



HAL
open science

Antecedents of the Barriers Toward the Adoption of Unified Payment Interface

Sayantana Khanra, Rojers P. Joseph, Amandeep Dhir, Puneet Kaur

► **To cite this version:**

Sayantana Khanra, Rojers P. Joseph, Amandeep Dhir, Puneet Kaur. Antecedents of the Barriers Toward the Adoption of Unified Payment Interface. International Working Conference on Transfer and Diffusion of IT (TDIT), Dec 2020, Tiruchirappalli, India. pp.608-625, 10.1007/978-3-030-64861-9_53 . hal-03744826

HAL Id: hal-03744826

<https://inria.hal.science/hal-03744826v1>

Submitted on 3 Aug 2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License

Antecedents of the barriers toward the adoption of Unified Payment Interface

Sayantana Khanra^{1,2*}[0000-0001-6618-8542], Rojers P Joseph²[0000-0003-4794-9857],
Amandeep Dhir^{3,4}[0000-0002-6006-6058] and Puneet Kaur⁵

¹ Woxsen University, Hyderabad, Telangana 502345, India

² Indian Institute of Management Rohtak, Haryana 124010, India

³ University of Agder, Kristiansand 4630, Norway

⁴ Lappeenranta University of Technology, Lappeenranta 53850, Finland

⁵ University of Bergen, Bergen 5007, Norway

sayantan.khanra@iimrohtak.ac.in*

Abstract. This study examines the influence of factors related to consumer resistance on the intention to continue using the Unified Payment Interface (UPI) for electronic payments. UPI facilitates advanced, peer-to-peer, immediate payment with seamless interoperability among banks in India. The study extends the innovation resistance theory by including two behavioral measures - privacy concerns and visibility - and two moderators - security concerns and word of mouth (WOM). It used cross-sectional data collected from 714 UPI users aged between 16 and 55 years to test the proposed research model. The findings suggest that privacy concerns and usage barrier are the two crucial factors to be addressed for breaking down consumer resistance towards continuing usage of UPI. The other significant factors are image barrier and visibility. In addition, security concerns and WOM are found to partially moderate the influences on the associations between the key variables and continuing usage of UPI.

Keywords: Consumer resistance, digital financial service, innovation resistance theory, mobile payment, online payment, unified payment interface (UPI).

1 Introduction

Consumer preference for performing routine tasks is gradually shifting towards innovative services driven by the advancement of information and communication technologies [1]. Recognizing the potential of innovative mobile-based financial services, the National Payments Corporation of India (NPCI), an umbrella organization promoted by the Reserve Bank of India (RBI) and Indian Banks' Association for retail payments, launched a mobile-based service named the "Unified Payment Interface (UPI)" to facilitate an advanced level of interoperability among different banks in India [2]. Simply put, UPI facilitates a smartphone-based secure services that can instantly transfer money directly from one bank to another with few clicks [3]. The only instant payment service that offers a comparable level of simplicity and interoperability as UPI does is named 'Swish,' available in Sweden [4]. Following the trend, several countries, especially developed economies, are now in the process of launching instant payment services similar to UPI [4-5].

Since the launch of UPI in 2016, the government as well as the banks in India have undertaken several initiatives to introduce and popularize UPI among the citizens [3,6]. These initiatives include incentives for referring new customers, promotional cashbacks on transactions over a certain value and volume, and even discounts at certain marketplaces [7-8]. According to the recent data released by RBI [2], it is evident that these initiatives have boosted the use of UPI in terms of the number of transactions as well as the total value of transactions to some extent. The growth in number of UPI-based transactions led to an increase in the total number of electronic transactions in India, especially in the second half of the financial year 2017-2018 [2]. However, the Real Time Gross Settlement and National Electronic Funds Transfer, two modes of electronic payment systems offered as a part of the online banking services provided by the full-service banks, accounted for more than 91% of the value of all electronic transactions [2]. Within the remaining value of about 9%, the total value of UPI-based transactions is found to be minuscule [2].

Though UPI was expected to provide the much-needed push for digital transactions in the country, its adoption has been quite low so far [9-10]. Several media reports also confirmed that UPI faces resistance from a large majority of consumers who are not innovators or early adopters [11-12]. A major reason for this resistance may be attributed to the ineffective knowledge transmission about the use of UPI to many consumers who prefer to pay in cash over using online payment methods [12-13]. According to some of the trusted media houses for financial news in India, UPI has grossly underachieved the desired target of the government [13-14]. Therefore, we felt it important to investigate the possible causes of consumer resistance to UPI, as an awareness of the causes might help the appropriate bodies work towards achieving better adoption of the payment interface [15].

There is a vast body of literature on the adoption of various digital financial services. However, the

majority of these studies are centered around understanding the factors behind the adoption of various digital banking solutions. In contrast, empirical studies examining the reasons for resistance towards the usage of digital financial services are rare. Woodside's seminal work on technology adoption argues that even superior innovations may often be unsuccessful because of a high degree of consumer resistance [15]. Hence, the objective of this study is to identify and examine the factors related to consumer resistance, which affect the intention to continue the usage of UPI. We draw from the Innovation Resistance Theory (IRT) [16], a theoretical framework best suited to examine user resistance associated with the intention to continue UPI usage.

This study extends the original IRT framework through the inclusion of important behavioral measures, namely privacy concerns and visibility. The two main justifications for this model extension by including these specific variables are as follows: First, this study aims to complement the existing list of consumer barriers provided by IRT with other relevant and important variables. Second, relatively recent studies have suggested that variables like privacy-related concerns [17-19] and visibility [16, 20] play an important role in the successful adoption of digital payment solutions. In addition, previous research hints that security concerns may moderate the associations between different barriers and the adoption of digital payment services [21-22]. Furthermore, we also recognize the possibility of word of mouth (WOM) [23-25] moderating the associations investigated in this study. Hence, the study also examines the moderating influence of security concerns and WOM on the relationship between the different barriers and the users' intention to continue using UPI. Thus, the proposed research model includes seven independent variables associated with the intention to continue using UPI and two interaction variables that may moderate these associations. The study used a cross-sectional data set collected from 714 UPI users aged between 16 and 55 years to test the research model.

The remainder of the article is organized as follows. The second section of the paper is dedicated to developing the hypotheses of this study. In the third section, we report the data that is analyzed to test the different hypotheses. The findings from the analysis are discussed in the fourth section. Section five concludes the paper with a brief assessment of the limitations of this study and recommendations for future research.

