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A Move towards Cashless Economy: A Case of Continuous Usage of Mobile Wallets in India

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Abstract

Purpose: India is trying to move from cash-dominant economy to cashless economy using digital technologies namely mobile wallets and digital money. A large number of companies have launched their mobile wallet services and people have also rapidly adopted of mobile wallets. However, there is lot of user switching among mobile wallets of different service providers. In such a scenario, it becomes imperative for the mobile wallet service providers to understand the quality factors that support continuous intention of use of mobile wallets by the customers. Very few researchers have focused on the quality aspects as antecedents of the mobile wallets usage like information quality, system quality and service quality. This research study aims to fill this gap by analyzing a research model integrating the two concepts of technology acceptance and quality. **Research Methodology**: Data were collected from mobile wallet users in India. Structural Equation modelling was used to analyze the data. **Findings**: The study found that information quality of the mobile wallets significantly impacts perceived usefulness however a significant impact of system quality and service quality on perceived usefulness was not found. The study found that system quality and service quality of the mobile wallets significantly impacts perceived security. Perceived usefulness and perceived security were found to have significant impact on continuous intention to use among the mobile wallet users. **Originality:** This study will provide insights to the technology developers, managers and mobile payment service providers to focus on the quality aspects of the technology along with the value proposition. This is one of the few research studies to study the quality aspects of the mobile wallets as a technology.

Keywords

Demonetization, Mobile Wallets, Continuous Intention of Use

1. Introduction

Mobile wallets in India are a fairly new mode of payment, it initially started in the last decade, when the Oxigen wallet was launched in 2004 [1]. Subsequently other more popular wallets like PayTM was launched in 2010, currently it has a subscriber base of almost 20 million users. Also MobiKwik is a mobile wallet with a subscriber base of 40 million users. Indian government has also launched a mobile wallets known as Bhim introduced by National Payments Corporation of India [2] and State Bank Buddy [1] introduced by a nationalized bank State Bank of India. Mobile wallet is a mechanism to carry the debit and credit card information on the mobile phone so that transactions may be made without carrying the physical card. It can be used for transactions like making bill payments, ticketing, paying fees electronically.

Also, recent advancements in mobile technologies, specifically in mobile wallet area, has opened up opportunities for unbanked citizens to access financial services [3]. In a developing country like India, mobile wallets are also doubling up as banks for the population not having bank accounts [4]. Indian government has introduced many schemes which propel users to mobile wallets, like introduction of cashless transactions in railways and in toll plazas on highways. In the demonetization drive November 2016, Indian government banned the Rs 500 and Rs 1000 notes there by increasing the dependence on mobile wallets. During demonetization drive it was reported that there was—"700% increase in overall traffic on the platform and 1000% growth in the value of money added to Paytm accounts. In addition, the average transaction value has increased by 200% and the number of mobile app downloads by 300%." [5] [6]. This demonetization drive provided a push towards a less-cash society. Mobile wallets can bring around the turnaround in India which has otherwise been a cash dominant society.

For mobile wallet service providers, it becomes inherently important to retain users so that, they keep using their services. The following study is done with an objective to identify the impact of quality factors of mobile wallets for continuous intention of users to use mobile wallets in Indian economy. In this study the quality factors have been integrated with technology acceptance model to study the continuous intention of users.

The subsequent part of this paper is designed as follows: first, the paper briefly reviews the literature on information quality, system quality, system quality, perceived usefulness, perceived security, continuous intention to use and develops a conceptual framework based on the same. The subsequent section elaborates upon and justifies the research methodology used. The next section analyzes the data and discusses the results. Finally, the paper provides a discussion on the findings and highlights the limitations of the work and point towards future direction of research.

