Digital Payments Adoption by Indian Households and Retailers Post Demonetization: Combined TAM and Decomposed TPB Approach

Anubhuti Dwivedi

Asian Business School, Noida, India

ABSTRACT

This study was aimed at understanding the factors influencing the digital payments adoption decision of households and retailers in India. Research framework based on the theoretical constructs using a combination of Technology Adoption Model (TAM) and Decomposed Theory of Planned Behaviour (TPB) was used to identify the attitudinal, social and perceived behavioural control factors that would influence the adoption of digital payments.

The results from the Structural Equation Modelling revealed that attitudinal and perceived behavioural control factorsplay a significant role in influencing the intention to adopt digital payments but subjective norms are not found to be significant in case of household consumers though they have an influence on the behavioural intentions to adopt digital payments in case of retailers. In particular, perceived usefulness, compatibility, perceived ease of use and risk involved in using digital payments were found to influence intentions to adopt digital payments methods. Apart from this the confidence in using these methods and resource and technology facilitating conditions for digital payments were also found to influence intentions.

KEYWORDS: Digital Payments, Technology Adoption Model, Decomposed Theory of Planned Behaviour, India

1. INTRODUCTION

Indian economy has been primarily cash dependent in all types of financial transactions and more importantly retail consumer transactions.[1] It has been asserted that India is lacking in the readiness for digital payments and this is considered to be a major hindrance in the progress towards making India a cashless economy. On 8th November 2016, Government of India announced the demonetization of notes of Five hundred and One Thousand Rupees denomination stripping these notes of their status of being legal tender. According to Reserve Bank of India, 86.9 percent of Indian currency was in these denominations[2] and thus the demonetization has influenced the economy in all pervasiveness. Along with those involved in illegal activities or parallel economy, the hardest hit are the sections of economy which are uncovered by banking facilities and form a part of what is called an informal or unorganized sector of the economy. The ultimate aim of demonetization move is to make India a cashless economy in order to boost public revenue through reduced corruption which breeds on cash transactions and achieve the objective of inclusive growth. This policy direction has acted as a forced motivation for the households and retailers of which more than ninety percent are in unorganized retail sector, to adopt digital payments methods including Banking Cards, Mobile Wallets, Internet Banking, Mobile Banking, POS, USSD, UPI, AEPS, etc. for their transactions. But what needs to be answered is the factors which actually influence the adoption and diffusion of digital payments so that policy initiatives may be taken to put a system in place for augmenting the positive factors and minimizing the negative ones so as to

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1. *Beyond Cash- Why India loves cash and what it means for financial inclusion*, Report by United States Agency for International Development (USAID), released in January 2016 mentions that 97% of retail transactions in India were conducted in cash or cheque.
https://www.globalinnovationexchange.org/beyond-cash

2. Report on Macroeconomic Impact of Demonetisation - A Preliminary Assessment, Reserve Bank of India, March 10, 2017

achieve the long term objective of demonetization sooner than later when it has lost its impact.

The recent demonetization is not the first instance of demonetization in India. Rupees One Thousand and higher denomination notes were first demonetized in January 1946 and then again in 1978. Both these attempts were to curb black money in the economy but encouraging digital payments among the masses was not an existing viable option in that era. Therefore the existing body of literature on demonetization in India does not include studies on digital payments adoption and further diffusion of this technology among the people. As far as the recent demonetization move is concerned, there are articles on the impact of demonetization on economic growth, monetary system and black money in Indian economy like Jain (2017), Lahiri (2016), Tripathi (2016) and Sarkar (2012) but there is a dearth of any comprehensive study on the factors responsible for people not adopting digital payments even after a long driven IT revolution in India and finding the answers regarding policy recommendations related to incentives for bringing about greater willingness for digital payments which is necessary to achieve the objective of demonetization in the democratic set up of India.

This study is aimed at understanding the factors influencing the digital payments adoption decision of households and retailers in India using a combination of Technology Acceptance Model (TAM)[3] and Decomposed Theory of Planned Behaviour (TPB)[4] for analysis of digital payments adoption decisions by Indian households and retailers who have been till recent past accustomed to doing all major transactions in cash.

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3. TAM specified by Davis (1986, 1989) is an adaptation of the Fishbein and Ajzen's Theory of Reasoned Action (TRA), which indicates that social behaviours are motivated by individual attitudes, and can predict the use of information system.

4. Ajzen (1985) extended the TRA in the Theory of Planned Behaviour (TPB) to include conditions where individual behaviour is not entirely under volitional control. The decomposed TPB model (Taylor & Todd 1995) decomposed the belief structure of TPB into several factors.

Digital payment is a payment in which the payer and payee both use electronic or digital modes to send and receive money without involving any hard cash. For the purpose of this study, digital payments were taken to include payments through bank cards, internet and mobile banking, mobile or e-wallets and UPI (Unified Payment Interface) apps. Though there are other modes of digital payments available in India like Aadhar Enabled Payment Service (AEPS) and Unstructured Supplementary Service Data (USSD) but these are not generally used in making payments by households for their retail purchases.

Since behavioural intention may not always be transformed into actual usage, this paper also examined the relationship between intended and actual use. Section 2 introduces the conceptual background to the study, including the research model and hypotheses involved. The theoretical and managerial relevance of the model is discussed.

The conceptual model was empirically estimated using data from a survey of 1682 consumers and 781 retailers considering a decision to adopt digital payments. Structural equation modelling (SEM) was used to validate the research model. Sections 3 and 4 present the research design and the survey results, respectively. Finally, Section 5 discusses implications of the findings and outlines future research directions.

2. RESEARCH FRAMEWORK

There have been studies on Internet banking adoption in India like Kumar and Govindaluri (2014), Saffani and Kammani (2011) which have analyzed consumer intentions to adopt internet banking using TAM approach. But it has been found by various studies that certain aspects of attitude, subjective norms and perceived behavioural control as envisaged in theTPB approach when decomposed further using Roger's innovation diffusion theory give better results regarding technology adoption decisions (Taylor and Todd 1995). Nevertheless TAM has its own predictive power of intended and actual use of a technology, especially in

developing countries where perceived usefulness and perceived ease of use form an important component of attitude towards adopting a new technology or its continued use.

2.1 Technology Acceptance Model (TAM)

TAM (Davis 1986, 1989) specifies perceived usefulness and perceived ease of use, as determinants of attitude towards behavioural intentions and IT usage. TAM was conceived to explain and predict individual acceptance of IT in which behavioural intention to use leads to actual IT usage.

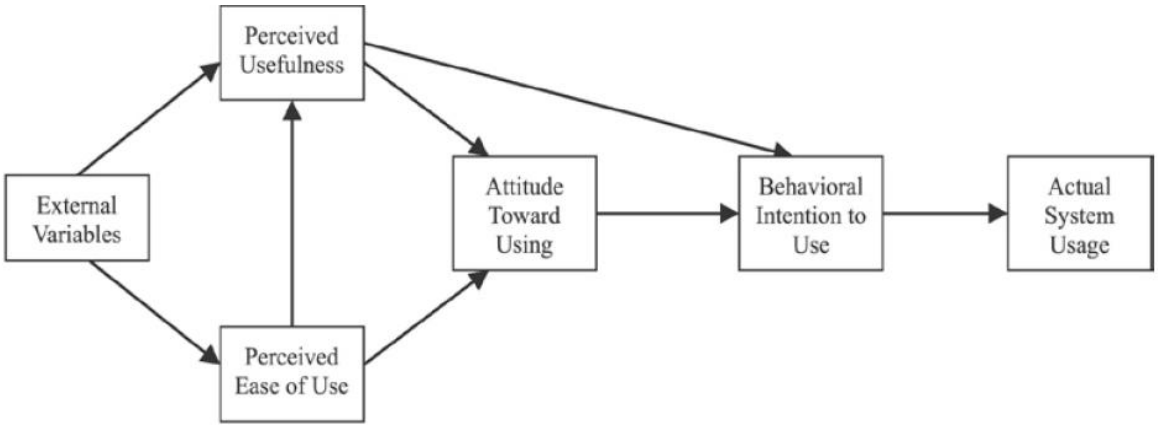

Fig 1: Framework for Technology Adoption Model
Source: Davis 1989

Attitude is affected by perceived usefulness and ease of use while behavioural intention is determined jointly by attitude and perceived usefulness. Perceived ease of use also has a direct effect on perceived usefulness.