2 Background Literature

Over the years, research on this topic began to polarize into two broad dimensions, namely adoption and resistance. Pioneered by Rogers [26], the first dimension explains how potential users adopt an innovation, whereas the other dimension brings resistance to innovation into focus. However, these two dimensions are not mutually exclusive, as the theory of adoption was later linked to the theory of innovation resistance by Ram and Sheth [16]. Gradually, it was established that the resistance to innovation may determine the popularity of new products and services [16].

2.1 Innovation Resistance Theory (IRT)

IRT is a pioneering theoretical framework for studying consumer resistance toward newer innovations [16]. IRT suggests two main components of innovation resistance, namely functional barriers and psychological barriers. Functional barriers originate in the consumers' perception about the changes from adopting an innovation; whereas psychological barriers arise because of the perceived contradictions with the consumers' prior beliefs while adopting an innovation. While extending the concept introduced by Ram and Sheth [16], many researchers, including Woodside [15], reinforced the argument that superior innovations may fail to achieve commercial success because of consumer resistance. Three recent studies on the digital payment ecosystem in India also support this argument. The first study [27] suggests that although users of mobile banking recognize its benefits, most of them prefer to use cash because of privacy and security concerns. Upadhyay and Jahanyan [28] studied the adoption of mobile-based money transfers and found that value barrier and risk barrier do not hinder the adoption of this technology as much as usage barrier and insufficient technological infrastructure. In the third study, Sivathanu [29] examined the barriers to adoption of digital payment systems and found that innovation resistance creates a barrier toward the usage of digital payment systems in India.

Functional Barriers. There are three types of functional barriers: (a) usage barrier, (b) value barrier, and (c) risk barrier. A usage barrier is observed when a new innovation conflicts with the existing workflows, practices, or habits of the consumers who consequently tend to resist the innovation [16]. This IRT component is similar to 'perceived ease-of-use', an important parameter in the Technology Acceptance Model (TAM) [30]. Furthermore, it is also closely related to complexity, that is, the degree of perceived difficulty by a consumer in understanding and using an innovation as defined by Rogers [26]. Therefore, the importance of usage barrier is recognized in different theories, in different forms, to measure the practical usability of an innovation. Value barrier develops when consumers perceive an innovation to be incapable of delivering better functionalities than

the alternative options, for the same economic resources. In such cases, the consumers are less likely to change their present practices and habits [16]. Risk barrier is important because innovations are perceived to come with some inherent risks and the degree of risk determines the risk barrier toward the innovation [16].

Laukkanen and Cruz [31] argue that the usage barrier is probably the strongest among the three aforementioned barriers in the case of resistance to digital banking. Laukkanen and Kiviniemi [32] report that the association of value barrier is important in the case of resistance to mobile banking. Perceived risks related to an innovation are often inherent in its nature and in the case of mobile banking, users generally perceive risk from limited battery life and poor strength of wireless connection [33]. Risk barrier reportedly plays an important role in developing resistance to mobile banking [32]. Many users perceive risks in making mistakes in performing online banking, as they may not be familiar with the processes [34]. Martins, Oliveira, and Popovič [35] report that the association of risk barrier is found to be important in the context of Internet banking. Therefore, we hypothesize that

H1: Low usage barrier is positively associated with users' intention to continue the usage of UPI.

H2: Low value barrier is positively associated with users' intention to continue the usage of UPI.

H3: Low risk barrier is positively associated with users' intention to continue the usage of UPI.

Psychological Barriers. There are two types of psychological barriers: (a) tradition barrier and (b) image barrier. A tradition barrier reflects resistance to the change that an innovation may cause to the daily routines of a consumer [16]. In the case of Internet banking, the tradition barrier may occur if consumers prefer to interact with the banks or to perform banking operations such as payments through traditional means instead of adapting to new technologies [36]. An image barrier arises because of stereotypes about an innovation, which may relate to factors like the country of origin or the associated brand [16]. Over time, it was found that image barrier in the digital banking ecosystem is developed through non-availability of information for the common people [37], frequently failed transactions [32], high adoption costs and lack of demand from the merchant perspective [38].

In the context of our study, both tradition barrier and image barrier may be considered important because UPI intends to reduce dependence on cash – challenging the existing routines for payments and combating prior beliefs that technology use is complicated or “something wrong could happen.” In the early days of digital banking, users reportedly preferred to interact with banks to perform banking operations in traditional ways [36]. Later, an exploratory study in four countries with advanced wireless infrastructure revealed that tradition barrier still acts as an important inhibitor in delaying the diffusion of mobile banking services [39]. Laukkanen [33] identified tradition barrier as a key factor for driving the rejection of Internet banking in Finland. A recent study by Park, Jun, and Park [40] reported the importance of habit in using traditional payment methods over mobile payment services in South Korea. Similar findings by Low [41] reinforced the role of tradition barrier in causing user resistance to mobile payment adoption among youths in Malaysia. Laukkanen [33] also reported that image barrier is primarily responsible for driving the rejection of mobile banking. Therefore, we formulate the following hypotheses.

H4: Low tradition barrier is positively associated with users' intention to continue the usage of UPI.

H5: Low image barrier is positively associated with users' intention to continue the usage of UPI.

2.2 Barriers Emerging from Privacy Concerns and Visibility

According to the extant literature in the domain of digital banking ecosystem, information privacy risk is associated with the concern about the potential compromise of sensitive user information - both personal and financial - that is not meant for unauthorized access [1]. In the context of online banking, users may be concerned about privacy, as personal information such as identity of the user is also exchanged at the time of monetary transactions [42]. Perceived privacy risk is often studied to expand the established theoretical frameworks to understand the issues related to user acceptance of digital payment services [17]. Privacy risk plays a role in creating barriers to the adoption of different modes of digital payment. For instance, in-store mobile payments in France [43], people-to-people (P2P) mobile wallet services in South Africa [18], tap-and-go payments among university students in the US [44], and mobile payments in China [19], all face barriers because of privacy concerns. Even mobile payment services made available worldwide by high-profile technology companies such as Apple, Google, and PayPal are not spared from such concerns [17]. Therefore, we hypothesize that

H6: Privacy concerns are negatively associated with users' intention to continue the usage of UPI.