2. Literature Review

Many researchers have studied the antecedents of continuous usage of any technol-

ogy. Many researchers have employed Technology Adoption Model (TAM), an information systems theory to investigate the intention behind accepting new technologies by the people. Extensions of TAM model have been provided by the researchers as the two constructs do not completely explain reasons for the continuous use of technology by people. Liebana-Cabanillasa *et al.* [6] reported that perceived usefulness and perceived security had a positive significant impact on the mobile wallet use. Cao *et al.* [7] explored the effect of "trust in mobile payment" on intention of users to continue using the technology. Kumar *et al.* [8] found that perceived usefulness, perceived ese of use, perceived security, trust, grievance redressal and satisfaction had an important effect on consumer's intention to use mobile wallets. Fan *et al.* [9] indicated that security measures and payment culture have a significant impact on the user attitude towards the usage of mobile wallets. Singh *et al.* [4] have shown that perception, satisfaction, preference are determiners for the usage of mobile wallets, this study is more relevant to the following research as it is done for the North Indian consumers. There are studies conducted which have identified that perception and satisfaction is gender based in case of mobile wallet usage [10] [11]. It has been examined empirically by Arcand *et al.* [12] that dimensions of mobile banking service quality (e.g security/privacy, design/aesthetics, sociality and enjoyment) impacts the relationship quality (e.g. trust, commitment and satisfaction). No research has been found which has focused on the quality aspects as antecedents of the mobile wallets usage like information quality, system quality and service quality. This research study aims to fill this gap by analyzing a research model integrating the two concepts of technology acceptance and quality.

2.1. Quality Characteristics of Mobile Wallets Impacting an Individual User's Continuous Intention to Use Mobile Wallet

Keyser *et al.* [13] studied the impact of technical and functional service quality on consumer happiness in a multichannel environment, this study went beyond the SERVQUAL instrument [14] [15] which focused only on service delivery process to include the service-encounter outcomes specifically in case of automated services. However, Keyser *et al.* [14] was researching in the field of automated services. This research is aimed a specifically studying the intention of the Indian user to continue to use mobile wallet. Thus apparent quality is definitely a reason for sustenance; however, quality may be further broken into different components. Shah *et al.* [16] depicted that in online environment, the features of a website design significantly affects the website data protection, integrity and confidentiality. Upadhyay & Jahanyan [17] found that system quality affects perceived usefulness of a mobile based payment transfer. Zhou [18] reported that "structural assurance and information quality are the main factors affecting initial trust, whereas information quality and system quality significantly affect perceived usefulness". Thus System Quality and Information Quality emerged as components of quality impacting Perceived Usefulness, also as mobile wallets is a service, Service Quality [13]) is also taken as a component. Perceived Useful-

ness has been reported as impacting the user's continued intention to use the mobile wallet [19] [20] [21].

H_1: There is a significant positive relationship between Information Quality and Perceived usefulness.

H_2: There is a significant positive relationship between System Quality and Perceived usefulness.

H_3: There is a significant positive relationship between Service Quality and Perceived usefulness.

H_4: There is a significant positive relationship between Information Quality and Continuous Intention to use.

H_5: There is a significant positive relationship between System Quality and Continuous Intention to use.

H_6: There is a significant positive relationship between Service Quality and Continuous Intention to use.

2.2. Perceived Usefulness Impacting the User's Continued Intention to Use the Mobile Wallet

Davis [22] defined perceived usefulness as "the degree to which a person believes that using a particular system would enhance his/her job performance". Upadhyay & Jahanyan [16] reported that perceived usefulness had a significant impact on continuous intention of using mobile money transfer. Gefen *et al.* [23] reported that perceived usefulness of an e-commerce web-site had a significant effect on its continuous use intent. Chan & Chong [24] reported that perceived usefulness had a significant relationship with m-commerce adoption. Zhou [18] reported that performance expectation by the user significantly impacted the continuous use of a mobile payment technology. Bhattacharjee [25] [26] found that perceived usefulness was one of the important antecedents of user's continuous intention to use e-commerce services. Liébana-Cabanillas *et al.* [6] reported that one of the important factors for continuous intention to use mobile payment systems was its usefulness.

H_7: There is a significant positive relationship between Perceived usefulness and Continuous Intention to use.

2.3. Perceived Security Impacting the User's Continued Intention to Use the Mobile Wallet

Hartono *et al.* [27] reported that perceived security had a significant impact on perceived ease of use, perceived usefulness and continuous intention to use of a technology. Ha *et al.* [28] researched that Perceived Security has an impact on users' intention to use the website. Salisbury *et al.* [29] published that Perceived Security is an important determinant for users' choice of using the website. Kumar *et al.* [8] have reported that Perceived Security is a significant determinant in case of users' continued intention to use mobile wallets. Flavián and Guinalíu, [30] have written that "trust in the internet is particularly influenced by the security perceived by consumers regarding the handling of their private data".

