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Diffusion Modelling of Digital Payments

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Abstract: This study studies the adoption of digital payments by lead adopters-college students in Kanchipuram District in India. The intent is to identify key drivers for adoption of digital payment applications by students between the age group of 17-22 years old. The study tries to establish the logical relation between latent constructs in an individual's behavior/preferences and the outcome of different logical combinations driving to adoption of digital payments. In this study, digital payment refers to e-Wallet applications like Paytm, BHIM, PayZapp, etc. The first study was done amongst college student who joined college and in the first week of academic cycle. The second study was done amongst same student who had finished first year. In the intermediate period it is interesting to observe that adoption of digital payments has increased from 12-76%. Digital payment adoptions analyzed through social network propagation. More people are using cards at point of sale devices and just not ATMs. This apart many inactive debit card users have started using the cards. This study is attempting to understand the behavioral shift amongst users in India by taking the example of a set of lead adopters of technology vis-a-vis digital payments. We have taken college students, since, they are considered lead adopters in mobile usage and expected to have some adoption levels of digital payments also. Structural tapping, social reinforcement and homophily are 03 key influence factors amongst student population for adoption of digital payments. Two key findings of the study includes: ease of use and security are considered the most important factor for adoption of digital payments. Incentives to adopt digital payments.

Key words: Diffusion, digital payments, social analytics, early adopters, lead users, payments

INTRODUCTION

The rapid adoption of digital payments in the post demonetization era deems a deeper analysis to check for the sustainability of this as an economic model and benefits of adoption from an individual point of view.

In the long run, moving to a digital currency or cashless operation is an answer to the growing need of digital economy. Digital payments have been receiving lot of policy thrust and being encouraged by the government through various measures:

- Increased availability of digital payment solutions commercially
- Free installation of applications on an already thriving smart phone network
- Increased broadband connectivity in uncovered pockets with new telecom players
- Cash shortage in public utilities in ATMs, banks

Bulk of India's transactions are kirana-like merchant payments and that has to go cashless. The shift has seen a steady increase from cash to plastic to mobile payments mode. This leapfrogging into financial inclusion is the subject of investigation of this study. RBI data says that mobile wallet transactions are estimated to leapfrog from 5500 crores in 2017 to 30,000 crores in 2022. Growth of credit and debit card has been insignificant at 2-3%. Rising smart phone penetration and internet access has been the key levers for this transition.

As many as 23.3 crore unbanked people out of 38 crore smartphone users are skipping plastic money usage altogether and embarking directly into digital transaction stage.

While India has 01 billion people have registered for Aadhaar and 250 million people have access to digital wallets currently. There are approximately 350 million people with feature phones and the only way to reach out to them is USSD technology. USSD is a protocol used by GSM cellular telephones to communicate with service providers computers that can be used to make payments similar to OTP pin.

With above factors driving digital payment adoption top down, there is a serious need to look into adoption

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factors at a user level. This study intends to fill the gap through user journey mapping exercise and surveys through questionnaire. In this study, we attempt to measure the willingness of people to move into the digital ecosystem.

Objectives of the study: The objective of the study is to understand the key variables determining the rate of adoption of digital payments. We are examining the variables determining the rate of adoption through perceived attributes of innovation-advantage, compatibility, complexity, trialability, observability.

The researcher has evaluated models and constructs used in IS research for adoption of new technologies. The key construct here is individual acceptance of technology by using intention or usage as a dependent variable (Compeau *et al*., 1999). Other streams have focused on implementation success at the organizational level (Leonard-Barton and Deschamps, 1988) and task technology fit (Goodhue, 1995; Fishbein and Ajzen, 1975) among others. While each of these streams makes important and unique contributions to the literature on user acceptance of information technology, the theoretical models to be included in the present review, comparison and synthesis employ intention and/or usage as the key dependent variable. The goal here is to understand usage as the dependent variable. The role of intention as a predictor of behavior, (e.g., usage) is critical and has been well-established in IS and the reference disciplines (Fishbein and Ajzen, 1975; Plouffe *et al*., 2001). This approach is consistent with prior training and individual acceptance research where individual reactions to a new technology were studied (Olfman and Mandviwalla, 1994; Venkatesh *et al*., 2003).

Here, we adopt a homogenous population of college students as the sample strength. Here, we investigate the measures of the five perceived attributes. As a further step, the researcher see possibility to develop a separate of scale for this application. The study student sample has been selected through a simple random sampling exercise. The behavioral dimensions and the response to an innovative idea is measured using structured equation modelling. Initially we map the latent constructs and the manifestation in a graphical path diagram which is subsequently distilled into a matrix diagram. We define the variables (Observed-rectangle) and latent constructs as per research model given in the following section. We estimate the path coefficients of the structural model and see the level of influence of latent factors on consumer decision making using R^2 method.

We also take into consideration a residual error term which is not captured in the experiment. This would be explained by the adjusted R^2 when certain unexplained variables are also decision factors like inclination ti use new technologies.

This is unmeasured and captured in the path flow diagram. We use following hypothesized factors adoption factors ease of usage and positive perception of online transactions.

