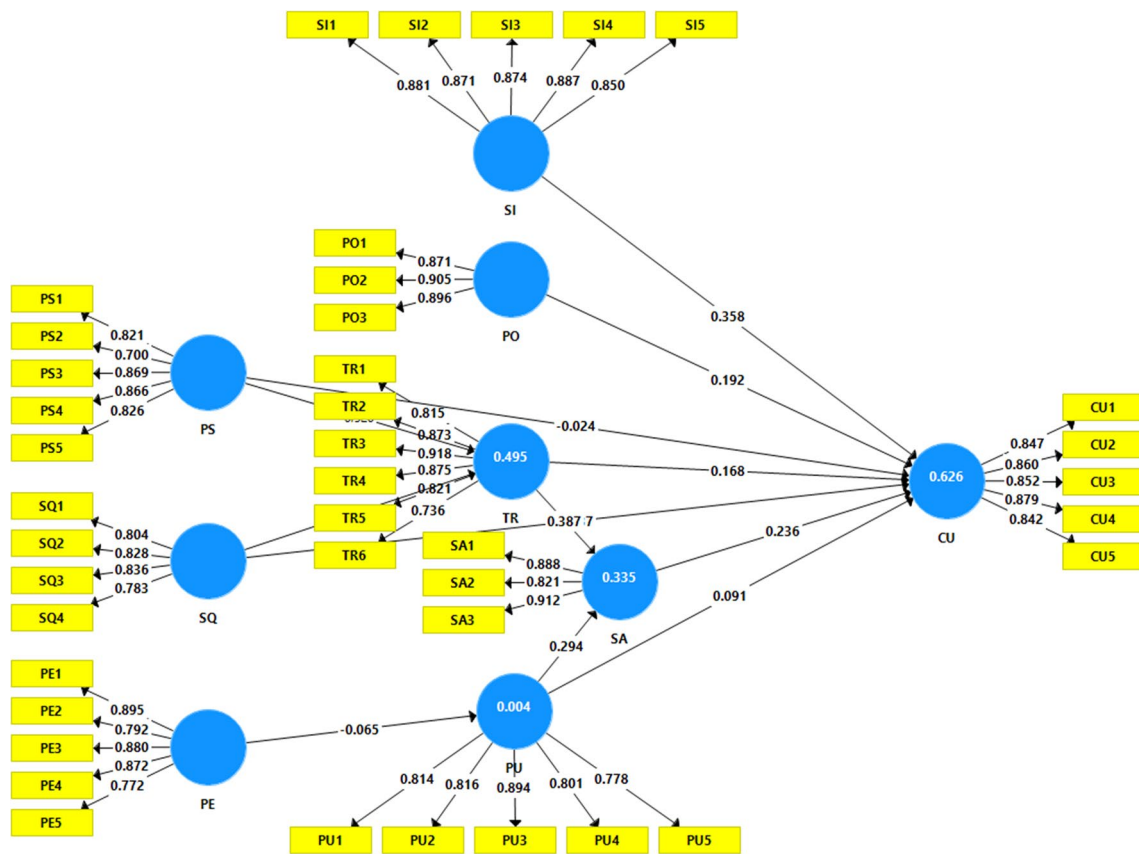


Fig. 2 Path coefficients and their significance

Table 5 Predictive relevance of the endogenous latent construct. Source: Authors’ survey

Endogenous variable	R ²	Q ²
SA	0.335	0.251
TR	0.495	0.348
CU	0.626	0.452

the existing literature by developing an integrated model using TAM, IS model, TR, PO, and SI. This model offers valuable insights into the various direct and indirect relationships between the multiple constructs from the extant literature with its high predictive power. The incorporation of PO and its ability to impact the CUI of mobile wallets is a distinctive contribution of this study. Additionally, no studies integrated the SI of COVID-19 pandemic in the context of mobile wallets. Such a study has meaningful implications for emerging economies like India while considering its colossal population, the untapped user base, and the dangers of the pandemic.

