An Extended Tam Model to Explain the Adoption of Payment Banks in India

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Abstract. In the present context banking is all about innovation for survival. With the emergence and complete acceptance of digital KYC and mobile banking model, India has flown to next stage technical banking innovation i.e. Payment Banks. Introduction of Payment banking is one of the most strategic change in Indian banking platform implemented by the Indian government to promote financial inclusion among the Indian economy. Thus, the purpose of this study is to investigate the factors that influence the adoption of Payment Banking by current customers. Through, various dimensions and theories of adoption a comprehensive research model of the current study is established with seven factors i.e. Social Influence, Facilitating Conditions, Trust, Perceived Ease of Use, Perceived Usefulness, Behavioural Intension and Adoption. Data was collected by field survey questionnaire from various customers using Payment Banks services. The results mainly showed that intension to adopt Payment Banks services is significantly and positively influenced by Perceived Usefulness and Trust whereas facilitating conditions found to have effect on perceived ease of use. Social influence construct of UTAUT, used as external variable to TAM model in current study, positively effects both Perceived Usefulness and Trust. This Study has both theoretical and managerial contribution in area of adoption of IT/IS studies and Payment Banks.

Keywords: Payment bank · Adoption · TAM · Trust · Social influence · Facilitating conditions

1 Introduction

The international economy has expanded and advanced both towards institutional and market prowess, as the banking industry has gone through various innovative phases [30]. Information technology and the internet has played a significant role in the development of financial service deliberation for the economic growth of the country. With technology financial services are now available at the fingertips of people, and they are much efficient, trustworthy and secure with the passage of time.

In India, significant semi-urban and rural population remain deprived of the formal financial system; most of them do not actively use their bank accounts. Payments banks were set up with the motive of financial inclusion, so they can extend financial services to non-urban areas with increased quality and reduced cost, which has enhanced financial infrastructure in developing country like India [26, 39]. As like other

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commercial banks, payment banks also provide offers on e-commerce websites for their advertising and adoption and increase customer base.

Many researchers have explored the concept of mobile banking and internet banking. Nevertheless, still, the literature lacks noble research in the area of payments banks though they have a significant role in financial inclusion and expansion of digital payments model in India. So, this study aims to identify the customer's adoptions of payment banks through Technology Acceptance Model (TAM) and constraints of the Unified Theory of Acceptance and Use of Technology (UTAUT) with Trust (TR) as literature has already discussed the framework of payment banks and their motive of implementation in Indian economy [18, 37].

After serving demonetization crises in 2016 and corona pandemic in 2020, payment banks literature is in its nascent stage in India, but still few studies have been carried out in adoption framework of the payment banks [18]. Even though this study has analyzed few predictors of payment banks, but still relevant predictor Perceived Ease of use (PEOU) and Perceived Usefulness (PU) could explain payment banks. TAM and UTAUT variables were considered for the quantitative model of this study, which are widely applied in studies of adoption of Information systems [3, 4, 22, 25].

2 Literature Review

Through the last decade, India has gone through various technological advancement i.e. ATM, mobile banking, internet banking and still fintech are working towards development of payment system day by day. With the implementation of information technology in financial services, they have become quite dynamic and can be accessed anytime from anywhere as compared to traditional financial services that were place and time centric.

Payment Banks consist of the features of both mobile banking and internet banking, as the operations are widely conducted on mobiles or computer screen by the use of the internet. As the literature support, there are various theories which have been studied to ascertain the various factors that lead to the Adoption of mobile banking [10, 28, 37, 38] or internet banking [26, 27, 36] technology by the customers. Therefore, theoretical base for this study is being acquired from various classic theories and models formulated in Information System/Information Technology (IS/IT) areas related to banking. Theory of Reasoned Action (TRA) [1] a psychological theory in which behavioural is directly determined by intension further intension to adopt is predicted by both attitude and subjective norms. Theory of Planned Behaviour (TPB) [2] which is an extension of TRA theory [6], Innovation Diffusion Theory (IDT) [35], the Technology Acceptance Model (TAM) [13], Unified Theory of Acceptance and Use of Technology (UTAUT) [42]. These theories were mostly proposed to study the organizational culture and assess behavioural intension of people.

TAM model is widely considered as the one of the strongest, parsimonious [4], robust and highly accepted model [13], from last two decades. Designed on the base of Theory of Reasoned Action (TRA) [14]. In TAM model as per Davis [13] adoption of technology is directly influenced by Behavioural Intension (BI) to use that technology and Behavioural Intension is further influenced by Attitude and two beliefs: PU and

PEOU. However, through previous studies, it has been concluded that attitude does not mediate the effect of PU and PEOU on BI [39, 45] and Davis [13] in his original study also found weak relation of attitude and BI in comparison of effect of PU on BI. Therefore, attitude has been excluded from the model [32, 42].

