



Mobile Banking: An Analysis of Usage in the Present Era

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ABSTRACT

Purpose: This article aims to study mobile banking usage in recent times and to understand the relationship between the perception of customers and actual usage trends.

Design/methodology/approach: Primary data is collected using the survey method and various charts along with the TAM (Technology Acceptance Model) constructed using SmartPLS is used to understand the relationship.

Findings: The results showcase a strong relationship between perceived ease of use, usefulness, intention to use, and actual usage of mobile banking. The findings demonstrate that mobile payments saw a surge in the present era, bank visits and chequebook usage dropped, and increased adoption in the older population.

Research limitations/implications: The limitations that are observed in this research, are that it did not focus on some additional elements of mobile banking like mobile applications stability, customer care support, and security which can be analyzed using other models like UTAUT or IS system.

Originality/value: The paper presents the patronage and usage of mobile banking in recent times after the pandemic and earlier demonetization in India. The analysis using the TAM model helped to check the current trend and users' mind-set shift.

Keywords: Mobile banking, Perceived usefulness, Perceived ease of use, TAM, SmartPLS

I. Introduction

Mobile banking and using mobile phones as complete payment solutions started catching up about a decade ago with the introduction of affordable smartphones and the tremendous growth of mobile application developments. Mobile banking usage took a major leap in India after Demonetization and COVID-19, which are the game changers in the mobile

banking arena and helped change users' mind-set in handling money. Passbooks and checkbooks now started vanishing slowly. UPI enablement by banks in India, is another main aid for this change, in the mobile banking platform, as it promotes the protection of the people by bringing in an online system to buy goods and pay instantly. Banks and payment services in India and many other countries, are required to adhere to Know Your Customer (KYC) norms from all users using mobile payment services and KYC serves as a basic hygiene factor now in the payment sector. Some of the safety processes like triple validation, biometrics scanning like

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fingerprints, and post transaction re-confirmation (as started by Airtel payment bank) have given more boost and confidence in mobile banking security. Recently, banks and payment providers changed the one-time password from 4 digits to 6 digits to improve security measures. Please note that 4-digit OTP is hackable at the chance of 1 in 10,000, while the 6-digit OTP is hackable at the probability of 1 in 1,000,000.

II. Analysis of Prior Work

A Study of Mobile Banking in the State of Kerala by Roshna Thomas et al., 2019, focus on mobile banking awareness and as alternative to ATM, cheque, the author analyze the bank visits and focus on basic mobile banking expectations like time saving, accessibility, mobility etc along with demographics variables and on technology acceptance on the whole. The authors used nonparametric test like chi square test of association, spearman's correlation. Veronika Lee et al., 2022, in their study on explain about impact of pandemic in online purposes via e-commerce platforms in Uzbekistan. The author uses combination SERVQUAL and TAM to check the adapted e-commerce market in Uzbekistan. It is observed from the analysis, that some of the parameters like responsiveness and reliability are not found significant for adoption and the parameters on customer satisfaction is similar with perceived usefulness and ease of use. So the extension of TAM with SEQVQUAL is found not be not so useful this this case for online purposes. Amin, H et al., 2012 in the study focus on factors that determine the local citizens of Sabahan bank customers' motive to adopt mobile banking. This study extends the applicability of the technology acceptance model (TAM) to mobile banking and incorporates perceived usefulness and perceived ease of use along with perceived credibility, perceived enjoyment and perceived self-efficacy, The analysis indicate that perceived credibility, enjoyment,