Perceived usefulness is defined as the extent to which a person believes that using a particular system would enhance his or her job performance. Perceived ease of use represents the degree to which a particular system is perceived as being free of effort in being easy to understand, learn or operate. The TAM which is based on constructs of perceived usefulness

and perceived ease of use has been tested and extended by many researchers. Overall, it was empirically proven successful in predicting about 40% of a system's use (Hu et al. 1999).

2.2 Decomposed Theory of Planned Behaviour

Several studies have examined approaches to decomposing attitudinal beliefs in order to understand the relationship between belief structures and antecedents of intention.[4]The decomposed TPB model first introduced by Taylor and Todd (1995) is based on the theory of planned behaviour (TPB) (Ajzen 1985) and the diffusion of innovations theory (Rogers 1983). It was found to have better predictive power compared to the technology acceptance model (TAM) and traditional TPB model.

In the decomposed TPB model, attitudinal, normative and control beliefs are decomposed into multidimensional belief constructs. The decomposed TPB model uses three constructs from the innovation literature[5] (relative advantage, compatibility and complexity) which influence the attitudinal beliefs. It also explores subjective norms and perceived behavioural control more comprehensively by decomposing them into more specific dimensions. Relative advantage refers to the degree to which an innovation provides benefits which supersede those of its precursor.[6]

The "relative advantage" is often considered to be analogous to the ''perceived usefulness'' in TAM. The complexity construct is similar to ''perceived ease of use'' concept in TAM, though in reverse direction. Compatibility is the degree to which the innovation fits with the potential adopter's existing values, previous experiences and current needs.

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5. Rogers (1983), Taylor & Todd (1995), Tan &Teo (2000), Chau & Hu (2002) and Gillenson&Sherrell (2002) have decomposed the belief structures influencing adoption of new technology and innovations into different factors.

6. Rogers (1983) describes relative advantage as one of the perceived characteristics of innovation which affects its adoption. Relative advantageincorporates factors such as economic benefits, image enhancement, convenience and satisfaction.

Subjective norms refer to "the person's perception that most people who are important to him think he should or should not perform the behaviour in question" (Fishbein and Ajzen 1975). They affect behavioural intention because people often act based on their perception of what others think they should do. Subjective norms have been found to be significant in the early stages of innovation implementation when users have limited direct experience from which to develop attitudes (Hartwick and Barki 1994; Taylor and Todd 1995).

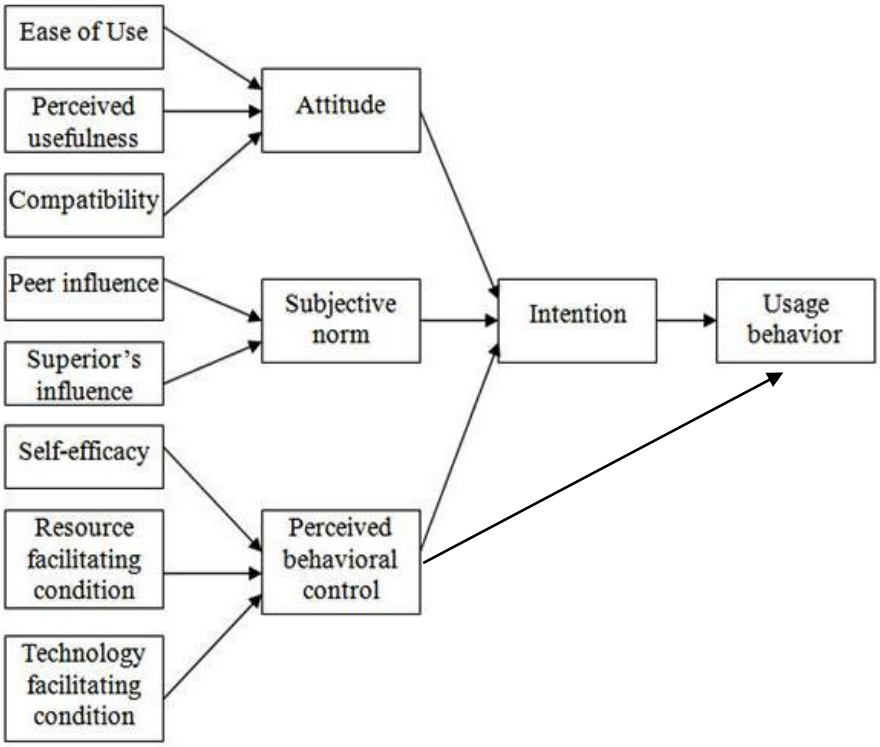

Fig 2: Framework for Decomposed Theory of Planned Behaviour
Source: Taylor & Todd 1995

Perceived behavioural control refers to the factors that may cause hindrance in the performance of the behaviour. This has been decomposed into two components in the Decomposed TPB Approach. The first component is self-efficacy and is defined as an individual's self-confidence in his or her ability to perform a behaviour (Bandura 1977, 1982) and the second component is "facilitating conditions" which refer to the availability of

resources needed to engage in the behaviour (Triandis 1979). Facilitating conditions have two dimensions when IT usage is concerned, one relates to the resource conditions such as money and time; and the other relates to technology facilitation.

2.3 Combined TAM and Decomposed TPB Framework for Adoption of Digital Payments

This study combines TAM and decomposed TPB approaches for drawing inference regarding adoption of digital payments in India by households and retailers. The framework postulates that a person's intention to adopt digital payments is determined by three factors. They are (i) ***attitude***, which describes a person's perception towards digital payments; (ii) ***subjective norms***, which describe the social influence that may affect a person's intention to use digital payments; and (iii) ***perceived behavioural control*** which describes the beliefs about having the necessary capabilities and resources to adopt digital payments. Intention to adopt digital payments, in return, is expected to affect the actual adoption of digital payments. Figure 3 shows the research framework for the adoption of Digital Payments by Household Consumers and Figure 4 exhibits the framework for Retailers.

i) Attitude

Attitude is defined as an individual's positive or negative feelings about performing a target behaviour (Fishbein and Ajzen 1975). It is related to behavioural intention because people form intentions to perform behaviour towards which they have a positive attitude. This relationship between attitude and behaviour is fundamental to TRA, TAM, and other related models.[7]

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7. Bentler and Speckart (1979) found that attitude has both a direct effect on behaviour and an indirect effect through intentions. Bagozzi (1981) found that attitude influences behaviour only through its impact on intentions which was in line with the classic sequence hypothesized by Fishbein&Ajzen (1975) and Triandis (1977). Triandis (1977) also suggests that there is a trade-off between attitude and habit in the prediction of behaviour with the attitude-behaviour relation being weak, when habit is strong. This may have implications for payments system in India as people have been habitual of doing transactions in cash.

Taylor and Todd (1995) suggest that the different dimensions of attitudinal belief toward an innovation can be measured using the five perceived attributes (relative advantage, compatibility, complexity, trialability, and observability) of an innovation. As discussed earlier, relative advantage and complexity in the theory of Diffusion of Innovations (Rogers 1983) are considered analogous to perceived usefulness and ease of use respectively in TAM. The terms perceived usefulness and ease of use are adopted in Decomposed TPB to align with the MIS literature. But it differs from TAM in that the influence of perceived ease of use on perceived usefulness has not been taken into account.

In this study, perceived usefulness is modelled to be affected by perceived ease of use as in TAM because in developing countries like India, ease of use partly determines the perception about the usefulness of a new technology given the lack of technological skill in people. Further decomposition is based on the Decomposed TPB Approach.

Apart from the three components of perceived usefulness, ease of use and compatibility, two other dimensions of observability and risk are included in the decomposition of attitude. Observability dimensionhas been adopted from Rogers (1983), thus incorporating all the dimensions from diffusion of innovations theory except trialability.

Trialability was not considered for the study as most of the digital payments methods are available freely in India for trial with the emphasis of Indian Government on the promotion of their use. Thus it was not expected to be a significant differentiating factor.

Perceived Usefulness of digital payments is generally evaluated in terms of the associated benefits and costs, including maximizing convenience, minimizing transaction time and improving performance. Thus, this study measured the perceived usefulness in terms of these three parameters.

Perceived ease of use represents the degree to which the digital payments methods are perceived to be easy to understand, learn or operate. If a digital payments system has a well-

designed user interface and simplified process, digital payment would be considered as being free of effort.

Compatibility as a dimension was studied by Tornatzky and Klein (1982) who conducted a meta-analysis of innovation adoption and found that an innovation is more likely to be adopted when it is compatible with individuals' job responsibilities and value system. Digital payments have been viewed as a system that is compatible with the lifestyle and working of the modern day customer, who is likely to be familiar with the information technology developments. Therefore, it is expected that the more the individual perceives the digital payments as compatible with his or her lifestyle, the more likely they are to adopt them.