Even though TAM being most identified model, but as literature supports TAM alone has not been able to predict and explain properly BI to use any technology [11, 32]. TAM has extended in various studies to improve the predictive power of the model. Al-Somali [6] has extended TAM by including Trust, Social Influence (SI), self- efficacy and quality of internet connection as control variables. TAM was combined with Theory of Planned behaviour. Gefen [16] in his study proposed extended tam model by including trust, lifestyle, FC and compatibility as an additional construct. Gu [17] has incorporated the TAM model with the UTAUT model to predict consumer intension and attitude to adopt mobile wallet in India. To study student intension to adopt mobile banking, Nikou [31] has explained and extended TAM with constructs from the UTAUT model.

2.1 Conceptual Model and Hypothesis

The study aims to examine the BI towards Adoption of payment banks, which is quite a complex process as it involves various personal, utilitarian and behavioural aspects. Constructs of TAM, i.e. PEOU and PU were considered for the study, but theses constructs alone were not sufficient to explain BI and Adoption. Therefore, TAM model has been extended and modified by including Trust [5, 11], as Trust has already been the crucial construct predicting BI to adopt any technology [3].

Even though PEOU and PU as the key constructs to predict BI in the TAM model, Davis [13] mentioned both PEOU and PU could be affected by external variables. So, in the current study, SI [6, 36] and FC [17, 31] are considered as external variables which will affect both PEOU and PU respectively.

Perceived Usefulness (PU). In the TAM model, PU is considered as the significant predictor of BI to adopt any technology. PU has been defined as "the extent to which a consumer believes that using Payment banking services would enhance his or her banking performance" [13]. Many Information Systems (IS) researchers have proven that BI to use any technology is positively influenced by PU [13, 41]. Over and above PEOU, PU is also affected by various external factors.

H1. Perceived Usefulness (PU) will positively influence customers Behavioural Intension (BI) to Adopt Payment Banks services.

Perceived Ease of Use (PEOU). PEOU can be defined as "the degree to which a person believes that using a particular system would be free of effort" [13]. Technology is found to be at ease when a customer finds technology user-friendly, more accessible and effortless to operate. As more comfortable the technology to use, the useful and accepted it becomes for customers [12].

As observed in few studies, PU is also affected by PEOU, as the easy the technology to use, the more useful and accepted it becomes for customers. Studies in various context [33, 44] has pointed that PEOU has a significant and positive effect on PU.

H2. Perceived Ease of Use (PEOU) will positively influence customers Behavioural Intension (BI) to adopt Payment Bank services.

H3. Perceived Ease of Use (PEOU) will positively influence Perceived Usefulness (PU) associated with Adoption of payment banks.

Social Influence (SI). SI was earlier documented in Theory of Reasoned Action (TRA) as "subjective norm" [1, 14], later it emerged as one of the constructs in UTAUT model [42]. SI is defined as "the extent to which an individual perceives that important others believe he or she should apply the new system" [42]. Encouragements and information's provided from peers such as friends, family, reference groups and leaders can deliver awareness and build a sense of trust which inspires to use any technology more effectively. In various studies, SI has successfully been incorporated into the TAM model and found that SI affects both BI and PU [31].

Venkatesh [41] in their study also found SI positively and significantly affect PU.

There are several studies which have demonstrated that Trust is effected by SI especially while operating through online banking as it involves uncertainty about the transaction's outcome [20, 29]. Moreover, when customers find any difficulty while operating through online banking, they try to find a solution by interacting with their social network [29].

H4. Social Influence (SI) will positively influence Perceived Usefulness (PU) to use the payment bank.

H5. Social Influence (SI) will positively influence Trust (TR) associated with the Adoption of the Payment Banks.

Facilitating Conditions (FC). FC can be characterized as "the degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system" [42]. FC comprises of proper technical infrastructure and convenient availability of technical suggestions to facilitate the use of any technology. In starting people could not use technical services adequately, but they will feel connected to any technology if they realize that various environmental conditions will support them to learn that technology [17]. Gu [17] in his study has found a significant and positive impact of FC on PEOU.

H6. Facilitating Conditions (FC) will positively influence Perceived Ease of Use (PEOU).