The theory of diffusion of innovation proposes that adoption of an innovation can be better understood as an uncertainty reduction process, where potential adopters accumulate and synthesize information regarding

the innovation [26]. Eventually, the rate of adoption of an innovation among the potential adopters is influenced by five perceived characteristics of the innovation. Two such characteristics, namely relative advantage and trialability, pertain to value barrier. Another two characteristics, namely compatibility and complexity are captured in the discussions related to tradition barrier and usage barrier, respectively. The fifth perceived characteristic of innovation is observability that refers to the visibility of usage of an innovation in a society, without changing the measures [26]. The extant literature suggests that more visibility leads to more awareness and results in a higher intention to use technological innovations [45]. Also, a group of adopters may be influenced to adopt mobile internet when they see that many are already using the technology [46-47]. From the perspective of merchants, higher visibility of mobile payments indicates a steady stream of revenue, which motivates them to allocate resources required for receiving mobile payments [20]. Thus, we formulate the hypothesis:

H7: High visibility of UPI is positively associated with users' intention to continue the usage of UPI.

2.3 Moderating Role of Security Concerns and Word of Mouth (WOM)

Information security is primarily concerned with the extent to which sensitive information such as financial details are perceived as safe to transmit online [1]. Security threats appear when data, either stolen from a hacked device or retrieved from a lost or stolen device, may cost the user financial and non-financial losses [48]. Security-related concerns often raise barriers to the adoption of mobile payment services [17, 48-49]. Prior literature suggests that security concerns moderate the association between factors influencing the user intentions and the adoption intentions in the context of online banking [21] and mobile banking [22] respectively. Therefore, this study intends to examine whether security concerns exhibit a moderating role in the context of UPI, with the following hypothesis.

H8: Security concerns moderate the relationships reported in hypotheses H1 to H7.

Word-of-Mouth (WOM) refers to peer-to-peer exchange of opinion and information via an informal medium within a society influencing the future intention to use and continue the usage of concerned services in the society [47, 50]. This may be because of a tendency among users to look for experiences derived from personal recommendations, which also influence their usage pattern [51-52]. Therefore, it is not surprising that a wide range of studies often report that WOM has a moderating influence on various decisions in the context of service economy, such as purchase and re-purchase intention on e-commerce [23-24], brand trust [53], destination selection and travel intentions [54-55], and tickets re-purchase intention [25]. Based on these findings, we formulate the following hypothesis to examine if WOM exhibits a moderating role in the context of this study.

H9: WOM moderates the relationships reported in hypotheses H1 to H7.

3 Study Design and Results

3.1 Data Collection

We designed a closed-ended questionnaire with the help of the extant literature. Our study used instruments that most appropriately measured the constructs of our study. Next, we consulted with an expert in the domain to refine the questionnaire. Finally, the respondents were required to choose an option from a five-item Likert scale for a total of 34 statements. The questionnaire also contained eight questions to capture the demographics of our sample (see Table 1). The data were collected during April to July of 2018 from several field studies at the Common Service Centers (CSCs) in different parts of the country. The CSCs are ICT-enabled, government-authorized service delivery points for government services [52]. We reached out to the dedicated departments responsible for providing e-government services in all 29 states in India. With permission from the appropriate authorities, we arranged our visits to several CSCs in five big states, namely Bihar, Haryana, Telangana, Uttar Pradesh, and West Bengal. During the field studies, only those visitors to the CSCs familiar with the usage of UPI were asked to complete a questionnaire. However, 18 completed questionnaires, out of a total of 732, were discarded, as they failed the consistency check. Therefore, our sample is made up of 714 valid responses.

3.2 Data Analysis

We used SPSS 23, AMOS 23, and PROCESS macro in SPSS to perform the required tests. Throughout the analysis, demographic variables, namely age, gender, education, and economic condition were controlled to better understand the relationships under examination [56]. Any change in control variables would skew the results and invalidate the correlation among the constructs involved in the hypotheses. The results suggest that

the study measures possessed sufficient convergent validity because the factor loading for the measurement items were above the threshold limit of 0.50 (see Table 2), the average variance extracted (AVE) was above 0.50, and composite reliability (CR) for all the measures was above 0.70 (see Table 3) [57]. The study results also confirmed the presence of sufficient discriminant validity because the correlation between any two variables did not exceed the threshold limit of 0.70, and the square root of AVE was higher than the correlations across constructs [58]. Also, AVE surpassed average shared variance (ASV) as well as maximum shared variance (MSV). The construct reliability was investigated by examining the CR value for the different study measures. The study variables possess sufficient construct reliability because the CR for all study measures was found to be comfortably above 0.70 [57].

It is important to note that two constructs of the study - value barrier and risk barrier - yielded low factor loadings and failed to meet the criteria of validity and reliability for measuring the structural model [57]. Therefore, following the extant literature on theoretical and methodological suggestions for SEM [57, 59], both of these measures were eliminated from the later stages of analysis. However, exclusion of value barrier is not surprising in the context of this study because UPI provides more convenience, benefits, and control to the users than digital banking alternatives. Also, the low cost of Internet further diminishes any chance of developing value barrier in our context, as low financial cost to access Internet is expected to increase the adoption of Internet-based services. Besides, considering that a UPI-based transaction attracts zero fee, there is limited ability of a value barrier to act as a significant barrier toward the adoption of UPI. For the same reason, there are limited opportunities for economic and functional risks in the context of this study. Besides, in the case of using a smartphone-based app, the significance of physical and social risks is nominal, if not non-existent. Thus, no aspect of the risk barrier was significant in the context of our study and therefore, its exclusion seems justified.

Table 1. Demographic Characteristics of the Study Sample (N = 714)

Demographic measures	Category	Percentage (Frequency)
Age	18 or less	2.2 (16)
	19 – 25	32.4 (231)
	26 – 32	36.4 (260)
	33 – 40	22.8 (163)
	41 – 50	5.5 (39)
	50 or more	0.7 (5)
Gender	Female	34 (243)
	Male	66 (471)
Economic background	Difficult	11 (79)
	So-So	31 (221)
	Middle-Class	45.5 (325)
Educational background	Rich	12.5 (89)
	Higher Secondary or less	20.3 (145)
	Pursuing / completed Under Graduation	51.3 (366)
	Pursuing / completed Post Graduation	23.9 (171)
Prior experience of using Mobile banking	Pursuing / completed Doctorate	4.5 (32)
	Yes	76.8 (548)
Prior experience of using Debit / Credit card	No	23.2 (166)
	Yes	96.4 (688)
Prior experience of using Mobile wallets	No	3.6 (26)
	Yes	71.1 (508)
Duration of UPI usage experience	No	28.9 (206)
	Less than 3 months	13.6 (97)
	3 – 6 months	26.1 (186)
	6 – 12 months	32.6 (233)
	More than 12 months	27.7 (198)