In terms of compatibility with the needs of the potential adopters, digital payments can be viewed as a tool that allows customers to better manage their multiple financial transactions. With growth in financial products and services, it is expected that individuals who have a higher frequency and variety of financial transactions will be more inclined to adopt digital payments.

Observability is the degree to which the results of an innovation are visible to others. The observability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption. *Observability* was found to include two dimensions, *result demonstrability* and *visibility* by Moore and Benbasat (1996). Result Demonstrability is the degree to which the results of using digital payments are observable and communicable to others. Visibility refers to the degree to which a digital payment method is apparent to the sight of people.

Risk was introduced as an additional dimension in diffusion and adoption of innovationsby Bauer (1960), Webster (1969), and Ostlund (1974). It was also taken as a dimension of attitude by Tan and Teo (2000). Lack of security and privacy over the Internet has been considered as a common obstacle to any type of electronic commerce adoption (Bhimani

1996; Cockburn and Wilson 1996; Quelch and Klein 1996; Rhee and Riggins 1997). Thus, it is expected that digital payments would be adopted more readily by only those individuals who perceive using them as a low risk phenomenon.

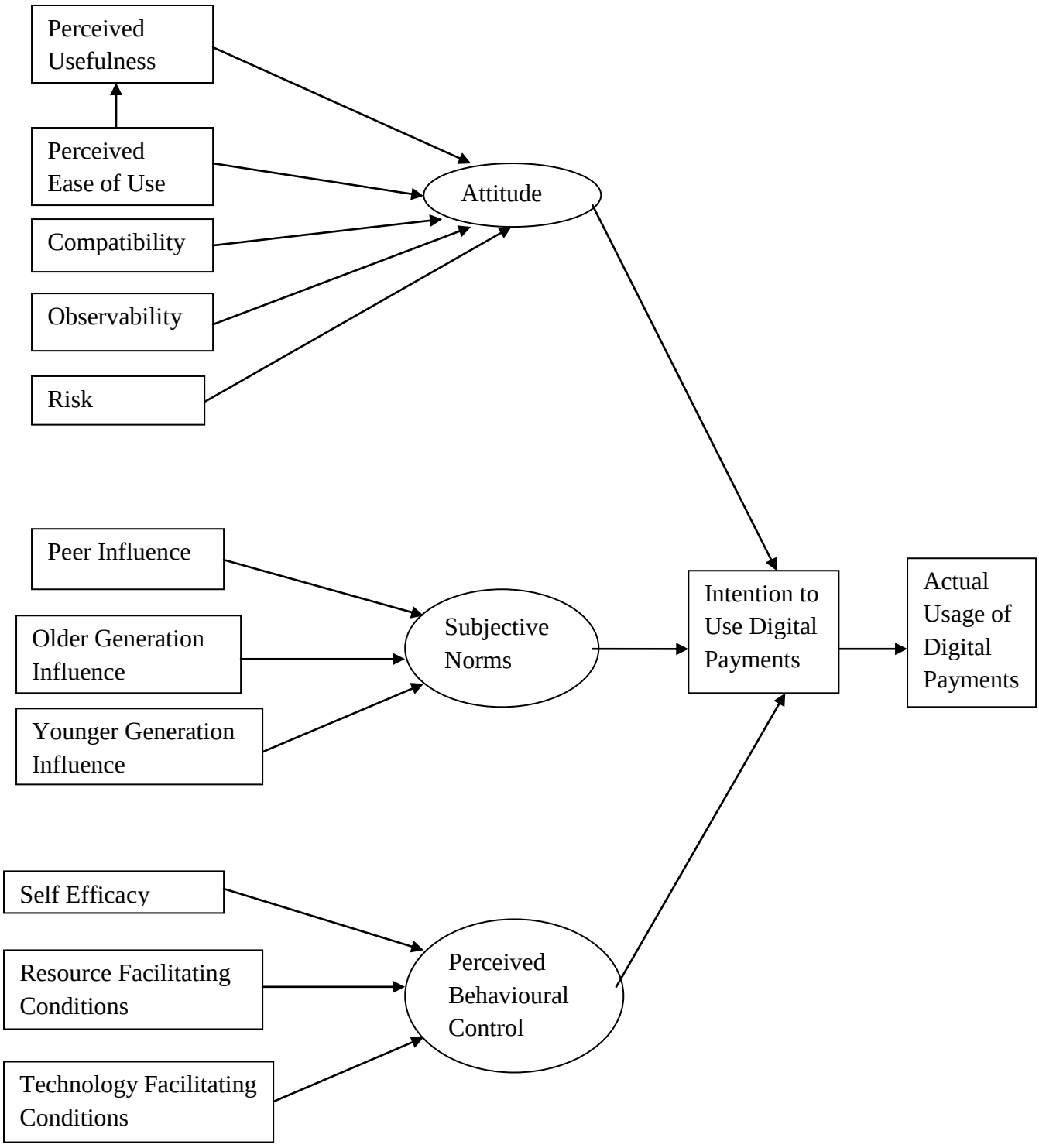

Fig 3: Combined TAM and Decomposed TPB Framework for Digital Payments Adoption by Household Consumers

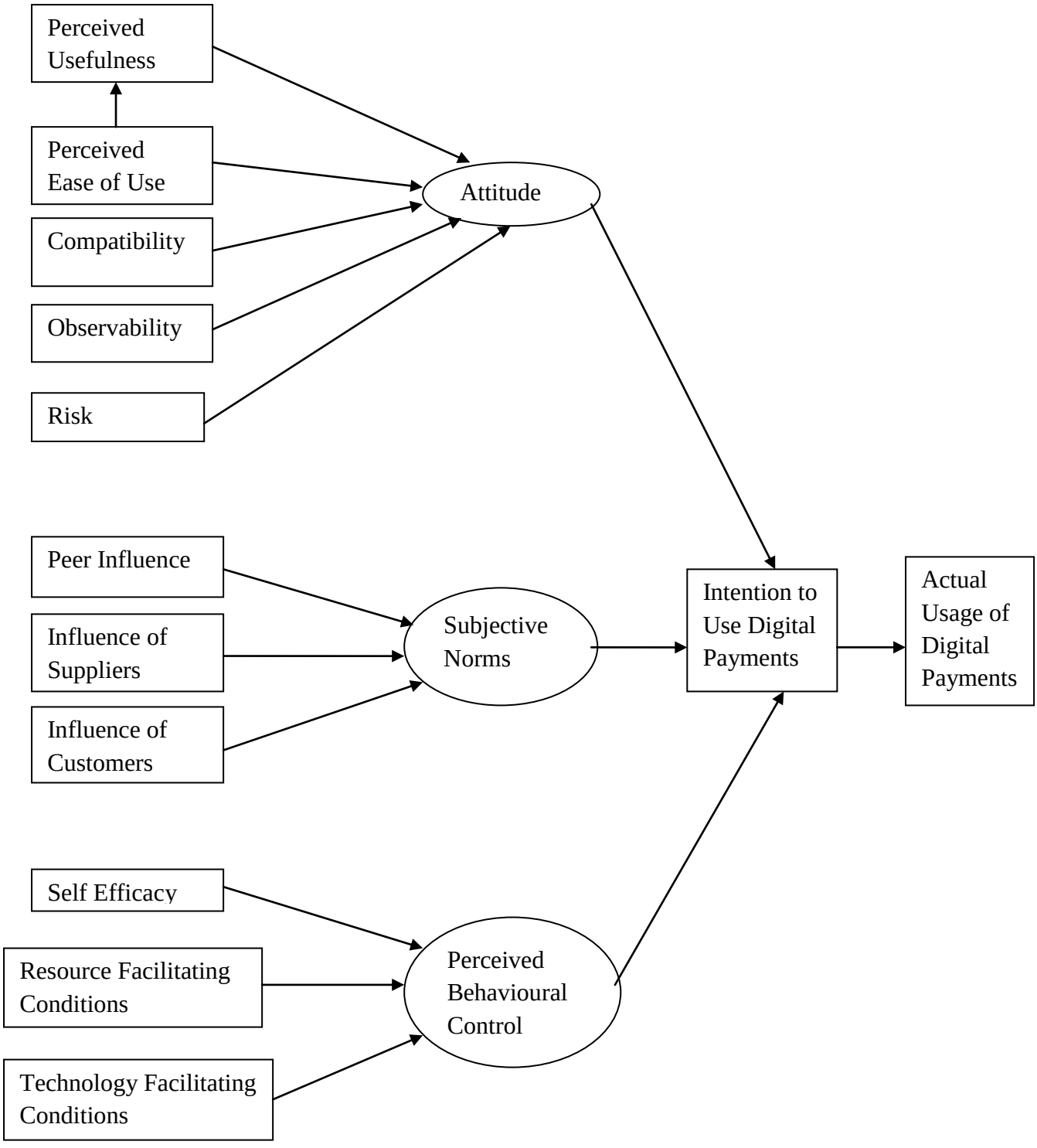

Fig 4: Combined TAM and Decomposed TPB Framework for Digital Payments Adoption by Retailers

ii) Subjective Norms

Subjective norms have been found to be significant in the early stages of innovation implementation when users have limited direct experience from which to develop attitudes (Hartwick and Barki 1994).