Trust (TR). Trust is often defined in three dimensions [8] first ability: ability means technology provider has enough awareness and understanding to complete their task. Second is integrity means that technology service provider keeps their promises with their customers, last but not the least is benevolence with states that technology service providers will work according to the customer needs rather than imposing their own interest. As per the previous literature, their exist a positive relationship between TR and BI. [4, 23]. Luo [23] has shown a positive and significant effect on both BI and performance expectancy.

H7. Trust (TR) will positively influence customers Behavioural Intention (BI) to adopt Payment Banks services.

Behavioural Intention (BI). Consumer willingness and intension are considered as the essential requirement to study the real behaviour of adopting any new technology. As per the previous studies of IS/IT, BI has a significant relationship with Actual Adoption (AD) of any technology [41, 42]. Venkatesh [42] has empirically tested BI as the valid predictor of Adoption. The relationship of BI and AD has largely been proven in various mobile and internet banking studies [4, 24].

H8. Behavioural Intension (BI) will positively influence Actual Adoption (AD) of Payment Banks services.

3 Methodology

Items were measured using a five-point Likert scale where '1' for strongly disagree, '3' for neutral point and '5' for strongly agree. Respondents of the questionnaire were mostly from Allahabad, Auraiya, Kanpur, Delhi-NCR, Pune regions. The questionnaire consisted of two sections, part one consists of demographic questions and part two consist of items (questions based on variables). Thirty scales items have been used in the present study to evaluate the constructs of the conceptual model [13, 16, 40–43]. Four constructs from TAM (PE, PEOU, BI and AD) and two external constructs influences are also included from UTAUT (SI and FC), they are being measured by same items as used in original TAM and UTAUT model by Davis [13] and Venkatesh [42]. Perceived Trust has also been widely enumerated as a significant predictor of BI. In the current study, Perceived Trust is being measured by six items taken from Gefen [16].

Data is collected from both industry professionals and students, as in the field of information systems responses from college students are being criticized as they may not be similar to the target population [25]. However, students often have convenient access to the internet and the basic computer skills required for conducting various online activities. Whereas they also possess necessary technology infrastructure to conduct mobile banking and internet banking. [23, 25].

4 Results

4.1 Respondents' Profile and Characteristics

Two hundred and Forty-Three (243) valid questionnaire of payment banking were completed by current payment banking customers. 63.79% of the respondents were male compared to 36.21% of the respondents were female. Relating to the respondents age, it was noticed that the age group of 21–30 captured the largest part of the total valid sample (74.48%) i.e. 181. With reference to the annual income level, the vast majority of respondents have less than 3,00,000 as their annual income followed by income group of 5,00,000–10,00,000 with (85) 34.98% and (71) 29.22% respectively.

4.2 Normality

To test univariate normality of each variable, the skewness-kurtosis approach has been adopted [9, 21]. The values of skewness and kurtosis are found to be within their respective levels when tested using AMOS 23.0. all the values of skewness and kurtosis are below the cut-off point of '3' and '8' respectively [21].

4.3 Structural Equation Modelling Analysis

Collected data is further being analyzed through Structural Equation Modelling (SEM).

4.4 Measurement Model: Confirmatory Factor Analysis

Model Fitness. To evaluate model fitness all main indices are being tested. The model fitness yields of the initial model of Payment Banks are as follows: CMIN/DF(Normed Chi-Square) = 1.521, GFI (Goodness-of-Fit Index) = 0.875, AGFI(Adjusted Goodness-of-Fit Index) = 0.845, NFI(Normed-Fit Index) = 0.888, CFI(Comparative Fit Index) = 0.958 and RMSEA(Root Mean Square Error of Approximation) = 0.046. As some of these values could not reach the minimum cut-off point as required [19]. So, to increase the goodness of fit of Payment Bank model problematic items were dropped, excluded items involve items with factor loadings less than 0.50 [19] or those which had higher residual value (Anderson et al., 1995).

Items (FC4) from FC, one item (TR4) from the TR, one item of PEOU (PEOU4) and lastly (PU3) from PU were observed to have under their cut-off value and thus removed. The revised model was again tested, after dropping all problematic items and as anticipated model fitness improved significantly (CMIN/DF = 1.223, GFI = 0.914, AGFI = 0.888, NFI = 0.921, CFI = 0.984 and RMSEA = 0.030 [19].

Construct Reliability. Composite Reliability CR), Average Variance Extracted (AVE) and Cronbach's alpha (α) values are being considered to measure adequate level of scale reliability of all constructs. Cronbach's alpha (α) value for all constructs are above cut-off point of 0.70 whereas all value of α range between .788 for SI to .873 for both BI and Trust (Nunnally, 1978). Composite Reliability (CR) for all constructs are above the minimum cut-off point of 0.70 [15]. 0.874 being the highest value for BI while the lowest was for the SI (0.788). as all indexes are above the cutoff point, While Average Variance Extracted (AVE) for all the construct are above 0.50 and as per data its ranges 0.554 Social Influence to 0.661 Perceived Usefulness.