self-efficacy are main governing factors for Malaysia's bank customers intentions to use mobile banking, The study results indicate that the perceived usefulness and ease of use has minimum impact on mobile banking compared to perceived credibility, enjoyment and self-efficiency which were much more important patronage aspects for mobile banking use. The analysis might indicate particular region people's mindset or due to low sample size. Zamil, 2011, analyse the effect of deployment of mobile banking from marketing viewpoint in Jordan taking survey from bank managers point of view. Data analysis is done via SPSS and analysis of variance (ANOVA) is used. The results prove a strong statistical significance exist in implementation of mobile banking adoption from marketing viewpoint by bank managers in Jordan owing to following factors: gender, age, qualification and location of bank managers. Further checking on similar research using TAM model, Huang, Y, 2013 used enhanced TAM model to study on smart phone usage. The author used external factors like enjoyment, social influence along with perceived usefulness, and perceived convenience (similar to perceived ease of use) to check customers' acceptance of smartphones. His analysis shows that enjoyment and social influence as external factors had impact perceived usefulness and perceived convenience. Interestingly his analysis perceived usefulness has no direct and positive relationship with intention to use which may be due the behavior of target survey respondent who were undergraduate students from Korea with major as business administration. Koenig-Lewis N. et al., 2010 in their article on predicting young consumers' use of mobile banking services tried combining TAM and IDT variables of perceived usefulness, perceived ease of use, intention to use, along with compatibility, perceived trust, credibility and perceived cost. But the results show no significant impact of perceived cost, credibility, and perceived trust on intention to use and only compatibility has significant impact thus indicating that this extension of TAM model is not bringing much benefit in the theoretical model. M. Aboelmaged and T. R. Gebba in their paper on mobile banking, tried integrating Technology

Acceptance Model (TAM) and Theory of Planned Behaviour (TPB). Along with perceived usefulness, ease of use, subjective norm and behaviour control parameters were introduced and results indicate that only subjective norm (how your friends circle think about your mobile banking usage) has impact in adoption. Further the study indicate, perceived usefulness impact both adoption and attitude towards usage and perceived ease of use has impact on perceived usefulness although not directly impacting attitude towards usage or adoption. It may be noted that sample size is lower in this case (about 110 respondents).

Although there are many studies which uses TAM, Extended TAM or combination of TAM with other models for mobile or internet banking adoption or usage, these articles that focusses on mobile banking adoption after pandemic for south of India in particular region of Chennai which is South India's most advanced technology district was minimal. This study tries to address this gap using the Technology Acceptance Model to check mobile banking acceptance by customers from Greater Chennai and further insight into customer visits to banks and cheque book usage.

The objective of this article is to check and analyze the behavior and perception of the consumers in Greater Chennai area in South India on mobile banking in recent times with the changes in the mind-set of the people after the pandemic and earlier demonetization. The aim is to understand the perceived ease of use and perceived usefulness of mobile banking and to understand its effect with intention to use along with the slow sunset of traditional banking aids seen by consumers like cheque book and passbooks using the users' responses. Additionally, the pattern of usage across age groups is presented to understand the usage pattern among various age groups.

To summarize, the study mainly focuses on the following research questions in terms of impact among users in Greater Chennai

1. How users of mobile banking perceive its usefulness and ease of use and its relation to intention to use and actual usage?
2. What is the collective user behavior on general mobile usage considering usefulness and ease of use?
3. Is there any substantial trend of usage of mobile banking in India age-wise before and after COVID-19 and its disruptiveness to traditional banking methods?

To address the research questions one and two following hypothesis are proposed.

- H1:** Perceived Ease of use has impact in perceived usefulness to use mobile banking
- H2:** Perceived Usefulness has impact intention to use mobile banking
- H3:** Perceived Ease of use has impact intention to use mobile banking
- H4:** Intention to use mobile banking has impact in actual usage of mobile banking

To address the research question three, data related to mobile banking usage trend and analysis represented as chart is provided (refer Figure 2).