In terms of household consumers, the consumer-relevant groups around the individual may influence the individual's adoption. As suggested by Chua (1980) the adopter's friends, family, and colleagues/peers are groups that will potentially influence the adoption. Influence of peers, older generation and younger generation of the family and community have been postulated in the framework to be having an effect on individual consumer's intentions to adopt digital payments.

In terms of retailers, apart from peers, the groups relevant to business i.e., suppliers and customers are expected to influence the adoption of digital payment methods.

It is expected that the influence of these groups as a whole will be significantly related to the individual's intention to adopt digital payments.

iii) Perceived Behavioural Control

Perceived behavioural control refers to the factors that may impede the performance of the behaviour and encompasses self-efficacy, resource facilitating conditions and technology facilitating conditions as postulated in the decomposed TPB approach.

Hill et al. (1986) found that self-efficacy predicts intentions to use a wide range of technologically advanced products. Thus, an individual confident of having the required skills in using technology for making digital payments like operating mobile phones and internet is expected to be more inclined to adopt digital payments by virtue of being comfortable in using the innovation.

The second component, "facilitating conditions," refers to the easy access of resources and technological infrastructure. Goh (1995) suggests that, with the easy availability of

supporting technological infrastructures, adoption of Internet commerce applications becomes more feasible. Goh also suggests that the government can play an intervention and leadership role in the diffusion of innovation. In India, government has become a major driving force in the diffusion of information technology in recent years through the digital India initiative by providing support for resource and technological infrastructure for digitalization in the economy including digital payments. Potential users, in turn view new applications such as digital payment methods more favourably, and are thus more likely to use them. Facilitating conditions reflect the availability of resources needed to perform particular behaviours. With the growing availability of supporting mobile and internet equipments and applications (technology facilitating conditions) and resource factors such as time and money (resource facilitating conditions), digital payments adoption is expected to become increasingly feasible.

3. RESEARCH METHODOLOGY

3.1 Subjects and Procedure

Primary data was collected through a nationwide survey which included internet survey as well as structured telephonic interviews along with direct personal contact made through enumerators especially in the rural areas where population was not expected to be educated enough to understand the questions themselves. Survey of retailers was not done through internet as it could not be ensured over internet if the respondent is actually a retailer. Though internet survey of consumers and pilot survey of retailers and consumers through enumerators in Uttar Pradesh was initiated in January 2017, the major part of survey was conducted during June and July 2017.

As digital payments is a two way process, therefore its acceptability was assessed in both the household consumers and the retailers. A combination of quota sampling and snowball sampling was used in order to have a reasonable sample size of respondents who would be willing to give genuine responses from different regions of India including cities, small towns and villages from each region. Efforts were made to get responses from all the regions of India including Northern, Eastern, North Eastern, Western, Central and Southern India.[8]

Table 1A: Sample Characteristics of Household Consumers (n = 1682)

Demographic characteristics	Frequency	Percent (%)	Cumulative (%)
Gender			
Male	1021	60.7	60.7
Female	661	39.3	100
Age			
<25 years	394	23.4	23.4
25–45 years	717	42.6	66.0
>45 years	573	34.0	100
Region			
Northern	496	29.5	29.5
Eastern	331	19.7	49.2
North Eastern	121	7.2	56.4
Western	318	18.9	75.3
Central	190	11.3	86.6
Southern	226	13.4	100
Urban	923	54.9	54.9
Semi-urban	396	23.5	78.4
Rural	363	21.6	100
Use of Digital Payments			
Several times	693	41.2	41.2
Sometimes	360	21.4	62.6
Rarely	232	13.8	76.4
Never	397	23.6	100

8. Northern region includes Jammu and Kashmir, Himachal Pradesh, Punjab, Uttarakhand , Uttar Pradesh, Haryana, Delhi and Chandigarh. Eastern region is comprised of states of Bihar, Orissa, Jharkhand, and West Bengal. Western region includes the states of Rajasthan, Gujarat, Goa and Maharashtra. Southern region comprises of the states of Andhra Pradesh, Karnataka, Kerala and Tamil Nadu. Central region includes the two states of Madhya Pradesh and Chhattisgarh while North Eastern region includes the states of Assam, Sikkim, Nagaland, Meghalaya, Manipur, Mizoram, Tripura and Arunachal Pradesh.

Though the number of cities, towns and villages covered were limited in case of survey through enumerators, response from internet and telephonic survey were collected from a wide range of places. Complete responses for the survey could be obtained from 1682 household consumers and 781 retailers. Out of the 1682 consumer responses, 307 responses were obtained through internet survey. The response rate from internet survey was very low at around 23 percent. Also, having larger responses from internet survey could introduce a bias towards those who are technologically more adept at using digital payments. Therefore, major proportion of responses was recorded through enumerators from various places. The demographic profile of the respondents is given in Table 1A and Table 1B.

A total of 1682 usable, complete responses were obtained from household consumers. The gender breakdown was approximately 61percent male and 39 percent female. Different age groups were included in the sample with approximately 23 percent respondents below the age of 25 years, 43 percent in the age group of 25-45 years and 34 percent aged above 45 years. Through volunteers references in various regions of India, responses from a representative sample based on population density in each region were collected with approximately 29 percent respondents belonging to northern India, 20 percent from eastern India, 7 percent from north-east region, 19 percent from western region, 11 percent from central India and 13 percent from southern India. Out of these, around 55 percent belonged to urban areas, 23 percent to semi urban areas and 22 percent to rural areas. Considering the volume and value of transactions being higher in the urban areas, the sample was taken to be representative of the population. Around 41 percent respondents were those who had used digital payments several times, 21 percent sometimes, 14 percent were those who had rarely used digital payments and around 24 percent had not used digital payments at all till the time response for this study was recorded.

Table 1B: Sample Characteristics of Retailers (n = 781)

Demographic characteristics	Frequency	Percent (%)	Cumulative (%)
Gender			
Male	758	97.1	97.1
Female	23	2.9	100
Age			
<25 years	143	18.3	18.3
25–45 years	527	67.5	85.8
>45 years	111	14.2	100
Region			
Northern	225	28.8	28.8
Eastern	158	20.2	49.0
North Eastern	46	5.9	54.9
Western	169	21.7	76.6
Central	79	10.1	86.7
Southern	104	13.3	100
Urban	446	57.1	57.1
Semi-urban	199	25.5	82.6
Rural	136	17.4	100
Acceptance of Digital Payments			
Several times	416	53.3	53.2
Sometimes	133	17.0	70.2
Rarely	124	15.9	86.1
Never	108	13.8	100

In case of retailers, a total of 781 usable, complete responses could be obtained as internet survey was not conducted for retailers. Retail in India being pre dominantly a male occupation in the unorganized sector, the gender breakdown was 97 percent male and 3 percent female. 18 percent respondents among retailers were below the age of 25 years, 68 percent in the age group of 25-45 years and 14 percent aged above 45 years. Approximately 29 percent respondents were from northern India, 20 percent from eastern India, 6 percent from north-east region, 22 percent from western region, 10 percent from central India and 13 percent from southern India. Out of these, 57 percent belonged to urban areas, 26 percent to semi urban areas and 17 percent to rural areas. It was difficult to get responses from rural

areas as most of the retailers are not interested in using digital payments methods and are not very open about discussing about it. Out of the retailers in the sample, around 53 percent were those who have been accepting digital payments from their customers at several times, 17 percent have accepted digital payments sometimes, 16 percent were those who had rarely accepted digital payments (most of them during the cash crunch in the period following demonetisation) and around 14 percent had never accepted digital payments till the time response for this study was recorded.