Construct Validity. To measure construct validity both convergent and discriminant validity were observed. As Items of all constructs has significant standardized regression weight (factor loadings) above cut-off point of 0.50 and factor loading of all items are all found to be significant as p value is less than 0.0001 [15, 19]. As the square root of AVE for all constructs is higher than their inter-correlation values with all other constructs. As observed all values are above the cut-off point, which indicates that data has no issue of convergent validity.

Common Method Bias (CMB). For assessing CMB, Harman's single factor test [34] was done with all unremoved items of 7 construct (PU, SI, FC, TR, PEOU, BI, AD). Items of all constructs were entered into exploratory factor analysis, but fixed number of factors were set to 1. With unrotated factor analysis, results showed that first factor explains 44.228% which is less than cut-off value of 50% [34] of variance and no single factor was able to arise as good as first factor.

4.5 Structural Model

All statistical results of measurement model as indicated above are found to be satisfactory. Statistical results of various path coefficients are summarised in Table 1. As recommended by Hair [19], various values of model fit (CFI, IFI and TLI) should be greater than 0.90 and RMSEA value should be less than 0.08 for good fit of model. Various statistical fit indices of the structural model are as follows: Chi-Square/df = 2.005; CFI = 0.926; TLI = 0.915; IFI = 927, and RMSEA = 0.064.

Table 1. Assessment of reliability and discriminant validity

	CA	AVE	CR	PU	SI	FC	TR	PEOU	AD	BI
PU	.854	0.661	0.854	**0.813**						
SI	.791	0.557	0.790	0.629	**0.746**					
FC	.831	0.621	0.830	0.750	0.608	**0.788**				
TR	.873	0.580	0.873	0.691	0.592	0.630	**0.761**			
PEOU	.844	0.706	0.878	0.668	0.594	0.535	0.669	**0.840**		
AD	.835	0.632	0.837	0.673	0.589	0.602	0.716	0.556	**0.795**	
BI	.873	0.635	0.874	0.623	0.743	0.612	0.552	0.507	0.683	**0.797**

Various factors of extended TAM were found to be significant with Behavioural Intension to use Payment Bank services except PEOU. External variables also found to have significant effect on PEOU and PU: SI has positive and significant impact ($b = 0.631$, $p < 0.000$) on PU and ($b = 737$, $p < 0.000$) on Trust whereas, FC has also significantly impacted PEOU ($b = 0.630$, $p < 0.000$). The main path coefficient begin with PU, PEOU and TR and ends on BI: PU ($b = 0.501$, $p < 0.000$), Trust ($b = 0.268$, $p < 0.000$) were found to have significant impact on BI whereas Ease of Use ($b = 0.042$, $p < 0.577$) not proved to have any statistical relation with BI.

Whereas in support of literature, statistical results also proved to have a significant impact of PEOU on PU. Further impact of Behavioural Intension on use of Payment Banks services on adoption was analysed. It reported to positive and significant ($b = 0.725$, $p < 0.000$) impact. Therefore, all the hypothesis H1 and H3-H9 except H2 are supported. The value of (R2) for endogenous factors, extracted from dependent variables i.e. 40% for PEOU, 69% for PU, 54% for TR, 54% for BI and 53% for adoption (Fig. 1 and Table 2).

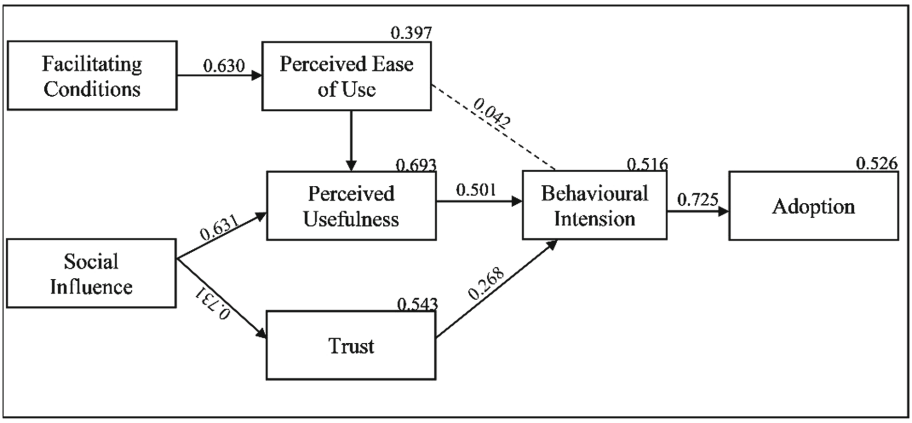

Fig. 1. Validated research model

Table 2. Results of quantitative test between path coefficients and their p-values