III. Literature Review

A. Advances in Digital Payments and Mobile Banking

On the evolution of payments, Roger W. H. Bons et al., 2012 in his paper explain that banking functions have evolved on a large scale with the shift from physical to electronic payments, replacing savings books, deposit certificates with online services and digital alternatives. Luigi Wewege, 2020, mentions in his article that in the banks, the footfall is dropping by approximately four visits per year, and there is an expectation that mobile transactions will rise to 121% in the 2017-2022 period. There is also an expectation that in the next five years, bank transactions on laptops/desktop devices will also drop to a significant extent, and 88% of the interactions and mobile devices will drive the transactions. Seung-

Bum Haa et al., 2021 talk about making mobile payments rewarding, the banks should consider providing incentives on usage similar to credit cards to make the consumers become repeat users and offer discounts and coupons which worked well for credit cards. Also, reward points for purchases might be useful to make m-payments attractive and enjoyable. Asongu, Simplice and Nwachukwu, Jacinta C., 2016 in their article, talk about 4 changes mobile phones brought in the banking area: First cell phones are used like a virtual credit card. It uses PIN and bank account number which is saved in the SIM card to use it in the same way as the bank's virtual card. Secondly, the phone is used as point of sale (POS) terminal. They give similar payment functions like in retail stores or outlets. Thirdly, the mobile phone can work like an automatic teller machine (ATM). Fourthly mobile used as virtual bank for making payments and transfers.

B. Impact of Pandemic in Online Payments

As per Stephanie Walden, and Daphne Foreman, 2020, even after the pandemic, the trend of growth in mobile banking and payment is very likely to stay due to customer changed behavior. At the start of the pandemic, some banks upgraded customers' physical credit and debit cards to include "tap to pay" technology. According to Yuyang Zhao and Fernando Bacao, 2021, mobile payment transactions during the pandemic efficiently support the survival of various businesses and maintain the social economy's development under an emergency. Regarding mobile banking during COVID-19, Nilufa Khatun et al., 2021 say mobile banking is extensively used by all citizens during COVID-19 as it gives them financial access safely and easily. Arthi M.C., and Shanmugam K., 2020, in their paper, say, that the economic uprising of going away from cash and moving to digital transactions has begun in India for the previous few years, and due to the pandemic condition in India, there has been an increased need to go with contactless transactions. Ellen Schindler,

2021, explains in the last year of the COVID-19 period, we see more applications booming with innovative mobile solutions by Banks and Payment service providers. Examples are remote connectivity via live chat and secure messaging. Veronika Lee et al., 2022, in their study on explain about impact of pandemic in online purposes via e-commerce platforms in Uzbekistan. They found that 68% of people agreed that their purchases in online e-commerce sites increased markedly from 2018 to 2020 and the respondents (about 74%) are eager to continue of purchase of goods via e-commerce platforms even after COVID-19.

C. Theoretical Background and Framework

The popular models that can be used for mobile banking adoption are mainly TAM, Extended TAM or called as TAM 2, Innovation Diffusion Theory (IDT), and the unified theory of acceptance and use of technology (UTAUT), and a few combinations of these models.

The TAM model was first introduced by Fred Davis in 1986. Mobile banking adoption and usage can be well modeled by TAM. According to Fred Davis et al. in 1986, the technology acceptance model (TAM) is an information systems theory that models how users come to accept and use technology. Fred Davies, 1986 stated that users' motivation can be explained by three factors: Perceived Usefulness (PU), Perceived Ease of Use (PEU), and Attitude toward using the system. PE is the degree to which a user believes that using a particular system will improve his day today work performance and defined PEU as the degree to which a person believes that usage a specific system would be free his mental and physical effort (refer Figure 1).

Extended TAM developed by Venkatesh and Davis, 2000 explained PU and usage intentions by social influence and perceptive instrumental processes along with PEU. The constructs link social influencers (like voluntariness, image, and subjective norm) and perceptive instrumental processes (like quality, rest demonstrability, job relevance, and PEU). IDT concept