Chellappa and Pavlou [31] have found that "consumer trust in electronic commerce transactions is influenced by perceived information security". Taherdoost [32] researched that "considering the high significance of perceived security, it is concluded that enhanced feelings of security will result in improved perception of quality. Furthermore, it is found that users will intend to use e-service if they feel that the quality of e-service is high.". Vinhal Nepomuceno *et al.* [33] identified security as the most relevant concern in e-commerce. In the above literature surveys it has been observed that most of the research papers cited have studied the impact of perceived security on users' intention to use one or the other digital media. Very few studies were found where the impact of perceived security only in mobile wallet transactions were studied.

H_8: There is a significant positive relationship between Perceived security and Continuous Intention to use.

H_9: There is a significant positive relationship between Perceived Security and Perceived usefulness.

H_{10}: There is a significant positive relationship between System Quality and Perceived security.

H_{11}: There is a significant positive relationship between Service Quality and Perceived security.

2.4. Conceptual Framework

On the basis of the above literature survey conceptual framework as shown in Figure 1 was conceptualized.

3. Research Methodology

3.1. Instrument Development

The instrument or the questionnaire for the study was developed by adapting scales from previous researchers to the Indian context. The scales used in the study are mentioned in Table 1.

3.2. Sample Design

For this study, people who have been using mobile wallets for at least one year were taken as the target population for the study. For convenience, data was collected from people residing in Delhi NCR only. Delhi/NCR has a high percentage of young population who are tech-savvy and prefer wallets and net banking
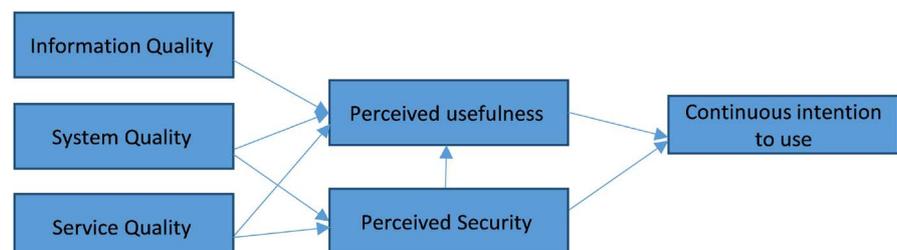

Figure 1. The Conceptual framework.

Construct	No. of items		Source
Information Quality	5	Information provided by m-wallets is useful	
		Information provided by m-wallets is understandable	
		Information provided by m-wallets is interesting	[34]
		Information provided by m-wallets is reliable	
		Information provided by m-wallets is complete	
System Quality	5	M-wallet is easy to navigate	
		M-Wall*et al*lows me to easily find the information I am looking for	
		M-Wallets are well-structured	[34]
		M-wallets are easy to use	
		M-Wallets offer appropriate functionality	
Service Quality	4	The responsible service personnel provide personal attention when I experience problems with m-wallet	
		The responsible service personnel are always highly willing to help whenever I need support with the m-wallet	[34]
		The responsible service personnel provide services related to m-wallets at the promised time.	
		The responsible service personnel have sufficient knowledge to answer my questions regarding the m-wallets.	
Perceived Usefulness	5	Using m-wallets simplifies my bill paying life.	
		I would find it useful to use m-wallets to pay for my purchases.	
		Being able to pay using m-wallets, relives me of the burden to carry cash and card.	[25] [26]
		Using m-wallets enhances my effectiveness in managing payments.	
		M-wallet saves time in making payments.	
Perceived Security	4	I think my account information is safe in m-wallets	
		I think my account money is safe in m-wallets	
		I think my money transfer is secure and safe in m-wallets.	[35]
		I think the m-wallet is secure of virus.	
Continuous intention to use	3	I intend to continue using M-wallet rather than discontinue its use	
		My intentions are to continue using m-wallet than using any alternative means	[25] [26]
		If I could, I would like to discontinue my use of m-wallet.	
Total	26		

more than the cash transaction as compared to other cities of India [36] [37]. During the survey, 500 questionnaires were administered to respondents. 250 questionnaires were received back. As per the literature, response rate of 20% is considered desirable [38] while the response rate for the research study was 50%. Questionnaire in which a large number of items were not responded to were discarded. After this exercise, 200 responses were observed to be usable. Respondent characteristics are given in Table 2.