Table 2. Study Measures and Measurement Items

Study Measures (Reference)	Measurement items	Standardized regression weights	
		Measurement Model	Structural Model
Usage Barrier [33]	The use of UPI is clear and understandable.	0.96	0.96
	Using UPI isn't mentally challenging.	0.95	0.95
	It was easy for me to become skillful at using the UPI.	0.96	0.96
Tradition Barrier [33]	I find it difficult to contact customer service at UPI.	0.93	0.93
	I find it difficult to get my problem resolved from UPI.	0.89	0.89
	I find customer service at UPI is not pleasant.	0.92	0.92
Image Barrier [33]	UPI customer service is not good.	0.93	0.93
	In my opinion, UPI is often too complicated to be useful.	0.88	0.88
	I have such an image that UPI is difficult to use.	0.95	0.95
Privacy [17]	I would not feel safe providing personal private information over UPI.	0.95	0.95
	I am worried about other people gaining access to my account if I use UPI.	0.96	0.96
	Using UPI would reveal important financial information.	0.84	0.84
Visibility [46-47]	I have seen others to use UPI.	0.89	0.89
	It is easy to observe UPI being used.	0.81	0.81
	I have often seen others using UPI.	0.85	0.85
Intention to use [33]	I expect my use of UPI to increase in the future.	0.94	0.94
	I intend to continue using UPI in the future.	0.90	0.90
	I shall try to use UPI whenever possible.	0.92	0.92

Table 3. Convergent and Discriminant Validity and Measurement Reliability

	CR	AVE	MSV	ASV	UPI	UB	TB	IB	PRV	VIS
UPI	0.95	0.85	0.79	0.60	0.92					
UB	0.97	0.91	0.82	0.66	0.89	0.96				
TB	0.96	0.84	0.46	0.35	-0.56	-0.60	0.92			
IB	0.91	0.84	0.82	0.60	-0.78	-0.90	0.64	0.92		
PRV	0.94	0.84	0.82	0.65	-0.88	-0.91	0.68	0.89	0.92	
VIS	0.89	0.72	0.52	0.40	0.70	0.72	-0.45	-0.60	-0.64	0.85

Note: CR = Composite reliability; AVE = Average Variance Extracted; MSV = Maximum Shared Squared Variance; ASV = Average Shared Squared Variance.

3.3 Measurement Model

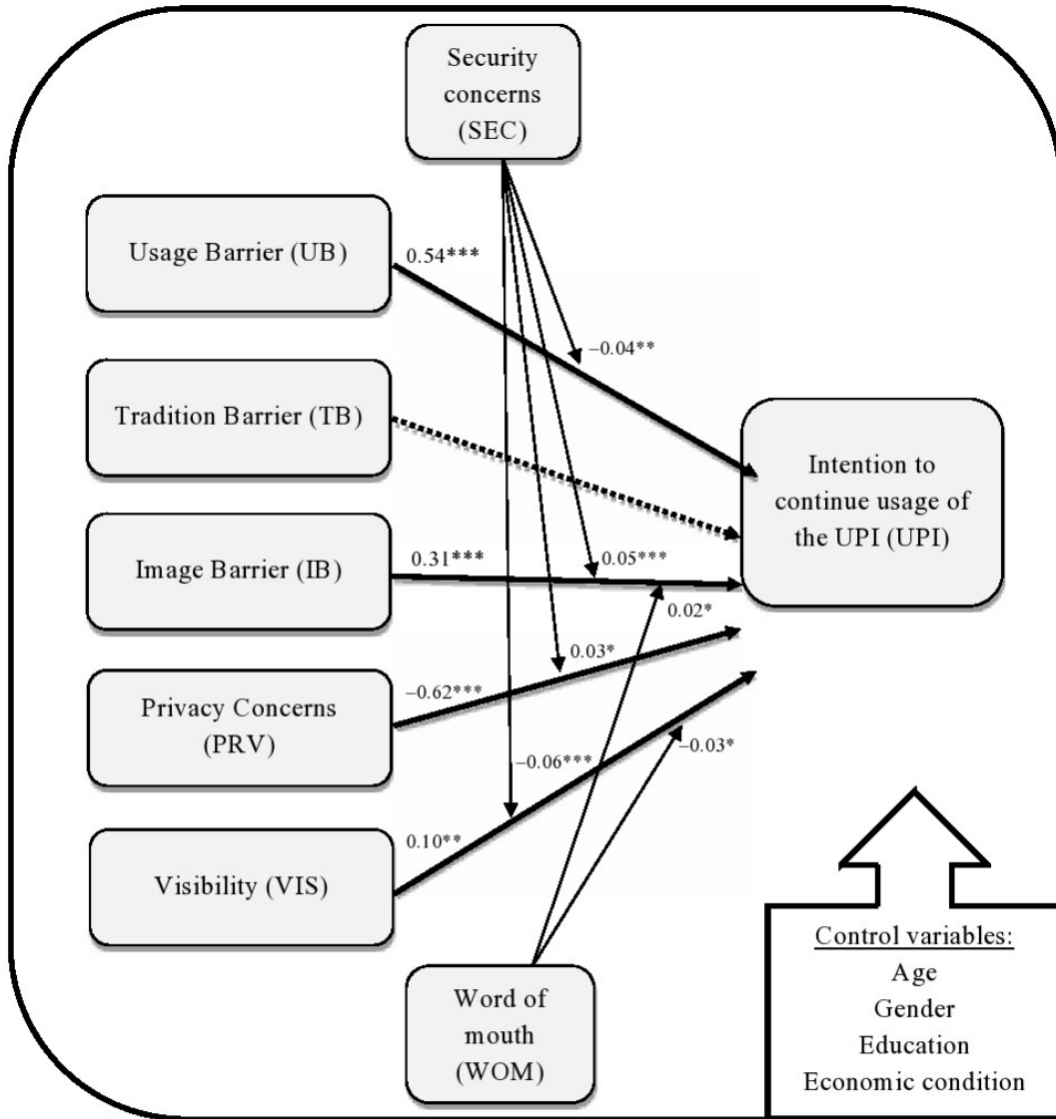
With a χ^2 value of 1451.37 for 369 degrees of freedom, the value of this normed chi-square ratio (C_{\min}/df or χ^2/df) stood at 3.93. The ratio represents a satisfactory fit when less than five, considering that the χ^2 statistic is sensitive to sample size, model size, and distribution of data. Hence, we checked other absolute fit indices such as goodness of fit and error of approximation for this model. High values of goodness of fit indices (GFI = 0.87 and AGFI = 0.84) with a presence of low root mean square residual (RMR = 0.04) indicated that the data fits our measurement model well. The value of Root Mean Square Error of Approximation (RMSEA = 0.06 at $p < 0.001$), within a range of 0.061 and 0.068 at 90% confidence interval, is close to the value of perfect fit. Additionally, our model reported satisfactory scores of relative fit indices with respect to a baseline model where all measured variables are uncorrelated. Our model scored comfortably above the cut-off score of 0.90 in Bentler-Bonett Normed Fit Index (NFI = 0.96), Bollen's Incremental Fit Index (IFI = 0.97), and the Tucker-Lewis Index (TLI = 0.96). Also, Bentler's Comparative Fit Index (CFI = 0.97) confirms that our model is not subject to any significant threat posed by the non-centrality problem. Finally, the parsimony adjusted fit indices for our model (PGFI = 0.69, PNFI = 0.81, PCFI = 0.82) signify that it is not too complex.