to avail of the sign-up bonus and discontinue its use after a few transactions. Consequently, this study is pivotal and exclusive in unearthing the factors responsible for the CUI of mobile wallets during COVID-19. The study advances

Table 6 Results of mediation analysis. Source: Authors’ survey

	Total effects		Direct effects		Path	Indirect effects		
	Coefficient	p-value	Coefficient	p-value		Coefficient	t-value	p-value
PS—CU	0.111	0.000***	-0.024	0.252	PS-TR-CU	0.088	4.118	0.000***
SQ—CU	0.114	0.000***	0.037	0.104	SQ-TR-CU	0.050	3.356	0.000***
PU—CU	0.161	0.000***	0.091	0.011**	PU-SA-CU	0.069	4.447	0.000***
TR—CU	0.260	0.000***	0.168	0.000***	TR-SA-CU	0.091	5.593	0.000***

***p < 0.01; **p < 0.05



Managerial implications

This study on the CUI of mobile wallet users during the COVID-19 pandemic is relevant for augmenting and reinforcing the clientele of mobile wallet service providers. The SI of the COVID-19 pandemic was the most significant predictor of the CUI of mobile wallets. Service providers can take advantage of COVID-19 to boost the adoption rate of mobile wallets and their CUI. Since mobile wallets eliminate the need to engage with people and surfaces directly, it reduces the likelihood of getting infected by the transmittable virus. Governments, service providers, health workers, and merchants can work hand-in-hand to promote mobile wallets to maintain social distancing and consequently contain its spread through contactless payments.

The study reveals that TR fully mediates the relationship between CUI and mobile wallets' PS and SQ. Enhanced security features and quality service strengthen users' TR in mobile wallets. PS is of utmost importance in building TR, and mobile wallet service providers can use it as a distinguishing feature. Service providers should not be misguided by the rise in the number of people using mobile wallets, as some can be forceful adoption due to the COVID-19 pandemic. They should try to mitigate security concerns by educating consumers on securing their mobile wallets from unauthorised use, fraud, and other potential risks. Secure and reliable applications with encryption, biometric, and two-stage authentication features can enhance the feeling of being protected. Besides, the results also indicate that SQ is an essential element in the usage of mobile wallets after initial adoption. Prompt and professional services should be the hallmark of an excellent mobile wallet service provider. This, combined with personalised services like location-based offers, will result in the CUI of mobile wallets. Failing this, mobile wallets may undergo a sharp decline in their user base once the pandemic is over.

Likewise, TR and PU influence SA and CUI. First, service providers should build TR by providing competent service, prompt transactions, and reliable service. The governments should also bring about regulations to stimulate the development of mobile wallets while ensuring the safety and security of the transactions. The legal frameworks should be conceived keeping the customer's best interests in mind. It will enhance the reputation and goodwill of the service provider. Second, the application's usefulness should be improved through an easy-to-use interface. To improve mobile wallets' usefulness, the service providers should also incorporate more use cases such as wearable device integration, spend analysis, and

bill-splitting. Thus, the PU and TR in mobile wallets make a customer satisfied and content, resulting in CUI. Hence, managers should concentrate on improving PU, TR, and SA because a satisfied customer will have a positive feeling towards mobile wallets, resulting in continuous use.

Also, this study revealed that PO affects CUI significantly. Consequently, service providers should offer PO such as referral bonuses and discounts to induce customers to use mobile wallets frequently. Using mobile wallets frequently will form a habit and contribute towards loyalty to that service provider. Also, service providers should compensate users by giving loyalty rewards to enhance their commitment and usage. Further, joining hands with different brands to offer discount vouchers on their products can increase the time a user spends on the mobile wallet application.