3.2 Measurement

This study adapted the measures used to operationalize the constructs included in the investigated model from relevant previous studies, making minor wording changes to tailor these measures to the context of digital payments. The measures of actual usage, behavioural intention, perceived usefulness and perceived ease of use were adapted from Davis (1989). Two items were used to assess respondents' intentions to adopt digital payments.[9] The first item asks respondents the extent to which they would be interested in using digital payments if it were available to them. The second item asks respondents the likelihood that they will adopt digital payments in the next 6, 12, and 18 months. To derive a value representative of such a scale, Babbie (1990) suggests weighting the responses. Accordingly, a numerical figure for the second item is computed as follows: the time periods of 6, 12, and 18 months are assigned the weights of 3/6, 2/6 and 1/6 respectively. The summation of the responses multiplied by their respective weights would produce a value between 1 and 7 for the second item that represents the respondent's intention to adopt digital payments.

For example, assuming that the respondent indicated 1 for all three time frames, the value will be calculated as 1 X 3/6 + 1 X 2/6 + 1 X 1/6 = 1

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9. This type of measure was used by Tan and Teo (2000) for measuring intentions to adopt internet banking. The first item in the measure is adapted from Davis (1989).

Similarly, if the respondents indicate 7 for all the three time frames, the value will be calculated as: 7 X 3/6 + 7 X 2/6 + 7 X 1/6 = 7

Hence, the minimum and maximum values produced by this transformation are 1 and 7 respectively. Other combinations of values for the three time frames will produce a value between 1 and 7.

The belief items for measuring compatibility and observability were adapted from Moore and Benbasat (1991) while that for risk from Tan and Teo (2000). Along with compatibility with values as given by Moore and Benbasat (1991), compatibility with financial needs was also measured. Measures for subjective norms were revised from Taylor and Todd (1995). Under perceived behavioural control, the measures for self efficacy were adapted from Compeau and Higgins (1995). Respondents were asked to indicate their confidence in using digital payment methods under four different usage situations. Measures for facilitating conditions were adapted from Tan and Teo (2000). Questionnaires for household consumers and retailers were worded differently according to relevant criteria. All items were measured using a seven-point Likert scale with anchors in most cases ranging from strongly disagree to strongly agree. Content validity was established through careful selection and adaptation of items from previously validated instruments while developing the questionnaire. After that, the questionnaire was pretested with 30 household consumers and 12 retailers who were taken as subjects and invited to comment on the questions and wordings. The pretesting focused on instrument clarity, question wording and validity. The feedback from the pilot test provided a basis for revisions to the construct measures and was used to improve the wordings of the questions in the instrument for better comprehension by the respondents. Question items for subjective norms which comprised of two statements for each item were combined into one composite statement and one statement regarding ease of use was dropped as the respondents found it ambiguous. The appendix lists the items used in final survey.

The hypothesized model was empirically tested using the structural equation modelling (SEM) approach, supported by LISREL 9.1 software (Joreskog and Sorbom 2012). Maximum likelihood estimation, which is appropriate for testing structural equation models that have a well-developed underlying theory (Bollen and Long 1993) was used. The measurement model was estimated using confirmatory factor analysis (CFA) to test reliability and validity of the measurement model, and the structural model was analyzed to examine the model goodness-of-fit, overall explanatory power, and postulated individual causal links.

4. ANALYSIS AND FINDINGS

4.1. Measure Reliability and Validity

The research instrument used confirmatory factor analysis (CFA) to examine the reliability and validity. Table 2A and 2B summarize the results of internal reliability and convergent validity for constructs in case of household consumers survey and retailers survey respectively. Internal consistency reliability to test unidimensionality was assessed by Cronbach's alpha. The resulting alpha values ranged from 0.73 to 0.89, which were above the acceptable threshold 0.70 suggested by Nunnally and Bernstein (1994). Convergent validity which refers to the degree to which multiple attempts to measure the same concept are in agreement was assessed based on factor loading, composite reliabilities, and average variances extracted (Hair et. al. 1995).

The results show that the factor loading for all items exceeds the recommended level of 0.6 (Chin et. al. 1997). Composite reliability values, which depict the degree to which the construct indicators capture the latent construct, range from 0.76 to 0.91 thus exceeding the minimum recommended level of 0.7 (Hair et. al. 1995).

The average variances extracted, which reflect the overall amount of variance in the indicators accounted for by the latent construct, were in the range between 0.56 and 0.77 thereby exceeding the minimum recommended level of 0.5 (Hair et. al. 1995).

Table 2A: Results of CFA for measurement model for Households

Construct	Item	Internal Reliability Cronbach's Alpha	Convergent Validity		
			Factor Loading	Composite Reliability [a]	Average Variance Extracted [b]
Actual Usage (AU)		0.82		0.85	0.67
	AU1		0.77		
	AU2		0.75		
Behavioural Intention (BI)		0.78		0.79	0.59
	BI 1		0.68		
	BI 2		0.71		
Perceived Usefulness (PU)		0.81		0.84	0.71
	PU1		0.78		
	PU2		0.81		
	PU3		0.78		
	PU4		0.76		
	PU5		0.79		
Perceived Ease of Use (PEU)		0.82		0.89	0.69
	PEU1		0.72		
	PEU2		0.74		
	PEU3		0.71		
Compatibility (COM)		0.77		0.83	0.73
	C1		0.66		
	C2		0.79		
	C3		0.75		
Observability (OBS)		0.81		0.88	0.56
	O1		0.71		
	O2		0.77		
	O3		0.72		
Risk (R)		0.86		0.91	0.63
	R1		0.76		
	R2		0.73		
	R3		0.81		
Attitude (ATD)		0.79		0.84	0.61
	A1		0.76		
	A2		0.74		
	A3		0.74		

Subjective Norms (SN)		0.74		0.76	0.67
	SN1		0.71		
	SN2		0.62		
	SN3		0.78		
Perceived Behavioural Control (PBC)		0.82		0.87	0.66
	PBC1		0.78		
	PBC2		0.68		
	PBC3		0.77		
	PBC4		0.72		
Self Efficacy (SE)		0.81		0.89	0.72
	SE1		0.81		
	SE2		0.79		
	SE3		0.74		
	SE4		0.82		
Resource Facilitating Conditions (RFC)		0.84		0.81	0.68
	RF1		0.76		
	RF2		0.78		
	RF3		0.69		
	RF4		0.71		
Technology Facilitating Conditions (TFC)		0.87		0.84	0.74
	TF1		0.78		
	TF2		0.74		
	TF3		0.80		

Note: All t-values are significant at $p < 0.005$.

a. Composite reliability = (square of the summation of the factor loadings)/{(square of the summation of the factor loadings) + (summation of error variances)}.
b. Average variance extracted = (summation of the square of the factor loadings)/{summation of the square of the factor loadings} + (summation of error variances)}.

Table 2B: Results of CFA for measurement model for Retailers

Construct	Item	Internal Reliability Cronbach's Alpha	Convergent Validity		
			Factor Loading	Composite Reliability [a]	Average Variance Extracted [b]
Actual Usage (AU)		0.78		0.81	0.77
	AU1		0.72		
	AU2		0.78		
Behavioural Intention (BI)		0.76		0.82	0.61
	BI 1		0.71		
	BI 2		0.82		

Perceived Usefulness (PU)		0.86		0.90	0.73
	PU1		0.79		
	PU2		0.76		
	PU3		0.74		
	PU4		0.69		
	PU5		0.72		
Perceived Ease of Use (PEU)		0.81		0.87	0.63
	PEU1		0.81		
	PEU2		0.78		
	PEU3		0.67		
Compatibility (COM)		0.79		0.79	0.75
	C1		0.71		
	C2		0.76		
	C3		0.73		
Observability (OBS)		0.73		0.81	0.59
	O1		0.69		
	O2		0.74		
	O3		0.72		
Risk		0.83		0.87	0.67
	R1		0.81		
	R2		0.79		
	R3		0.78		
Attitude (ATD)		0.83		0.85	0.69
	A1		0.76		
	A2		0.79		
	A3		0.77		
Subjective Norms (SN)		0.76		0.81	0.58
	SN1		0.71		
	SN2		0.74		
	SN3		0.73		
Perceived Behavioural Control (PBC)		0.87		0.91	0.72
	PBC1		0.74		
	PBC2		0.79		
	PBC3		0.73		
	PBC4		0.76		
Self Efficacy (SE)		0.81		0.89	0.65
	SE1		0.82		
	SE2		0.79		
	SE3		0.74		
	SE4		0.71		
Resource Facilitating Conditions (RFC)		0.79		0.83	0.62
	RFC1		0.68		
	RFC2		0.72		
	RFC3		0.78		
	RFC4		0.75		

Technology Facilitating Conditions (TFC)		0.82		0.86	0.71
	TFC1		0.74		
	TFC2		0.76		
	TFC3		0.72		

Note: All t-values are significant at $p < 0.005$.