3.4 Structural Model

The structural model provided satisfactory model fit with a $\chi^2/df = 4.35$; GFI = 0.92; AGFI = 0.89; RMR = 0.05 and RMSEA = 0.07. Baseline fit indices of this model are CFI = 0.98; TLI = 0.97; IFI = 0.98; NFI = 0.97. From the results, we may confirm that usage barrier, image barrier, privacy concerns, and visibility are significantly associated with users' intention to continue the usage of UPI. Thus, hypotheses H1, H5, H7, and H8 are supported. However, as there was no significant association found between tradition barrier and users' intention to continue the usage of UPI, H4 was not supported. In the context of our study, privacy concerns ($\beta = -0.62$) and usage barrier ($\beta = 0.54$) emerged as the strongest variables that correlated with users' intention to continue the usage of UPI, followed by image barrier ($\beta = 0.31$), and visibility ($\beta = 0.10$). In this study, we also examined the role of two moderators in the relationships among the constructs. The results of this analysis are presented in Table 4. The results of the hypotheses testing are presented in Figure 1. From the results we confirm that security concerns reasonably moderate the association between usage barrier, image barrier, privacy, and visibility and users' intentions to continue the usage of UPI. WOM moderated the association between usage barrier and visibility and users' intention to continue using the UPI. However, we found an insignificant moderating role of security concerns in the association between the tradition barrier and users' intention to continue using the UPI. Also, we found no significant moderating role of WOM in the associations between tradition barrier, image barrier, and privacy concerns, and users' intention to continue the usage of UPI.

Table 4. Moderation Results

	β	t	p	LLCI	ULCI	Moderation?
H8: Moderation Results for Security concerns						
UB → UPI	-.04	-3.35	.001	-.0697	-.0182	Yes
TB → UPI	-.02	-1.65	.10	-.0541	.0048	No
IB → UPI	.05	4.17	.000	.0271	.0754	Yes
PRV → UPI	.03	2.19	.029	.0033	.0620	Yes
VIS → UPI	-.06	-3.86	.000	-.0894	-.0291	Yes
H9: Moderation Results for WOM						
UB → UPI	-.001	-.11	.91	-.0253	.0226	No
TB → UPI	-.01	-.43	.67	-.0310	.0198	No
IB → UPI	.02	1.76	.04	-.0023	.0416	Yes
PRV → UPI	.01	.94	.35	-.0140	.0396	No
VIS → UPI	-.03	-1.83	.03	-.0545	.0019	Yes



Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

Thick arrows, thin arrows and the dotted arrow represent supported hypotheses, moderation and unsupported hypotheses, respectively.

Hypotheses H2 and H3 were not examined since both value and risk barriers did not satisfy the minimum thresholds set for ensuring construct validity and reliability.

Figure 1. Results of Structural Model

4 Discussion and Study Implications

The literature on technology use and continuance largely comprises studies focused on understanding the factors contributing toward acceptance, adoption, and use. Scholars have applied different technology acceptance models such as TAM, UTAUT, and UTAUT2 in previous studies. This approach has two main drawbacks. First, these acceptance models are more suitable for analyzing the initial intention to adopt a technology than understanding the intention to continue using the same. Second, prior research on technology acceptance focused on positive contributing factors and ignored reasons behind consumer resistance. This study draws from the innovation resistance theory (IRT) to enrich the prior literature related to continued technology usage. Also, the investigation has extended the original framework of IRT by incorporating two relevant measures, namely privacy concerns and visibility. Besides this, the study used two important moderating variables – security

concerns and word of mouth- that may provide valuable insights to the scholars interested in addressing similar research objectives. Thus, this is one of the earliest empirical studies on the intention to continue the usage of UPI and similar new age interface payment services. Consumer resistance toward newer innovations is a major cause of concern for businesses and governments alike. Thus, the current examination of user resistance toward UPI is timely and addresses a growing need of the present times. Consequently, the research model proposed in this paper significantly contributes to the literature related to e-governance and digital payments.

The strong support for H1 that examined if a low usage barrier is positively associated with users' intention to continue the usage of UPI is consistent with the majority of the prior literature available in the context of digital banking [31], mobile commerce [60], and mobile payment services [38]. Furthermore, prior literature also supports the significant role of usage barriers in developing countries [61-62]. To lower the existing usage barriers, mass awareness should be increased and the citizens need to be educated about how to use UPI. It is important that citizens of all socio-economic divisions come to realize that UPI is easy to use and can replace several inconvenient aspects of physical transactions. Hypotheses H2 and H3 were not examined in this study, as value barrier and risk barrier did not satisfy the minimum thresholds set for ensuring construct validity and reliability.

The study findings did not support H4, which proposed that low tradition barrier is positively associated with a users' intention to continue the usage of UPI. This is inconsistent with most of the prior literature available in the context of digital banking and payment systems [33, 39, 40-41]. A possible reason for this could be that the overwhelming majority of the UPI users in the data sample were already familiar with various forms of cashless payments. Hence, they may perceive that UPI brought no significant change to their daily routines and habits. Therefore, tradition barrier may not influence the users' intention to continue the usage of UPI. We interpret this as a positive sign for the overall digital payment ecosystem in India.