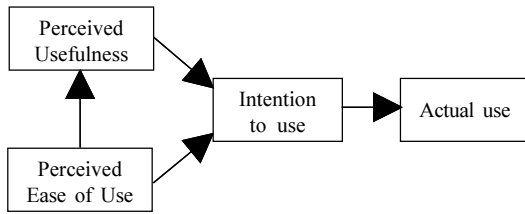


Figure 1. TAM model

was promoted by Everett Rogers who classifies Diffusion of Innovations into five features of innovation: complexity, compatibility, triability, observability, and relative advantage (Rogers, Everett 2003). The unified theory of acceptance and use of technology (UTAUT) is a technology acceptance model that aims to find the customer's purpose in using an information system and follow usage behavior. Developed by Venkatesh, Morris, Davis, G. B., & Davis, F. D. (2003) the model contains four key intention theories; social influence (SI), effort expectancy (EE), performance expectancy (PE), and facilitating conditions (FC). There are also four moderators: age, gender, experience, and voluntariness of use. The most popular model to study new technology acceptance is TAM which is used in this article to explain mobile banking adoption and usage.

IV. Methodology

The study is conducted to obtain data on adopting a digital payment system in India and has been done across citizens of Greater Chennai, India who are mobile banking users. Online survey mode was adopted, and 300 responses were received. Responses related to topics on visits to banks, chequebook usage, and trend of mobile banking usage were collected along with demographic-related questions. Responses related to perceived usefulness, ease of use, intention to use, and actual usage were also collected on a Likert's Scale of 1 to 5 ranging from strongly disagree, to disagree, neutral, agree, and strongly agree.

The mobile banking users were the intended

respondents and covered all age groups, both genders and income groups. The questionnaire is provided to respondents via Google Forms, and the link is sent via email and social media platform, WhatsApp. Data analysis is done using charts and the SmartPLS model for structural equation (SEM) modeling.

V. Outcomes

A. Consumers Visit to Banks

After the introduction of mobile banking, coupled with technological advancement and affordable smartphones we see only 17% of users go to banks frequently, i.e., more than one time a month. Occasional visitors visit once or twice in a quarter mainly for loans, locker usage, or other personal services from banks (refer Table 1).

B. Chequebook Usage

Consumers' chequebook usage trend compared to online transfers analysis show the mindset of the users. In addition, the banks discourage cheque usage by increasing clearance time, and multiple authorizations. Another advantage of mobile banking is; checking balance in the accounts anytime with ease. This reduces overdraft issues and the bouncing of cheques (refer Table 2).

Table 1. Trend of customer visits to banks

Responses	Distribution
Frequent Visits to Bank	17%
Occasional Visits to Bank	45%
Seldom Visit Bank	38%

Table 2. Chequebook usage

Responses on Chequebook usage	Distribution
Used greater than 1 time per month	12%
Rarely Used	45%
Never used	43%

C. Mobile Payment Usage after COVID-19 based on User Survey

In this part, we asked respondents about the usage pattern of mobile payments after COVID-19. The below chart shows the details. There is a surge in usage among the older generations (>60 years of age), and they quickly moved to mobile banking than expected (refer Figure 2).

D. SmartPLS Output and Model analysis

The survey output was modelled using TAM and constructed using SmartPLS (refer Figure 3).

Factor loading: Explains the relationship between factors and variables, many factors show a strong correlation (where loading is >0.7) and few factors show moderate co-relation (where loading is $>0.5 <0.7$) - refer Table 3.