Apart from convergent validity, discriminant validity also needs to be measured for the constructs which depicts the degree to which the measures of different concepts are distinct. Discriminant validity can be examined by comparing the squared correlations between constructs and average variance extracted for a construct (Fornell and Larcker 1981) The analysis results showed that the square correlations for each construct is less than the average variance extracted by the indicators measuring that construct, as shown in Table 3A and 3B, indicating adequate discriminant validity for the constructs.

Table 3A: Discriminant Validity of Constructs (Households)

Constructs	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) AU	0.67												
(2) BI	0.31	0.59											
(3) PU	0.17	0.31	0.71										
(4) PEU	0.14	0.42	0.22	0.69									
(5) COM	0.20	0.26	0.31	0.25	0.73								
(6) OBS	0.26	0.19	0.14	0.26	0.30	0.56							
(7) RISK	0.34	0.23	0.19	0.33	0.25	0.18	0.63						
(8) ATD	0.17	0.16	0.11	0.08	0.22	0.20	0.24	0.61					
(9) SN	0.21	0.12	0.27	0.14	0.12	0.21	0.18	0.15	0.67				
(10) PBC	0.23	0.11	0.21	0.24	0.13	0.17	0.16	0.23	0.13	0.66			
(11) SE	0.19	0.24	0.18	0.15	0.27	0.26	0.22	0.16	0.31	0.24	0.72		
(12) RFC	0.11	0.13	0.20	0.13	0.21	0.19	0.09	0.11	0.12	0.19	0.13	0.68	
(13) TFC	0.24	0.17	0.31	0.22	0.17	0.08	0.12	0.14	0.27	0.07	0.16	0.15	0.74

Note: Diagonals represent the average variance extracted, while the other matrix entries represent the square correlations.

Table 3B: Discriminant Validity of Constructs (Retailers)

Constructs	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) AU	0.77												
(2) BI	0.27	0.61											
(3) PU	0.21	0.42	0.73										
(4) PEU	0.18	0.28	0.35	0.63									
(5) COM	0.14	0.17	0.22	0.21	0.75								
(6) OBS	0.23	0.21	0.19	0.18	0.32	0.59							
(7) RISK	0.37	0.14	0.26	0.23	0.18	0.20	0.67						
(8) ATD	0.28	0.18	0.13	0.11	0.27	0.25	0.19	0.69					
(9) SN	0.15	0.24	0.29	0.16	0.21	0.23	0.11	0.16	0.58				
(10) PBC	0.32	0.19	0.14	0.29	0.18	0.13	0.21	0.14	0.24	0.72			
(11) SE	0.24	0.27	0.12	0.17	0.24	0.12	0.18	0.23	0.29	0.22	0.65		
(12) RFC	0.19	0.20	0.22	0.09	0.28	0.23	0.12	0.18	0.17	0.15	0.19	0.62	
(13)TFC	0.31	0.11	0.25	0.14	0.19	0.16	0.09	0.12	0.26	0.13	0.21	0.17	0.71

Note: Diagonals represent the average variance extracted, while the other matrix entries represent the square correlations.

Thus, the measurement model demonstrated adequate reliability, convergent validity, and discriminant validity.

4.2. Structural Model Results

The most acceptable indices were used to measure the overall model fit. These were as follows: a normed Chi-square (Chi-square/ df) with a level between 1.0 and 2.0 (Hair et al. 1995); the adjusted goodness-of-fit index (AGFI) which exceeds the recommended cut-off level of 0.8 (Chau and Hu 2001); a comparative fit index (CFI) larger than 0.9 (Hair et al., 1995); a non-normed fit index (NNFI) with a level of 0.9 (Bagozzi and Yi 1988, Hair et al. 1995); and a root-mean-square error of approximation (RMSEA) with a marginal acceptance level of 0.08 (Steiger 1990, Browne and Cudeck 1993). Table 4A and 4B show the fit statistics for structural model for digital payments adoption by household consumers and retailers respectively. The coefficients of determination R^2 for the structural equations are also given in Table 4A and 4B.

Table 4A: Fit Indices and Explanatory Power of the Structural Model (Households)

Fit index	Value	Recommended Criteria
df	728	
χ^2	1317.68	
Normed Chi-Square (χ^2/df)	1.81	≤ 2.00
AGFI[a]	0.87	≥ 0.80
CFI	0.93	≥ 0.90
NNFI	0.94	≥ 0.90
RMSEA[b]	0.041	≤ 0.08
Explanatory power (R^2)		
R^2 Actual Usage (AU)	0.41	
R^2 Behavioural Intention (BI)	0.52	
R^2 Attitude (ATD)	0.58	
R^2 Subjective Norms (SN)	0.43	
R^2 Perceived Behavioural Control (PBC)	0.57	
R^2 Perceived Usefulness (PU)	0.36	

Table 4B: Fit Indices and Explanatory Power of the Structural Model (Retailers)

Fit index	Value	Recommended Criteria
df	728	
χ^2	1397.76	
χ^2/df	1.92	≤ 2.00
AGFI[a]	0.81	≥ 0.80
CFI	0.91	≥ 0.90
NNFI	0.96	≥ 0.90
RMSEA[b]	0.053	≤ 0.08
Explanatory power (R^2)		
R^2 Actual Usage (AU)	0.37	
R^2 Behavioural Intention (BI)	0.47	
R^2 Attitude (ATD)	0.51	
R^2 Subjective Norms (SN)	0.54	
R^2 Perceived Behavioural Control (PBC)	0.53	
R^2 Perceived Usefulness (PU)	0.31	

a. The adjusted goodness of fit index (AGFI) corrects the GFI, which is affected by the number of indicators of each latent variable.

b. The root mean square error of approximation (RMSEA) avoids issues of sample size by analyzing the discrepancy between the hypothesized model, with optimally chosen parameter estimates, and the population covariance matrix. The RMSEA ranges from 0 to 1, with smaller values indicating better model fit.

The observed normed Chi-square for measurement model for digital payments adoption by household consumers was 1.81 which is smaller than 2 recommended by Hair et. al. (1995). The non-normed fit index (NNFI) is 0.94 and comparative fit index (CFI) is 0.93, greater than the recommended 0.9. The adjusted goodness-of-fit index (AGFI) is 0.87, which exceeds the recommended cut-off level of 0.8.The root mean square error of approximation (RMSEA) for the model is 0.041 in case of household consumers. The combination of these results suggests that the demonstrated measurement model fits the data well. Overall, the structural model displayed a good fit with the data, compared with the suggested fit criteria.

The observed normed Chi-square for measurement model for digital payments adoption by retailers was 1.92. The non-normed fit index (NNFI) is 0.96 and comparative fit index (CFI) is 0.91. The adjusted goodness-of-fit index (AGFI) is 0.81and the root mean square error of approximation (RMSEA) for the model is 0.053 in case of retailers. Thus, in case of retailers too, the results suggest that the measurement model is a good fit to the data.

In terms of predictive power, the coefficients of determination of the dependent variables (R^2_{AU}, R^2_{BI}, R^2_{ATD}, R^2_{SN}, R^2_{PBC} and R^2_{PU}) of the hypothesised model for household consumers are equal to 0.41, 0.52, 0.58, 0.43, 0.57 and 0.36 respectively. In case of the model for retailers, the corresponding values are 0.37, 0.47, 0.51, 0.54, 0.53 and 0.31 respectively.

Furthermore, t-statistics for examining the correlation between the latent constructs and correlation among the latent constructs were used to test path links. The t-statistics exceeded the critical value (1.96) for the 0.05 significance level for most of the coefficients and for few even the 0.01 significance level (critical value = 2.576) (Reisinger and Turner, 1999). The levels of significance for individual paths were assessed by examining the values of β and γ. The path coefficients for models are shown in Table 5A and 5B.

In case of household consumers, perceived usefulness and ease of use were found to be significantly related to attitude. Also, the influence of perceived ease of use on perceived

usefulness was found to be significant as postulated in TAM. The other dimensions of decomposed attitudinal beliefs i.e., compatibility, observability and risk were all found to be significant with risk having a significant negative influence on intention to adopt digital payments.

Peer influence and influence of younger generation has been found to be significant in determining subjective norms but influence of older generation was not significant. Both self efficacy and facilitating conditions are a significant determinant of perceived behavioural control (PBC).