H5 was supported, which suggests that low image barrier is positively associated with users' intention to continue using UPI. This suggests the need for diminishing negative stereotypes about UPI. As discussed previously, non-availability of information for the common people [37], frequently failed transactions [32], lack of demand from the merchant's perspective [38], and security concerns related to digital services [35, 38] are the major causes that build image barriers. Government agencies should focus on resolving issues regarding transaction failures and security concerns, encourage merchants to improve acceptability, and ensure availability of information about UPI to reduce the possible image barriers.

H6, which suggested that privacy concerns are negatively associated with users' intention to continue the usage of UPI, was supported. This finding is largely consistent with the extant literature that indicates that privacy concerns negatively influence the adoption-related decisions [17-19, 43-44]. Government agencies need to reassure the citizens about privacy protection when it comes to the usage of UPI. The policymakers may implement systematic solutions like regulation of machine-to-machine data transfer, supervision of data release to unauthorized organizations, and protection of financial details and personal information [63]. Additionally, the cyber laws need to be periodically upgraded to match the demands of the fast-changing information-processing environment.

H7 was supported, which suggested that the high visibility of UPI in the society is positively associated with users' intention to continue the usage of UPI. This is consistent with prior literature that suggests a positive association between visibility and technology adoption [20, 46]. To improve the visibility of UPI usage among peers, the government may launch community-based activities. Higher educational institutes, or public and private organizations may be encouraged to arrange similar activities. If the merchants, especially those in unorganized retail, are incentivized to accept UPI-based payments, visibility among the peers may be highly improved, even in rural areas.

H8, which indicated that security partially moderates the association between different predictor variables and users' intention to continue the usage of UPI, was partially supported. To be specific, security concerns exert a moderating impact on the associations involving usage barrier, image barrier, privacy concerns, and visibility with users' intention to continue the usage of UPI. The finding is consistent with prior literature on digital payment services [17, 21-22, 48-49]. NPCI has promised strong end-to-end security and high level of data protection by the government, especially in digital payments [64-65]. Besides, neither the sender nor the receiver needs to reveal much sensitive data while using UPI, if both parties have VPAs. Additionally, to protect

the users against unethical hacking and phishing, UPI requires two-factor authentication from the user's side—one to start a transaction session and the other to authenticate after confirming a transaction. Therefore, government agencies have to communicate in clear terms that security need not be a major concern for UPI users, while dedicated cyber security teams should relentlessly work on ensuring protection against data theft and misuse of stolen data.

H9 proposed that WOM partially moderates the association of different barriers, privacy, and visibility with users' intention to continue the usage of UPI. This hypothesis was partially supported. Specifically, the results suggest that WOM moderated the association between usage barrier and visibility and users' intention to continue using UPI. Our finding is in partial agreement with previous research that suggested a significant moderating role of WOM [23-25]. The findings indicate that government agencies should advertise the various benefits of UPI to create positive WOM. Furthermore, they should incentivize community leaders to spread positive WOM and discuss UPI from verified accounts on various social media platforms to spread good electronic WOM.

5 Limitations and Future Scope

This study includes only the constructs that are relevant to continuous usage of UPI and, hence, some of the findings of this research may be limited to the context of India. It is important that future studies test our model in other contexts to validate our study results. In the case of other innovations similar to UPI, there may exist more relevant constructs, which can possibly explain the usage behavior of those innovations. For example, different forms of trust such as trust on a technology and trust on government agencies providing the technology. Future research may also borrow measures from other theories to extend our research model, which is developed using IRT as a baseline theory. The study design may aid scholars interested in conducting empirical studies on user barriers toward continuous usage of UPI or similar financial services in other countries. Furthermore, the study design can guide scholars interested in understanding consumer resistance toward different e-government issues, especially those involving digital financial services. Therefore, this study may interest researchers who investigate whether innovative payment methods influence purchasing behavior. Besides, this paper potentially provides valuable insights to the scholars examining online businesses, as different forms of electronic banking may play an important role in the development of those businesses.

We acknowledge the possibility of potential bias in our data collection method that relied on a cross-sectional design. Future research may use other techniques such as qualitative data, and experimental or longitudinal design to overcome such biases and deploy resources accordingly. For example, a longitudinal study to analyze the behavioral intention over time, would overcome the inherent limitation of a cross-sectional study. Also, this paper has validated a conceptual model for analyzing users' intention to continue the usage of UPI. Future research may analyze actual usage behavior instead of expressed intention to do that. Alternatively, a qualitative research or an experimental design-oriented study would help comprehend the enrollment and detachment processes among the users. Our study focuses on the individual users. Researchers may examine group level respondents such as UPI users within a university where peers may play much stronger role. It may also be interesting to explore the perspectives about UPI from individuals with low or no experience of using digital payments. Research can also be conducted to understand the merchants' perspective. UPI is fairly new as a method of payment and the behavioral intention of users is expected to evolve as the ecosystem surrounding this method matures. Therefore, similar empirical studies may be conducted in future to capture this evolution.

References

1. Khanra, S., Dhir, A., Mäntymäki, M.: Big data analytics and enterprises: a bibliometric synthesis of the literature. *Enterprise Information Systems*, 14(6), 737–768 (2020). doi: 10.1080/17517575.2020.1734241
2. National Payments Corporation of India Webpage, <https://www.npci.org.in/product-overview/upi-product-overview>, last accessed 2020/10/10.
3. Business Standards Report, <http://tiny.cc/Asthana>, last accessed 2020/10/10.
4. FIS Flavours of fast Report, <http://tiny.cc/FIS2015>, last accessed 2020/10/10.
5. Deloitte report, <http://tiny.cc/deloittepayment>, last accessed 2020/10/10.
6. Harvard Business Review Note, <http://tiny.cc/HBRspl>, last accessed 2020/10/10.