4. Analysis of Data

4.1. Assessment of Normality

Tests for normality were used to choose an appropriate estimation method in Structural Equation modeling [39]. The mean, minimum, maximum, skewness and kurtosis values were noted. Skewness impacts test of means while kurtosis severely affects the test of variances and covariance [40]. Table 3 gives the descriptive statistics of the 26 measurement items. All the skewness values was

Table 2. Demographic characteristics of respondents.

Category	Value	Valid%
Age	21 - 30	90.5
	31 - 40	8.2
	41 - 50	1.3%
Education	Graduate	87.3
	Postgraduate	12
	Doctorate	0.6
Gender	Female	29.7
	Male	70.3

Table 3. Descriptive statistics of measurement items.

S. No.	Items	Skew	Kurtosis
1	CI1	−0.43	0.82
2	CI2	−0.525	0.958
3	CI3	−0.365	0.539
4	I1	−0.212	−0.304
5	I2	−0.38	−0.637
6	I3	−0.514	0.369
7	I4	−0.537	0.375
8	I5	−0.726	0.341
9	PS1	−0.408	−0.706
10	PS2	−0.656	0.079
11	PS3	−0.675	0.051
12	PS4	−0.166	−0.252
13	PU1	−1.165	1.711
14	PU2	−0.998	1.594
15	PU3	−1.119	0.988
16	PU4	−0.921	0.745
17	PU5	−1.159	1.717
18	S1	−1.091	2.053
19	S2	−0.745	0.548
20	S3	−0.731	0.582
21	S4	−1.099	1.287
22	S5	−0.885	1.753
23	SE1	−0.319	−0.473
24	SE2	−0.294	−0.043
25	SE3	−0.453	−0.022
26	SE4	−0.052	−0.247
	Multivariate		90.692

lower than the cut-off value of ±3.0 [41]. All kurtosis values were also within the cut-off value of ±7.0 [41]. According to Bollen [42], "if Mardia's coefficient is lower than p* (p + 2) where p=number of observed variables, then the combined distribution of the variables is multivariate normal". For the study sample, Mardia's coefficient 243.647 is lower than p * (p + 2) where p = 26 variables. This indicated that the sample data meets the criteria for univariate and multivariate normality. Hence Maximum Likelihood (ML) method shall be used for estimation.

4.2. Assessment of Measurement Model

Confirmatory Factor analysis (CFA) was used to assess the reliability and validity of the measurement model. The measurement model consisted of the three first-order constructs of information quality, system quality, service quality, perceived security, perceived usefulness and continuous intention to use mobile wallets. Information quality, system quality, service quality, perceived usefulness and perceived security were independent variables. The first-order construct of "continuous intention to use" was a dependent variable. The software used for the analysis was AMOS 21. CFA assess the measurement model validity by using two approaches: 1) Model-fit indices and 2) construct validity and reliability [40] [43].

4.2.1. Model Fit

Before analyzing the path estimates for significance, the fit of the model to the data was assessed. Table 4 presents the model fit results. The Chi-square value was 760.55 with 284 degrees of freedom and a significant p-value. The study had a large sample size of N = 200, hence a significant p-value was likely [43]. The alternative fit indices were examined for fitness. The value for normed χ^2 was 2.678, the value for CFI was 0.855 with an SRMR of 0.078. These results were within acceptable limits. Hence the structural model fit was adequate, and path estimates could be examined for significance.

4.2.2. Convergent and Discriminant Validity

In the study, convergent validity was measured using factor loadings, t-values of the factor loadings, composite reliability (CR) and average variance extracted (AVE). Table 5 presents the convergent validity results. All item loading values within each construct were higher than 0.50 (Hair *et al.*, 2010). All the t-values exceeded 1.96 at p ≤ 0.001(Anderson and Gerbing, 1988). All CR values were

Table 4. Model Fit.

FIT Index	Value	Actual Value	Model Fit
Chi-Square/df	<3-Good, <5-Acceptable, >5-Not Acceptable	2.678	Good
CFI	>0.90-Good, >0.80-Acceptable, <0.80-Not acceptable	0.855	Acceptable
SRMR	<0.05-Good, <0.08-Acceptable, <0.10 -Mediocre, >0.10-Poor	0.078	Acceptable

Source: [40] [43] [44].

Table 5. Convergent validity.