Although, attitude and perceived behavioural control are significantly related to behavioural intention but subjective norm is not significantly related to behavioural intention of household consumers to adopt digital payments. Finally, intention has a significant influence on actual usage.

Table 5A: Path coefficients for Household Consumers

Paths	Coefficient
βIntention, Attitude	0.67*
βIntention, Subjective Norms (SN)	0.14
βIntention, Perceived Behavioural Control (PBC)	0.40*
βUsage, Intention	0.48*
γPerceived Usefulness, Perceived Ease of Use	0.36**
γAttitude, Perceived Usefulness	0.72*
γAttitude, Compatibility	0.06**
γAttitude, Perceived Ease of Use	0.34*
γAttitude, Observability	0.19**
γAttitude, Risk	- 0.59*
γSN, Peer Influence	0.26*
γSN, Elders Influence	0.09
γSN, Young Generation Influence	0.27**
γPBC, Self Efficacy	0.65*
γPBC, Resource Facilitating Conditions	0.24**
γPBC, Technology Facilitating Conditions	0.31*

Note: *Significant at $\alpha = 0.01$
** Significant at $\alpha = 0.05$

Table 5B: Path Coefficients for Retailers

Paths	Coefficient
βIntention, Attitude	0.72*
βIntention, Subjective Norms (SN)	0.17**
βIntention, Perceived Behavioural Control (PBC)	0.39*
βUsage, Intention	0.19*
γPerceived Usefulness, Perceived Ease of Use	0.41**
γAttitude, Perceived Usefulness	0.81*
γAttitude, Compatibility	0.28**
γAttitude, Perceived Ease of Use	0.37**
γAttitude, Observability	0.13
γAttitude, Risk	- 0.76*
γSN, Peer Influence	0.51*
γSN, Suppliers Influence	0.03
γSN, Customers Influence	0.62*
γPBC, Self Efficacy	0.37*
γPBC, Resource Facilitating Conditions	0.11
γPBC, Technology Facilitating Conditions	0.24*

Note: *Significant at α = 0.01
** Significant at α = 0.05

In case of retailers, perceived usefulness and ease of use were again found to be significantly related to attitude with the influence of perceived ease of use on perceived usefulness also being significant. Out of the other dimensions of decomposed attitudinal beliefs, compatibility and risk were found to be significant with risk having a negative influence on intention of retailers to accept digital payments from the customers. Observability was not found to be a significant determinant of attitude in case of retailers. Peer influence and influence of customers has been found to be significant in determining subjective norms but influence of suppliers was not significant. Self efficacy and technology facilitating conditions are significant determinants of perceived behavioural control but resource facilitating conditions are not significant in influencing retailers in terms of perceived behavioural control.

In case of retailers, all the three factors of attitude, subjective norms and perceived behavioural control were found to be significantly related to behavioural intention and intention in turn was found to have a significant influence on actual usage of digital payments.

V. DISCUSSION AND CONCLUSIONS

This study was aimed at understanding the factors influencing the digital payments adoption decision of households and retailers in India using a combination of Technology Adoption Model (TAM) and Decomposed Theory of Planned Behaviour (TPB). The framework postulates that a person's intention to adopt digital payments is determined by attitude, subjective norms; and perceived behavioural control. These were further decomposed using constructs from innovation literature.

Perceived usefulness and ease of use are found to be significant factors in influencing intentions through attitude in line with the past literature which has consistently shown that perceived usefulness and perceived ease of use have a significant and positive influence on the intention to adopt new innovations (Davis et. al. 1989, Moore and Benbasat 1991; Dennis et. al. 1992, Adams et. al. 1992). However, certain studies like Subramanian 1993 did not find ease of use to be a significant determinant of predicted future usage. The significance of ease of use in influencing digital payments adoption increases in Indian scenario as there is a large proportion of population which is not technology savvy and many do not have the minimum level of education and skills required to operate complicated applications or tools based on digital technology. Perceived usefulness is judged by a consumer or retailer in a comparative perspective relative to doing the transactions in cash. Digital payments are more likely to be adopted if the benefits of digital payments in terms of efficiency and effectiveness are significant when compared to cash payments. This implies that the

campaigns for increasing the level of digital payments adoption should focus on not only the ease of use dimension but also the benefits in terms of more productive use of resources, efforts and time.

The support for compatibility with values and lifestyle is consistent with Rogers' suggestion that compatibility of an innovation with a previously introduced idea can influence the adoption of the innovation. The development of financial products and services in India along with information technology innovations has made digital payments compatible with the lifestyle of modern India. Further, Hirschman (1980) has suggested that prior experience with a product class (the internet and mobile technology in this case) may lead to greater acceptability of new products (digital payments in this case), hence increasing the likelihood that they will be adopted. It is also consistent with Roger's suggestion that an innovation is more likely to be adopted if it meets a felt need. Therefore, it is likely that household consumers who have to make frequent retail financial transactions would have higher needs for convenient and easily accessible payment channels such as mobile wallets, UPI, mobile banking, etc. and thus be more likely to adopt them.

Also, the support for observability in case of household consumers is consistent with Rogers' argument that the degree to which the results of an innovation are visible to others has a positive influence on the rate of adoption of the innovation. The insignificant path coefficient for observability in case of retailers may be due to the fact that results of adoption of digital payments by retailers are not explicitly visible to other retailers as they are not disclosed openly to an extent which may create a significant influence on intention of retailers to adopt digital payments.

The significant negative coefficient for risk reflects similar arguments in the literature (Bhimani 1996; Cockburn and Wilson 1996; Lee 1996; Quelch and Klein 1996), which state that the perceived security and privacy risk associated with banking on the Internet is a major

impediment to the adoption of Internet banking. Digital payments are an extension to internet banking and the users have similar concerns about risk and privacy. This implies that enhancement in cyber security; strict laws and assurance of privacy by the government may lead to faster adoption of digital payments. The implementation of Goods and Services Tax is expected to play a significant role in reducing the inducement for cash transactions done in place of digital payments due to the perceived risk of disclosure of income to the authorities in adopting the latter. The recent Supreme Court judgement reaffirming the right to privacy is also expected to contribute in mitigating the perceived risk of losing privacy while making digital payments.

As expected, self-efficacy is found to be significant for both household consumers and retailers. Hence, users who are confident of their abilities to use digital payment methods are more likely to adopt such tools. This is consistent with the findings of previous studies (Burkhardt and Brass 1990; Hill et al. 1986), which found that self-efficacy has a significant influence on intentions to adopt new innovations.

The technology facilitating conditions is also found to have a significant influence on intentions to adopt digital payments as expected because the required technology support through internet connectivity along with mobile applications is essential for consumers to be able to adopt digital payments more easily. The resource facilitating conditions including money and time required for digital payments is also found to be significant in case of household consumers. The affordability of mobile phones has been a positive influence on digital payments adoption while the charges on digital payments have a negative influence as it is perceived as an extra cost over cash transactions. Hence, digital payments are more likely to be adopted if the usage charges are lower. Conversely, the resource facilitating conditions are found to have a positive but insignificant effect in case of retailers in contrast with previous findings. This may be due to the fact that retailers were surveyed for accepting

digital payments and not for making them. The costs for acceptance of digital payments are not significant except for acceptance of card payments which attract the merchant discount rate (MDR). Other methods of digital payments such as e-wallets do not incur any significant charges on the retailers for accepting digital payments. The retailers surveyed for this study were the ones in the unorganized sector as organized retail sector has been accepting digital payments in the form of card payments since long now. The concern for making India a less cash dependent economy is to get the small retailers who are catering to the major part of population to start accepting digital payments. These retailers started accepting payments through e-wallets during cash crunch after demonetization as firms like Paytm ensued aggressive marketing to cash on the opportunity. Still, there are very few small retailers who have installed the PoS machines to enable card payments though payments through e-wallet are becoming increasingly acceptable. This might have led to the coefficient of resource facilitating conditions to be insignificant in case of retailers in the study.

The results also show that the influence of the user's consumer relevant groups on his or her adoption is not significant. This result is in contrast with the results reported by Hartwick and Barki (1994) and by Taylor and Todd (1995), who found subjective norms to be important in affecting adoption in the early stages of introducing an innovation. A possible explanation for the lack of support for this hypothesis is that the easy access to information about the digital payments methods encouraged by government support for awareness campaigns regarding digital modes of payments has made potential adopters less reliant on their referent groups and also because the referent group in the smaller towns and rural areas itself does not comprise of a significant proportion of digital payments users. This result is similar to that obtained by Tan and Teo (2000) in the context of internet banking adoption in Singapore.