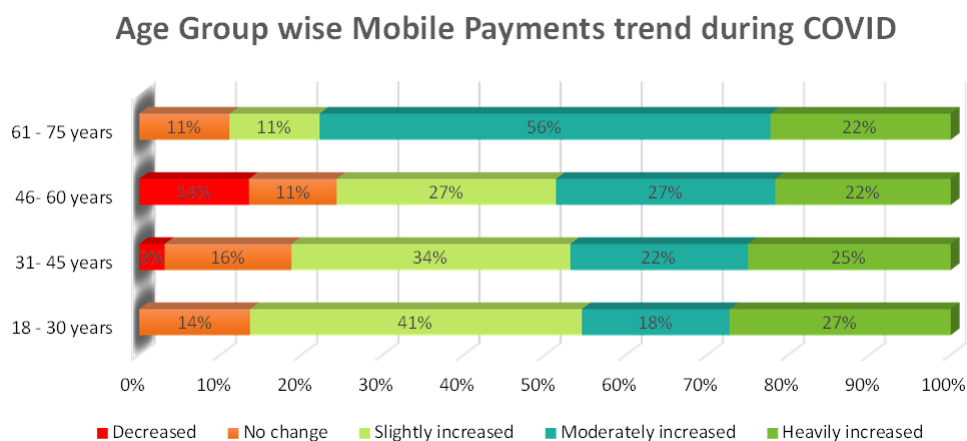


Figure 2. Age-wise change in trend of mobile payments after COVID-19

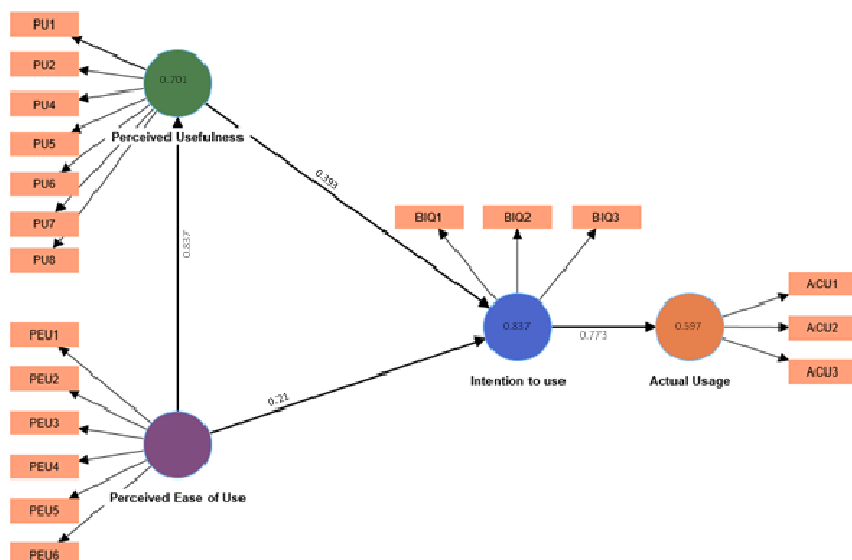


Figure 3. SmartPLS output

Model fitness: Standardized Root Mean Residual (SRMR): SRMR is the difference between the observed correlation and the model-implied correlation. It give the average amount of the differences between observed and expected correlations as an absolute measure of model fit criterion. SRMR <0.08 indicates the model is fit (refer Table 4).

Normed Fit Index (NFI): It calculates the Chi-square value of the proposed model and compares it against a meaningful benchmark. NFI >0.8 indicates a good fit (refer Table 4).

R Square: R square value >0.8 indicates a strong relationship between dependent variables and independent variables. It is the coefficient of determination and shows the percentage of the variance of the dependent variable explained by the independent variables (refer Table 4).

Construct Reliability and Validity: Reliability and validity are used to check how well a method, or a technique measures the collected data. Reliability is about the stability of a measure and validity is about the correctness of a measure. Cronbach's Alpha and rho_A threshold is greater than 0.7 for all the variables indicating high reliability and validity (refer Table 5).

Collinearity Statistics (VIF): Collinearity indicates independent variables' correlation in the study. In our analysis, the Variance Inflation Factor (VIF) which gives indication of collinearity was less than 4 for all the dimensions studied in the research, indicating that there is no collinearity problem among the study dimensions (refer Table 5).

Path Coefficient (T Statistics & P Values): The path analysis in SEM is the partial correlation coefficient among the dependent variable and an independent variable, corrected for other independent variables. The t-value > 1.96 and p-value < 0.05 for all the relationships indicate a significant correlation (refer Table 6) and indicating the hypotheses H1 to H4 are accepted and the influence is significant.