Limitations and recommendations for further research

Though this study broadens our understanding of mobile wallet continuance intention, we also acknowledge its limitations. First, the study was carried out in Kerala, India, and whether the results can be generalised to other parts of the country and other nations needs further investigation. Also, since snowball sampling was used, the sample may not represent the population precisely, which can be rectified by employing alternative sampling methods such as the quota sampling method. Second, mobile banking applications were not included in the study's purview since such applications do not truly represent a mobile wallet. Third, apart from the variables considered in this study, other variables may affect the CUI, viz. hedonic motivation and habit. Hence, such variables should be incorporated to better elucidate the CUI of mobile wallets in the future. Fourth, there is a need to understand different stakeholders' perceptions, such as merchants, network providers, and the government, as each stakeholder has a role to play in the success of novel technologies. Lastly, a longitudinal study should derive more insights concerning CUI as user behaviour changes based on circumstances, especially after the pandemic.

Appendix

Constructs, items, and references



Constructs	Measuring items	References	Constructs	Measuring items	References
Perceived ease of use	PE1—Learning to operate mobile wallets would be easy for me PE2—I would find it easy to get mobile wallets to do what I want them to do PE3—I would find mobile wallets easy to use PE4—It is easy to become skillful at using mobile wallets PE5—My interaction with mobile wallets is clear and understandable	Davis (1989)	Trust	TR1—I trust mobile wallet platforms to be competent and effective in handling my transactions TR2—I trust mobile wallet service providers to keep customer's interests in mind TR3—I trust mobile wallet systems to be reliable and trustworthy TR4—I believe the legal frameworks for mobile wallets are adequate to protect the customers TR5—I believe the mobile wallet service providers have a good reputation TR6—I feel the mobile wallet service providers have a reputation for being honest	TR1—Singh and Srivastava (2018) TR2, TR3—Kumar et al. (2018) TR4, TR5, TR6—Chandra et al. (2010)
Perceived usefulness	PU1—Using mobile wallets would enable me to make payments quickly PU2—Using mobile wallets makes handling payments easier PU3—Using mobile wallets would make it easier to make payments PU4—Using mobile wallets would enhance the effectiveness in making payments PU5—I would find mobile wallets useful to make payments	Davis (1989)	Promotional offers	PO1—I would like to benefit from promotions offered by mobile wallets PO2—I would like to use mobile wallets as long as promotions are offered PO3—Promotional offers prompt me to use mobile wallets frequently	Aydin and Burnaz (2016)
			Satisfaction	SA1—I feel satisfied with using mobile wallets SA2—I feel contented and pleased using mobile wallets SA3—Overall, I am satisfied with the financial services I am using with mobile wallets	Zhou (2013)



Constructs	Measuring items	References	Constructs	Measuring items	References
Situational influence	SI1—There are significant health risks associated with using physical notes and coins during the COVID-19 pandemic	Nguyen et al. (2020)	Perceived security	PS1—I feel secure putting my credit card information on my mobile wallet	Swilley (2010)
	SI2—Most businesses started accepting contactless payments during the COVID-19 pandemic			PS2—I feel confident putting personal information on my mobile wallet	
	SI3—Mobile wallet service providers offer more sales promotions during the COVID-19 pandemic			PS3—I feel safe transacting on my mobile wallet	
	SI4—Mobile wallet service providers partnered with online sellers and service providers to extend contactless payments to all situations			PS4—I feel my privacy is protected on my mobile wallet	
	SI5—Using contactless payments was a trend during the COVID-19 pandemic			PS5—I am comfortable in conducting financial transactions on my mobile wallet	
Service quality	SQ1—Mobile wallet provides on-time services	Zhou (2013)	Continued usage	CU1—I intend to continue using mobile wallets	CU1, CU2, CU4—Venkatesh et al. (2012) CU3, CU5—Kumar et al. (2018)
	SQ2—Mobile wallet provides prompt responses			CU2—I will always try to use a mobile wallet	
	SQ3—Mobile wallet provides professional services			CU3—I intend to continue using mobile wallets than any alternative means	
	SQ4—Mobile wallet provides personalised services			CU4—I intend to use mobile wallets frequently CU5—I intend to continue using mobile wallets rather than discontinue their use	

Declarations

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.



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