In case of retailers, subjective norms were found to be significant in influencing adoption of digital payments. The peer group which comprises of other retailers are in fact a competition

and therefore the adoption of digital payments by them influences adoption of digital payment methods by the retailers. Similarly the customers are the most influential referent group for the retailers in their decision to accept digital payments. If more customers think that the retailers should accept payments in digital mode, their influence becomes significant in retailers' intention and actual acceptance of digital payments. This implies that if household consumers can be convinced for adopting digital payments, this will in turn lead to a rise in acceptance of digital payments by the retailers.

The findings generated from this study have important implications for research; firms and banks providing digital payment solutions; and the government. In terms of research, this study provides further evidence on the appropriateness of using Roger's innovation attributes to measure the different dimensions of attitude towards digital payments adoption.

The results from this study have also shown that there are factors apart from attitudinal ones that can help us understand the adoption intentions for digital payments in a better manner. Two additional influencing factors (subjective norms and perceived behavioural control) proposed by Ajzen in the theory of planned behaviour, were included in this study. Although subjective norms were not found to significantly influence adoption intentions of consumers, perceived behavioural control dimensions were found to have significant influences on both consumers and retailers.

The findings of this study also hold important practical implications for banks and firms that are currently offering digital payments solutions and others that are planning to offer such services. As consumers were found to rely on their own judgement without being influenced by the referent groups, government, financial technology firms and banks should launch campaigns to create direct awareness among these individuals. Issues such as fears of privacy

and security risks together with comparative usefulness or relative advantages of using digital payments should be highlighted to educate potential customers.

This study was conducted to explore the factors influencing intentions to adopt digital payment methods. This study incorporated the constructs on perceived characteristics of innovation as given by Rogers (1983) for decomposing attitudinal influence on adoption of digital payments. Future research in this direction may include the analysis on the characteristics of the decision making unit (consumers or retailers in this study) which include socio-economic characteristics, personality variables and communication behaviour. Most studies in innovation diffusion literature have focussed on the perceived characteristics of innovation. The other four dimensions influencing the rate of adoption of an innovation mentioned by Rogers which are type of innovation decision- optional, collective or authority; communication channels; nature of social system; and extent of change agent's promotion efforts need to be given attention in future research on digital payments adoption. The characteristics of decision making unit and the above mentioned four dimensions are expected to be significant in further explaining the adoption of digital payments adoption particularly in emerging economies like India which also has a diverse socio-cultural environment.

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APPENDIX A: Questionnaire Items for Survey of Household Consumers

Actual Usage

AU1: How often do you use digital payments?

AU2: At an average, how many times do you use digital payments in a month?

Behavioural Intention

BI1: How much you would be interested in using digital payments methods if they were available to you

BI2

a: How likely are you to adopt digital payments in the next 6 months

b: How likely are you to adopt digital payments in the next 12 months

c: How likely are you to adopt digital payments in the next 18 months

Perceived Usefulness

PU1: Digital Payments make it easier for me to conduct my transactions.

PU2: Digital Payments give me greater control over my finances.

PU3: Digital Payments enable me to conduct my transactions more quickly.

PU4: Digital Payments increase my efficiency.

PU5: Digital Payments are useful for me in managing my financial resources.

Perceived Ease of Use

PEU1: I believe that it is easy to use digital payments for doing what I want to do.

PEU2: It is easy to learn how to make digital payments.

PEU3: It is easy for me to remember the process of making digital payments.

Compatibility

COM1: Digital Payments are compatible with my lifestyle.

COM2: Digital Payments fit well with the way I like to pay for my transactions.

COM3: Digital Payments fit into my working style.

Observability

OBS1: I have seen many people making digital payments.

OBS2: It is easy for me to observe others making digital payments.

OBS3: The results of using digital payments methods are apparent to me.

Risk

RISK1: I am apprehensive over the security aspects of digital payments.

RISK2: Information regarding my digital payments transactions would be known to others.

RISK3: Information concerning my digital payments transactions can be tampered with by others.

Attitude

ATD1: I feel using digital payments is a good idea.

ATD2: I feel using digital payments is a wise idea.

ATD3: I like to use digital payments.

Subjective Norms

SN1: My colleagues/peers are important for me and my decision to adopt digital payments would be influenced by what they think.

SN2: Elders of my family and community are important for me and my decision to adopt digital payments would be influenced by what they think.

SN3: Younger generation of my family and community are important for me and my decision to adopt digital payments would be influenced by what they think.

Perceived Behavioural Control

PBC1: I would be able to operate digital payment methods.

PBC2: I have the resources to use digital payments.

PBC3: I have the knowledge to use digital payments.

PBC4: I have the ability to use digital payments.

Self-efficacy

SE1: I am confident of using digital payments methods if I have only the online instructions or "help" for reference.

SE2: I am confident of using digital payments methods even if there is no one around to show me how to do it.

SE3: I am confident of using digital payments methods even if I have never used such a system before.

SE4: I am confident of using digital payments methods if I have just seen someone using it before trying it myself.

Resource Facilitating Conditions

RFC1: I can easily afford to get a mobile phone for making digital payments.

RFC2: Internet connectivity required for digital payments is easily available to me.

RFC3: I have the time for making digital payments.

RCF4: Charges imposed for making digital payments are insignificant for me.

Technology Facilitating Conditions

TFC1: Advances in Internet security technology provide for safer digital payments.

TFC2: Faster Internet access speed is important for digital payments.

TFC3: New technological developments like mobile applications, makes digital payments more feasible.

APPENDIX B: Questionnaire Items for Survey of Retailers

Actual Usage

AU1: How often do you accept digital payments?

AU2: At an average, how many times do you accept digital payments in a month?

Behavioural Intention

BI1: How much you would be interested in accepting digital payments if they were available to you

BI2

a: How likely are you to adopt digital payments in the next 6 months

b: How likely are you to adopt digital payments in the next 12 months

c: How likely are you to adopt digital payments in the next 18 months

Perceived Usefulness

PU1: Digital Payments make it easier for me to conduct my business.

PU2: Digital Payments give me greater control over my finances.

PU3: Digital Payments enable me to conduct my business transactions more quickly.

PU4: Digital Payments increase my efficiency.

PU5: Digital Payments are useful for me in managing my financial resources.

Perceived Ease of Use

PEU1: I believe that it is easy to use digital payments for doing what I want to do.

PEU2: It is easy to learn how to accept digital payments.

PEU3: It is easy for me to remember the process of accepting digital payments.

Compatibility

COM1: Digital Payments are compatible with my lifestyle.

COM2: Digital Payments fit well with the way I like to accept payments for my transactions.

COM3: Digital Payments fit into my working style.

Observability

OBS1: I have seen many people accepting digital payments.

OBS2: It is easy for me to observe others accepting digital payments.

OBS3: The results of accepting digital payments are apparent to me.

Risk

RISK1: I am apprehensive over the security aspects of digital payments.

RISK2: Information regarding my digital payments transactions would be known to others.

RISK3: Information concerning my digital payments transactions can be tampered with by others.

Attitude

ATD1: I feel accepting digital payments is a good idea.

ATD2: I feel accepting digital payments is a wise idea.

ATD3: I like to accept digital payments.

Subjective Norms

SN1: My peers are important for me and my decision to adopt digital payments would be influenced by what they think.

SN2: My suppliers are important for me and my decision to adopt digital payments would be influenced by what they think.

SN3: My customers are important for me and my decision to adopt digital payments would be influenced by what they think.

Perceived Behavioural Control

PBC1: I would be able to operate digital payment methods.

PBC2: I have the resources to accept digital payments.

PBC3: I have the knowledge to accept digital payments.

PBC4: I have the ability to use digital payments.

Self-efficacy

SE1: I am confident of using digital payments methods if I have only the online instructions or "help" for reference.

SE2: I am confident of using digital payments methods even if there is no one around to show me how to do it.

SE3: I am confident of using digital payments methods even if I have never used such a system before.

SE4: I am confident of using digital payments methods if I have just seen someone using it before trying it myself.

Resource Facilitating Conditions

RFC1: I can easily afford to get a device for accepting digital payments.

RFC2: Internet connectivity required for digital payments is easily available to me.

RFC3: I have the time for accepting digital payments.

RCF4: Charges imposed for accepting digital payments are insignificant for me.

Technology Facilitating Conditions

TFC1: Advances in Internet security technology provide for safer digital payments.

TFC2: Faster Internet access speed is important for digital payments.

TFC3: New technological developments like mobile applications, makes digital payments more feasible.