Table 3. Factor loading

Factor	Variable	Loading
ACU1	Actual Usage	0.954
ACU2		0.902
ACU3		0.927
BIQ1	Intention to Use	0.955
BIQ2		0.893
BIQ3		0.955
PEU1	Perceived Ease of Usage	0.877
PEU2		0.765
PEU3		0.901
PEU4		0.9
PEU5		0.883
PEU6		0.849
PU1	Perceived Usefulness	0.87
PU2		0.861
PU4		0.882
PU5		0.896
PU6		0.893
PU7		0.878
PU8		0.911

Table 4. Model fit, NFI and R Square

	Saturated model	Estimated model
SRMR	0.035	0.084
d_ULS	0.289	1.644
d_G	0.281	0.32
Chi-square	497.24	547.673
NFI	0.926	0.919
	R-square	R-square adjusted
Actual Usage	0.597	0.596
Intention to use	0.837	0.833
Perceived Usefulness	0.701	0.7

E. Analysis Findings

The SmartPLS analysis of the data indicates that there is a strong relationship between perceived ease of use and usefulness and its association with intention to use and actual usage (Hypothesis H1 to H4). Perceived usefulness and ease of use influence

Table 5. Reliability, validity and Collinearity analysis using VIF

Variable	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Actual Usage	0.92	0.925	0.949	0.861
Intention to use	0.927	0.936	0.954	0.873
Perceived Usefulness	0.931	0.935	0.946	0.746
Perceived Usefulness	0.962	0.963	0.968	0.768

Table 6. Path coefficient output

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
Perceived Ease of Use -> Perceived Usefulness	0.837	0.837	0.035	24.256	0
Perceived Ease of Use -> Intention to use	0.393	0.393	0.103	3.819	0
Perceived Usefulness -> Intention to use	0.21	0.208	0.106	1.983	0.047
Intention to use -> Actual Usage	0.773	0.772	0.058	13.396	0

intention to use which in turn, makes users use mobile banking applications. The model analysis was further confirmed with responses seen on other questions related to fewer visits to the bank, use of chequebook, and the trend of mobile banking usage age-wise before and after the Pandemic.

VI. Conclusion

A. Implications

The article covers both perspectives of theory and practice. From a theoretical perspective, the findings will contribute to existing literature providing insights to mobile banking usage from technology advanced population like South India, Chennai where after pandemic we see a shift in usage by age group. The model analysis exhibits that, the acceptance of mobile banking by users and the usage is driven by perceived ease of use and usefulness. First, the mobile banking advantages seen by users especially in terms of ease of use and usefulness due to mobile applications

becoming more user-friendly and uncomplicated for all generations. The change in mind set of people after the pandemic is a driving factor. Secondly, the significance of TAM model fitment for technology advancements on banking sector i.e. mobile banking is evident. Thirdly, the qualitative analysis on other important aspects that promotes mobile banking and what were the focus areas to address gives more insights in customer adoption theory. Fourth the study endorses that the technology acceptance literature by implying that perceived usefulness and ease of use impact on any new technology acceptance.

From practical implications perspective, the significant impact of perceived usefulness and ease of use clearly indicates that the more user friendly the mobile banking applications, the more the adoption and continued usage. The increase in banks' mobile applications usage after pandemic across age groups is an indication that shows the popularity and ease of use of mobile payments and the need to focus on 60 plus age group. The banking sector had come a long way moving away from cheque book and personal visits to banks to digital payments, mobile and online banking and round the clock service.

B. Recommendations

We see the age group 61-75 started adopting the change, especially in the south of India, which can be validated via future research. Mobile banking applications should rely on their strengths and advantages like contactless banking and 24/7 banking and work on weaknesses like high charges, simplification of mobile applications, and security concerns. This can be validated further with focused surveys and research focused on mobile banking features. It would be beneficial to describe the experiences, pros, and cons from banks' perspectives on the increased acceptance of mobile banking by its customers.

C. Limitations

The limitations that are observed in this research, is that it did not focus on some additional elements of mobile banking like mobile applications stability, customer care support, and security which can be analysed using other models like UTAUT or IS system model which will aid the banks and future adoption of mobile banking in the country.

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