Construct	Factor Loading	t	CR	AVE
Service Quality			0.838	0.570
SE1	0.875	-		
SE2	0.801	12.523		
SE3	0.554	8.098		
SE4	0.748	11.64		
Perceived Security			0.906	0.707
PS1	0.803	-		
PS2	0.926	15.35		
PS3	0.809	13.075		
PS4	0.773	12.326		
Perceived Usefulness			0.865	0.564
PU1	0.731	-		
PU2	0.731	13.394		
PU3	0.731	9.692		
PU4	0.731	10.193		
PU5	0.731	11.147		
Continuous Intention to Use			0.724	0.471
CI1	0.766	6.614		
CI2	0.688	6.504		
CI3	0.567	-		
Information Quality			0.884	0.605
I1	0.749	12.18		
I2	0.795	13.239		
I3	0.756	12.334		
I4	0.853	-		
I5	0.765	12.547		
System Quality			0.898	0.639
S1	0.834	13.937		
S2	0.69	10.791		
S3	0.798	13.111		
S4	0.827	-		
S5	0.833	13.921		

higher than 0.7 and all CR values were higher than AVE values (Hair *et al.*, 2010). All AVE values were higher than 0.5 except that of the construct of "continuous intention to use". According to Malhotra and Dash [45], "AVE is a more conservative measure than CR. On the basis of CR alone, the researcher may

conclude that the convergent validity of the construct is adequate, even though more than 50% of the variance is due to error.". Thus convergent validity was sufficiently established. The discriminant validity was measured using the square root of the AVE estimate which was larger than the correlations of a construct to any other constructs [45]. Table 6 presents the discriminant validity results.

4.3. Assessment of Structural Model

After the assessment of the measurement model, the next step was to test the causal relationships. The critical ratio and significance of path coefficients were used to evaluate the proposed hypotheses. When the critical ratio (CR) associated with a regression weight is greater than 1.96, the path is significant at the 0.05 level or lowers [38] [43].

Hypotheses H1 analyzed the link between perceived usefulness and continuous intention to use mobile wallets. The results show that the link between perceived usefulness and continuous intention to use mobile wallets was significant (path estimate $\lambda = 0.433$; t = 4.611; p = 0.001).

Hypotheses H2 analyzed the link between perceived security and continuous intention to use mobile wallets. The results show that perceived security had a significant effect on continuous intention to use mobile wallets (path estimate $\lambda = 0.317$; t = 3.72, p = 0.001).

Hypotheses H3 analyzed the link between information quality and perceived usefulness of mobile wallets. The results show that the link between information quality and perceived usefulness of mobile wallets was significant (path estimate $\lambda = 0.244$; t = 3.232, p = 0.001).

Hypotheses H4 analyzed the link between system quality and perceived usefulness of mobile wallets. The results show that the link between system quality and perceived usefulness of mobile wallets was not significant (path estimate $\lambda = 0.143$; t = 1.574; p = 0.115).

Hypotheses H5 analyzed the link between service quality and perceived usefulness of mobile wallets. The results show that the link between service quality and perceived usefulness of mobile wallets was not significant (path estimate $\lambda = 0 - 0.16$; t = −1.952; p = 0.051).

Table 6. Discriminant validity.

	Information Quality	System Quality	Service Quality	Perceived Usefulness	Perceived Security	Continuous Intention to Use
Information Quality	**0.778**					
System Quality	0.572***	**0.799**				
Service Quality	0.487***	0.430***	**0.755**			
Perceived Usefulness	0.236**	0.264**	0.064	**0.751**		
Perceived Security	0.356***	0.589***	0.467***	0.221**	**0.841**	
Continuous Intention to Use	0.282**	0.446***	0.213*	0.484***	0.407***	**0.686**

Hypotheses H6 analyzed the link between perceived security and perceived usefulness to use mobile wallets. The results show that the link between perceived security and perceived usefulness to use mobile wallets was not significant (path estimate λ = 0.125; t = 1.315; p = 0.189).

Hypotheses H7 analyzed the link between system quality and perceived security to use mobile wallets. The results show that the link between system quality and perceived security was significant (path estimate λ = 0.509; t = 6.929; p = 0.001).

Hypotheses H8 analyzed the link between service quality and perceived security to use mobile wallets. The results show that the link between service quality and perceived security was significant (path estimate λ = 0.293; t = 4.27; p = 0.001) (Table 7).