7. Inc 42 Report, <http://tiny.cc/inc42>, last accessed 2020/10/10.
8. Livemint Report, <http://tiny.cc/bhimreferral>, last accessed 2020/10/10.
9. The Economic Times Report, <http://tiny.cc/demonitization>, last accessed 2020/10/10.
10. Livemint Report, <http://tiny.cc/nilekani>, last accessed 2020/10/10.
11. The Economic Times Report, <http://tiny.cc/bhakta>, last accessed 2020/10/10.
12. The Wire Report, <http://tiny.cc/thewire>, last accessed 2020/10/10.
13. The Economic Times Report, <http://tiny.cc/25bn>, last accessed 2020/10/10.
14. Financial Express Report, <http://tiny.cc/finxp>, last accessed 2020/10/10.
15. Woodside, A. G.: Theory of rejecting superior, new technologies. *Journal of Business & Industrial Marketing* 11(3/4), 25–43 (1996). doi.org/10.1108/08858629610125450
16. Ram, S., Sheth, J. N.: Consumer resistance to innovations: the marketing problem and its solutions. *Journal of Consumer Marketing* 6(2), 5–14 (1989). doi.org/10.1108/EUM0000000002542
17. Johnson, V. L., Kiser, A., Washington, R., Torres, R.: Limitations to the rapid adoption of M-payment services: Understanding the impact of privacy risk on M-Payment services. *Computers in Human Behavior* 79, 111–122 (2018). doi.org/10.1016/j.chb.2017.10.035
18. Matemba, E. D., Li, G.: Consumers' willingness to adopt and use WeChat wallet: An empirical study in South Africa. *Technology in Society* 53, 55–68 (2017). doi.org/10.1016/j.techsoc.2017.12.001
19. Su, P., Wang, L., Yan, J.: How users' Internet experience affects the adoption of mobile payment: a mediation model. *Technology Analysis & Strategic Management* 30(2), 186–197 (2018). doi.org/10.1080/09537325.2017.1297788
20. Carton, F., Hedman, J., Damsgaard, J., Tan, K. T., McCarthy, J. B.: Framework for mobile payments integration. *Electronic Journal of Information Systems Evaluation* 15(1), 14–25 (2012). cora.ucc.ie/handle/10468/2910
21. Mangin, J. P. L.: The Moderating Role of Risk, Security and Trust Applied to The TAM Model in The Offer of Banking Financial Services in Canada. *Journal of Internet Banking and Commerce* 19(2) (2014).
22. Yoon, H. S., Oceaña, L. U. I. S.: Impacts of customers' perceptions on internet banking use with a smart phone. *Journal of Computer Information Systems* 54(3), 1–9 (2014). doi.org/10.1080/08874417.2014.11645699
23. Khare, A., Labrecque, L. I., Asare, A. K.: The assimilative and contrastive effects of word-of-mouth volume: An experimental examination of online consumer ratings. *Journal of Retailing* 87(1), 111–126 (2011). doi.org/10.1016/j.jretai.2011.01.005
24. Kuo, Y.F., Hu, T.L., Yang, S.C.: Effects of inertia and satisfaction in female online shoppers on repeat-purchase intention: The moderating roles of word-of-mouth and alternative attraction. *Managing Service Quality: An International Journal* 23(3), 168–187 (2013). https://doi.org/10.1108/09604521311312219
25. Saleem, M. A., Zahra, S., Yaseen, A.: Impact of service quality and trust on repurchase intentions—the case of Pakistan airline industry. *Asia Pacific Journal of Marketing and Logistics* 29(5), 1136–1159 (2017). doi.org/10.1108/APJML-10-2016-0192
26. Rogers, E. M.: Diffusion of innovations: An overview. In: *Use and Impact of Computers in Clinical Medicine* (pp. 113-131). New York: Springer (1981). https://doi.org/10.1007/978-1-4613-8674-2_9
27. Bhatt, A., Bhatt, S.: Factors affecting customers adoption of mobile banking services. *The Journal of Internet Banking and Commerce* 21(1) (2016).
28. Upadhyay, P., Jahanyan, S.: Analyzing user perspective on the factors affecting use intention of mobile based transfer payment. *Internet Research* 26(1), 38–56 (2016). doi.org/10.1108/IntR-05-2014-0143
29. Sivathanu, B.: Adoption of digital payment systems in the era of demonetization in India: An empirical study. *Journal of Science and Technology Policy Management* 10(1), 143–171 (2018). https://doi.org/10.1108/JSTPM-07-2017-0033
30. Davis, F. D., Bagozzi, R. P., Warshaw, P. R.: User acceptance of computer technology: a comparison of two theoretical models. *Management Science* 35(8), 982–1003 (1989). doi.org/10.1287/mnsc.35.8.982
31. Laukkanen, T., Cruz, P.: What determines mobile banking non-adoption? In: *Proceedings of Australian and New Zealand Marketing Academy Conference 2010*. ANZMAC, Christchurch (2010).
32. Laukkanen, T., Kiviniemi, V.: The role of information in mobile banking resistance. *International Journal of Bank Marketing* 28(5), 372–388 (2010). doi.org/10.1108/02652321011064890
33. Laukkanen, T.: Consumer adoption versus rejection decisions in seemingly similar service innovations: The case of the Internet and mobile banking. *Journal of Business Research* 69(7), 2432–2439 (2016). doi.org/10.1016/j.jbusres.2016.01.013
34. Kuisma, T., Laukkanen, T., Hiltunen, M.: Mapping the reasons for resistance to Internet banking: A means-end approach. *International Journal of Information Management* 27(2), 75–85 (2007). doi.org/10.1016/j.ijinfomgt.2006.08.006
35. Martins, C., Oliveira, T., Popovič, A.: Understanding the Internet banking adoption: A unified theory of acceptance and use of technology and perceived risk application. *International Journal of Information Management* 34(1), 1–13 (2014). doi.org/10.1016/j.ijinfomgt.2013.06.002
36. Heinonen, K.: Reconceptualizing customer perceived value: the value of time and place. *Managing Service Quality: an International Journal* (2004). doi.org/10.1108/09604520410528626
37. Laukkanen, T., Sinkkonen, S., Laukkanen, P.: Communication strategies to overcome functional and psychological resistance to Internet banking. *International Journal of Information Management* 29(2), 111–118 (2009). doi.org/10.1016/j.ijinfomgt.2008.05.008
38. Liébana-Cabanillas, F., Lara-Rubio, J.: Predictive and explanatory modeling regarding adoption of mobile payment systems. *Technological Forecasting and Social Change* 120, 32–40 (2017). doi.org/10.1016/j.techfore.2017.04.002
39. Luo, X., Lee, C. P., Mattila, M., Liu, L.: An exploratory study of mobile banking services resistance. *International*