Hypothesis:

- H: digital payment adoption is driven by individual need and not influenced by external/usage factors
- H: ease of usage has a positive impact on adoption
- H: trust/dependability has a positive impact on adoption
- H: opinion leader recommendation has a positive impact on adoption

The method adopted is structured equation modelling which is a multivariate statistical analysis technique that is used to analyze structural relationships. The latent and manifest variables have been identified after extensive interview with digital and non-digital payment users to understand key factors influencing their decision to continue or adopting digital payments.

In this study, we are trying to arrive at the various drivers and inhibitors for digital payment adoption amongst select group of potential customers. To get a clear view of lead user preferences, we have done a survey of 400 university students. A sample size of 400 students of first year and second year have been taken as sample size and questionnaire circulated to get their feedback on level of adoption.

Prior to joining college only 14% of students have been using digital payments using mobile wallets. However, at the end of the first year 83% of the students adopt digital payments. Also, it is observed that student prefer to use merchandise outlets having option for digital payments even if the payment is <Rs. 50. This trend is dictated by the rapid adoption in college environment.

MATERIALS AND METHODS

Structural model which relates the latent and manifest variables. Test items or observed variables for convenience and ease of usage:

- Quality and speed of connectivity and application
- Incentive for adoption
- Single point for all transaction types
- Ease of usage
- Accessibility

Test items or observed variables for personal needs and wants:

- Local language availability
- Ease of trial and onboarding
- Speed of transaction
- Eyeball stickiness

Test items or observed variables for familiarity with mobile usage:

- Consumer education
- PoS experience for first time buyer
- Ease of availability
- Attractive marketing schemes

Test for perception about online transactions:

- Cost of cash
- Tax management opportunity
- Perception control
- Managing cash and change is hassle free
- Technology addressing personal needs
- Security and risk
- Consumer grievance redressal

Amongst the above listed latent constructs, the researcher has picked up top 12 attributes for measuring the impact on adoption of digital payments through R' method. Interestingly, similarities among these constructs have been noted in prior research (Plouffe *et al*., 2001).

RESULTS AND DISCUSSION

Findings and suggestions

Measurement model: Factor loadings from the exploratory factor analysis of 10 content adequate questionnaire items and these are the latent variable analysis used for measuring goodness of fit (Table 1-3).

Through this exploratory factor analysis, we have been able to establish the items that clearly represent the content domain of the underlying constructs. The items identified in the exploratory factor analysis is to be tested for goodness of model fit in confirmatory factor analysis. We establish the goodness of fit between the model.

In our model the effectiveness of propagation of digital payments is characterized by the total number of individual adopters. We do a Chi square test to arrive at a p value and this will give us the input if the test results are significant:

Table 1: Basic data

	Sophomore digital payment users		New students digital payment users	
Basic data	Mean	SD	Mean	SD
Number of students	250	56.17	150	48.940
Degree (Corrected)	14.827	2.558	13.355	48.945

Table 2: Outcome variables

	Sophomore digital payment users		New students digital payment users	
Outcome variables	Mean	SD	Mean	SD
Digital payments take up rate of students	0.354	0.125	0.214	0.064

Table 3: Loadings from the exploratory factor analysis

Basic data	Sophomore digital payment users R^2	New students digital payment users R^2
Convenience of use	0.54	0.21
Incentives for usage	0.83	0.75
Targeted deals and offers	0.74	0.81
Single window for all transactions	0.56	0.42
Parental encouragement	0.62	0.62
Ease of trial and onboarding	0.53	0.33
Speed of transaction	0.83	0.21
Trust and reliability	0.74	0.45
Brand image of the application	0.23	0.32
Privacy	0.63	0.55
Strong reference for beginners	0.75	0.89
Ease of access to support desk	0.45	0.72

- Degrees of freedom-number of categories-1
- Alpha level is considered at 0.05

Results from the confirmatory factor analysis of the revised scales provided strong support for a three-factor model. Using the sample variance-covariance matrix as input and a maximum likelihood solution, the overall Chi-square was statistically significant -$_x$' = 7.82, df = 4, p>0.09.

All these values suggest good model fit. In addition, each item was a good indicator of the corresponding scale (i.e., all had significant t-values) and all modification indices were low.

CONCLUSION

The key drivers for adoption of digital payments in this study is incentive for new users and existing users apart from targeted deals and offers for new users. This attracts new users to adopt new digital payment technologies. For full-fledged users of digital payments single window payment system for any transaction is also another influencing factor for adoption.

This apart some of the key inputs received from the users is reducing turnaround time at point of purchase

while buying merchandise and incentive for joining mobile wallet program will encourage more students to join. Other key drivers for adoption of non-users of digital payments is simpler KYC norms, surcharging against a transaction by merchants incentive seeking approach from mobile payments. Broadly it is also observed that mobile payments preferred over card payments. Both users and non-users prefer ease of reaching out to the technical support team or helpline to complaint against misuse, surcharging preferably a direct conversation with call center executive. Parental influence/usage plays an important role in driving adoption, especially, due to funding needs of the children.

Overall the digital payment adoption shows a strong adoption curve amongst college students and they can be categorized as lead users. This apart demonetization drive has also given a strong push for adoption of digital payments in amongst early adopters of digital payments.

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