	Hypotheses	Estimate	p-value	Result
H1	PU → BI	0.501	***	Supported
H2	PEOU → BI	0.042	.577	Not Supported
H3	PEOU → PU	0.308	***	Supported
H4	SI → PU	0.631	***	Supported
H5	SI → TR	0.737	***	Supported
H6	FC → PEOU	0.630	***	Supported
H7	TR → BI	0.268	***	Supported
H8	BI → AD	0.725	***	Supported

5 Discussion and Implications

This study is performed with the motive to better understand the factors that affect intension and adoption of Payment Banks services among its customers. As per the results shown above, it has been examined that the model has reached the accepted level, as the measurement model validity, reliability and model fitness has achieved their cut-off standard. Whereas in the structural model values for all endogenous factors, i.e. for PEOU is 40%, PU is 69%, TR is 54%, BI is 54% and for AD 53% is attained successfully. Such values of R^2 are far close to other IS studies that have used TAM [41].

From the statistical results shown above, it is clear that PU has a significant relationship with BI [11, 31] with the weight of 0.50. This states that customers are more attracted towards the payments banking if they perceive that payment banking services are more useful, productive and efficient in their day to day life. Hence Payment Banks should try to demonstrate the usefulness and benefits of using their services, whereas Payment Banks should analyse the current customer base and investigate the features

which customers find useful. Alike this study, PU is found to have a better impact on Behavioural Intension in the context of mobile and internet banking also.

In the path coefficient analysis Trust is also found to have a positive and significant impact on BI [5, 7, 11, 17] with the weight of 0.27. This implies that Trust is shaping the customer's intension to adopt Payment Banks services. With the increase in the cybercrimes mainly in online banking, Payment Banks should use latest and innovative technology to make their system more secure and trustworthy [8, 16, 20, 23].

Empirical results have also proved a positive and significant relationship between SI and Trust (TR) [20, 25] with a regression weight of 0.74. This implies that users of mobile banking are most impacted by their friends, family and colleagues to trust online platform of Payment Banks. As per the Sociolinguistic Theory, men are interested in task-specific information, whereas women put more focus on exchanging social support and trust that information. So payment banks should use proper marketing channels with secure user interface.

Statistical results also found to have a significant and positive relation of SI and PU. Similar results have been achieved in previous studies as well where SI is found to be a significant predictor of PU [6, 31, 36]. It implies that if customers social groups such as friends, family or colleagues use Payment Banks and find it useful, then they would also find it useful to transact through Payment Banks.

As per the statistical results achieved FC has a positive effect on PEOU. Similar results have also been attainted where FC have a significant and positive relation with PEOU [17, 31]. Payment Banks have been launched in several languages with the friendly interface as due to the diversity of Indian culture, so this will made payment easier and accessible to use for common people.

Quantitative results approved above have considerable influence of PEOU on PU, whereas it has a positive and insignificant effect on BI with regression weight of 0.31 and 0.042 respectively. Consistent with the previous research on TAM, PEOU affects indirectly BI through PU [11, 17]. Research suggests that Payment Banks need to make services easily accessible as local peoples should easily access it by sitting at their doorstep. PEOU states to have an insignificant relationship with BI [7], it implies that the bank can promote its internet services by communicating its usefulness. In contrast, they should make their user-interface friendly with the customers so that customers do not feel difficulty in operating their interface.

6 Conclusion, Limitations and Future Recommendation

This research was in response to the call for customer-oriented research in Payment Banking. As in this study external variables (SI & FC) constructs of UTAUT were found to have impact on TAM Variables, this research contributes to the theoretical framework of technology adoption and Extension of TAM model. As various private and government institutions are involved in payment banking services for financial inclusion, so it is very important people use it for better banking connectivity.

Even through this study contributes in the area of adoption and Payment Banks services research with produces Prolific results, it is limited with certain limitations. Data of the study has been collected using convenience sampling from Five cities,

which in turn effect generalisability of the results across other parts of the country. Sample of the study were collected in selected duration, so it raises question about applicability of study in long term as with the passage of the time users' opinion, familiarity with technology may change.

As future research scope, this study can also be considered for longitudinal study, to measure the effect of various factors over time. as the proposed model is conceptually and statistically validated in the current study, so this model can be tested in other information systems adoption study.

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