- Journal of Mobile Communications 10(4), 366–385 (2012). doi.org/10.1504/IJMC.2012.048136
40. Park, M., Jun, J., Park, H.: Understanding Mobile Payment Service Continuous Use Intention: An Expectation-Confirmation Model and Inertia. *Quality Innovation Prosperity* 21(3), 78 (2017). dx.doi.org/10.12776/qip.v21i3.983
 41. Low, K. H.: Factor Affecting Consumer Resistance to Paypal Mobile Payment Adoption: A Study of Generation X Consumers. Doctoral Dissertation, Universiti Tunku Abdul Rahman (2017). [http://eprints.utar.edu.my/2427/1/Thesis_\(PayPal\).pdf](http://eprints.utar.edu.my/2427/1/Thesis_(PayPal).pdf).
 42. Chang, Y., Wong, S. F., Libaque-Saenz, C. F., Lee, H.: The role of privacy policy on consumers' perceived privacy. *Government Information Quarterly* 35(3), 445–459 (2018). doi.org/10.1016/j.giq.2018.04.002
 43. De Kerviler, G., Demoulin, N. T., Zidda, P.: Adoption of in-store mobile payment: Are perceived risk and convenience the only drivers? *Journal of Retailing and Consumer Services* 31, 334–344 (2016). doi.org/10.1016/j.jretconser.2016.04.011
 44. Bailey, A. A., Pentina, I., Mishra, A. S., Ben Mimoun, M. S.: Mobile payments adoption by US consumers: an extended TAM. *International Journal of Retail & Distribution Management* 45(6), 626–640 (2017). doi.org/10.1108/IJRDM-08-2016-0144
 45. Cruz, P., Barretto Filgueiras Neto, L., Munoz-Gallego, P., Laukkanen, T.: Mobile banking rollout in emerging markets: evidence from Brazil. *International Journal of Bank Marketing* 28(5), 342–371 (2010). doi.org/10.1108/02652321011064881
 46. Hsu, C. L., Lu, H. P., Hsu, H. H.: Adoption of the mobile Internet: An empirical study of multimedia message service (MMS). *Omega* 35(6), 715–726 (2007). doi.org/10.1016/j.omega.2006.03.005
 47. Khanra, S., Joseph, R. P., Ruparel, N.: Dynamism of an e-Government Network in Delivering Public Services. In: *Academy of Management Global Proceedings Slovenia 2019*, pp. 376, Academy of Management, New York (2019).
 48. Liu, Y.: Consumer protection in mobile payments in China: A critical analysis of Alipay's service agreement. *Computer Law & Security Review* 31(5), 1–10 (2015). doi.org/10.1016/j.clsr.2015.05.009
 49. Oliveira, T., Thomas, M., Baptista, G., Campos, F.: Mobile payment: Understanding the determinants of customer adoption and intention to recommend the technology. *Computers in Human Behavior* 61, 404–414 (2016). doi.org/10.1016/j.chb.2016.03.030
 50. Arndt, J.: Word-of-mouth advertising and of informal communication. In F. Cox (Ed.), *Risk Taking and Information Handling in Consumer Behaviour*, pp. 188–239. Cambridge, MA: Harvard University Press (1967).
 51. Anderson, E.W.: Customer satisfaction and word of mouth. *Journal of Service Research* 1(1), 5–17 (1998). doi.org/10.1177/109467059800100102
 52. Khanra, S., Joseph, R. P.: Adoption of e-Governance: The mediating role of language proficiency and digital divide in an emerging market context. *Transforming Government: People, Process and Policy* 13(2), 122–142 (2019). doi: 10.1108/TG-12-2018-0076
 53. Lock, A. C.: Impact of Brand Knowledge on Brand Trust in Private Higher Education Institutions: How Do Word of Mouth Sources Intervene? *Sarjana* 31(2), 13–32 (2016).
 54. Ishida, K., Slevitch, L., Siamionava, K.: The Effects of Traditional and Electronic Word-of-Mouth on Destination Image: A Case of Vacation Tourists Visiting Branson, Missouri. *Administrative Sciences* 6(4), 12 (2016). doi.org/10.3390/admsci6040012
 55. Jalilvand, M. R., Samiei, N., Dini, B., Manzari, P. Y.: Examining the structural relationships of electronic word of mouth, destination image, tourist attitude toward destination and travel intention: An integrated approach. *Journal of Destination Marketing & Management* 1(1), 134–143 (2012). doi.org/10.1016/j.jdmm.2012.10.001
 56. Khanra, S., Joseph, R. P.: Adoption and Diffusion of e-Government Services: the Impact of Demography and Service Quality. In: Baguma, R., De, R., Janowski T. (eds.) *the 10th International Conference on Theory and Practice of Electronic Governance 2017*, pp. 602–605. Association for Computing Machinery, New York (2017). doi: 10.1145/3047273.3047301
 57. Hair, J., Black, W., Babin, B., Anderson, R.: *Multivariate Data Analysis a Global Perspective*, Prentice Hall. Upper Saddle River, NJ (7th ed.). Prentice Hall (2010).
 58. Fornell, C., Larcker, D. F.: Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research* 18(1), 39–50 (1981). doi.org/10.1177/002224378101800104
 59. Farrell, A. M.: Insufficient discriminant validity: A comment on Bove, Pervan, Beatty, and Shiu (2009). *Journal of Business Research* 63(3), 324–327 (2010). doi.org/10.1016/j.jbusres.2009.05.003
 60. Bouwman, H., Carlsson, C., Molina-Castillo, F. J., Walden, P.: Barriers and drivers in the adoption of current and future mobile services in Finland. *Telematics and Informatics* 24(2), 145–160 (2007). doi.org/10.1016/j.tele.2006.08.001
 61. Rahman, M. M.: Barriers to M-commerce Adoption in Developing Countries-A Qualitative Study among the Stakeholders of Bangladesh. *The International Technology Management Review* 3(2), 80–91 (2013). doi.org/10.2991/itmr.2013.3.2.2
 62. Suki, N. M.: Factors affecting third generation (3G) mobile service acceptance: Evidence from Malaysia. *Journal of Internet Banking and Commerce* 16(1), 1–12 (2011).
 63. Khanra, S., Joseph, R. P.: E-Governance Maturity Models: A Meta-ethnographic Study. *The International Technology Management Review* 8(1), 1–9 (2019). doi: 10.2991/itmr.b.190417.001
 64. The Quint Report, <http://tiny.cc/thequint>, last accessed 2020/10/10.
 65. Firstpost Report, <http://tiny.cc/madanapalle>, last accessed 2020/10/10.