5. Discussion, Implication, Limitations and Future Research Directions

The objective of the study was to identify the factors that impact the continuous intention of users to use mobile wallets by integrating the IS success model and the technology acceptance model. The study reported that (Figure 2) perceived usefulness and perceived security had a significant impact on the continuous intention to use mobile wallets. The study also found that system quality had a positively significant impact on the perceived security of mobile wallets. Also, Service quality had a significant relationship with perceived security of mobile wallets however both system and service quality did not have a significant relationship with perceived usefulness. Information quality had a significant relationship with perceived usefulness.

The study investigates the quality aspects of the continuance intention of mobile wallet users and hence significantly contributes in enhancing the literature related to mobile wallet usage. It provides important insights to the service providers. Service providers must focus on enhancing the information quality, system

Table 7. Hypotheses testing results.

|	Dependent Variable	Independent Variable	Regression Estimate	SE	t	Sig
H1	Continuous Intention to use	Perceived usefulness	0.433	0.083	4.611	***
H2	Continuous Intention to use	Perceived Security	0.317	0.053	3.72	***
H3	Perceived usefulness	Information Quality	0.244	0.065	3.232	***
H4	Perceived usefulness	System Quality	0.143	0.082	1.574	ns
H5	Perceived usefulness	Service Quality	−0.16	0.059	−1.952	ns
H6	Perceived usefulness	Perceived Security	0.125	0.067	1.135	ns
H7	Perceived Security	System Quality	0.509	0.094	6.929	***
H8	Perceived Security	Service Quality	0.293	0.070	4.27	***

***p < 0.001; **p < 0.05 ns = Non-Significant.
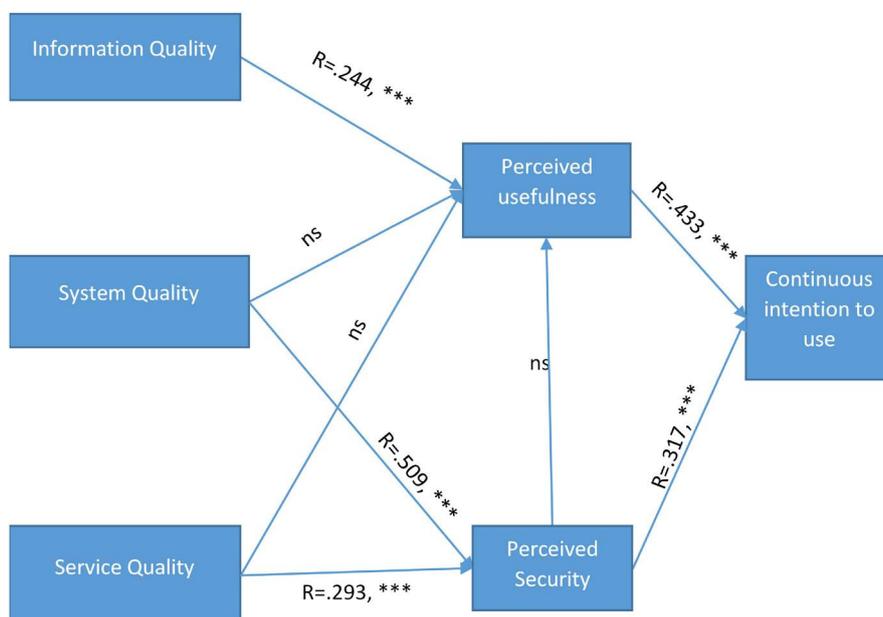
Figure 2. Structural model analysis.

quality and service quality of the mobile wallets. As System quality and service quality impacts the system security which in turn has significant relationship with continuous intention to use the mobile wallets. Also, information quality is an important aspect as it has significant relationship with perceived usefulness. Hence, the mobile service providers need to focus on system, service and information quality to retain their mobile wallet customers.

This study has few limitations. First, this study determines mobile wallet user's perception at a single point of time. Longitudinal study can be conducted to understand change in perception of wallet users. Second, the sample population was limited to young mobile wallet user's residing in north Indian cities of Delhi/NCR and hence may not be representative of perception of total population towards mobile wallets. Future research can include sample from other Indian cities to capture the perception of total Indian population and also compare the perception of the mobile wallet users residing in other Indian cities towards the quality of the mobile wallet.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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