EXAMINING THE ROLE OF THREE SETS OF INNOVATION ATTRIBUTES FOR DETERMINING ADOPTION OF THE INTERBANK MOBILE PAYMENT SERVICE

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Abstract

The interbank mobile payment service (IMPS) is a very recent technology in India that serves the very critical purpose of a mobile wallet. To account for the adoption and use of IMPS by the Indian consumers, this study seeks to compare three competing sets of attributes borrowed from three recognized pieces of work in the area of innovations adoption. This study aims to examine which of the three sets of attributes better predicts the adoption of IMPS in an Indian context. The research model is empirically tested and validated against the data gathered from 323 respondents from different cities in India. The findings are analysed using the SPSS analysis tool, which are then discussed to derive the key conclusions from this study. The research implications are stated, limitations listed and suggestions for future research on this technology are then finally made.

Keywords: *Adoption, DOI, Intention, IMPS, PCI.*

1. Introduction

The national payments corporation of India (NPCI) introduced the Interbank Mobile Payment Service (IMPS) as a mobile application in India, which allows transferring of funds electronically any time of day and any day of the week. With this application, users can access their bank accounts, anytime, from anywhere to make secure financial transactions. The beneficiary receives funds in a time as short as 15 to 30 seconds (NPCI, 2012). At the end of every transaction, a confirmation message is sent on the mobile phones of both, the beneficiary and the remitter. Users can make both *Person to Person* and *Person to Merchant* type of transactions by using this application on their mobile phones. Statistics for December 2012 on the NPCI website suggest that there are 51 banks in India that offer this IMPS facility to its customers, and 44497830 Mobile Money IDs (unique to a customer, required to make IMPS transactions) have been recorded as issued. The ubiquitous nature of mobile phones of offering access to different services while on the move is one of the major advantages of such mobile phone applications (Liang et al, 2007). IMPS being available 24/7, also allows for cost-time savings.

However, this application is compatible only with smart phones which may be seen as a potential reason for its current low adoption in India (Business Standard, 2012). Customers with basic phones can transfer funds through an SMS facility, but there is a limit on the amount that they can transfer. *PayMate*, a mobile payments company offers a SMS-IVR solution to increase this limit for the basic phone users, but the company has collaborated only with three banks at present. The existing body of literature houses numerous studies examining mobile payment applications/services and mobile commerce (Chen, 2008; Wu and Wang, 2005; Barnes, 2002). IMPS, however, is a very recent application in the Indian context and has no publications to its account yet. The need for empirical investigations offering constructive information regarding its adoption and diffusion is thereby critical. This study therefore aims to conduct an empirical examination on the role of various innovation attributes in the adoption of the IMPS application in the Indian context. The outcomes of this study may offer stakeholders an understanding of the different influences of various innovation attributes, which in turn may succeed in developing schemes that encourage wider IMPS acceptance in India.

The structure of this paper is as shown – section 2 is the subject-specific literature overview; section 3 lays out the theoretical basis and proposes the three attribute-sets and their respective hypotheses; section 4 explains the research method for this study; section 5 presents the study's findings and results from the various SPSS tests; section 6 discusses those findings, validates the hypotheses, and briefs about the study's research contributions and practical implications of its findings; section 7 is the last section drawing the study's conclusions, its limitations, and the probable potential directions for the future research on IMPS.

2. Literature Review

Consumers have to use data from the 3G/4G network providers to access the internet in order to use the IMPS application on their mobile phones to make the desired financial transactions. This application is evidently an integrative *internet banking–mobile payment* system. Technologies associated with mobile internet bring along advantages of mobility, communication, information, and transaction all on the move (Kim and Hwang, 2012). The existing literature is rich with studies on internet banking and mobile payment services – Gounaris and Koritos (2008) compare the TAM and DOI models with the PCI model in studying the drivers of internet banking; Yiu et al (2007) use the TAM model to study the implications of internet banking for retail banks in Hong Kong; Jaruwachirathanakul and Fink (2005) show that perceived usefulness greatly influences internet banking adoption in Thailand. Brown et al. (2004) show that attitudinal and behavioral control highly impacts internet banking adoption in South Africa. Shih and Fang (2004) use TRA and TBP models to show the impact of attitude on internet banking adoption intentions in Taiwan. Chen (2008) uses both, the TAM and DOI models to show that perceived use, ease of use, risk, and compatibility majorly influence the mobile payments adoption. Koenig-Lewis et al. (2010) use TAM to show that compatibility, usefulness, and risk highly influence mobile banking service adoption in Germany. Mallat (2007) used focus groups sessions to show that relative advantage and compatibility influenced the mobile payment services adoption.

These few of the many published studies on internet banking and mobile payment services are evidences of the absence of literature on the Interbank Mobile Payment Service in the Indian context. At the inauguration of IMPS (Nov, 2010) in Mumbai, Smt Shyamala Gopinath, the DG of Reserve Bank of India called the need for reducing the use of cash in India, and the aim to increase the use of the mobile wallet, as a twin challenge for India. In addition to making time and cost savings for the customers, on a global level, the contextual issues of queuing, congestion, need for personnel at desk, paper transactions, and large physical office spaces required to tend to the needs of large number of consumers, can all also be combated with the increased usage of mobile applications such as IMPS. These arguments place emphasis on the importance of adoption of such a ubiquitous product, effectively becoming an important subject of study. It therefore is necessary to have a good understanding of the factors that favour the adoption of IMPS in India. There are 51 existing member banks (NPCI, 2012) and more banks are expected to partner with NPCI to offer this IMPS application to their customers. The success of this application with the member banks will to a great degree persuade the other banks in becoming the IMPS members. In doing so, these other banks will seek information on how and what influences the customers to choose and use IMPS over the already existing finance transfer systems. No official studies/reports/statistics are available yet on the diffusion of this technology in the Indian context. The fact that this application is still in its initial years in India seems to be the probable cause behind the absence of diffusion reports, or empirical publications on this application. All of these aforementioned reasons, in addition to emphasizing the importance of this study, also act as the motivation backing this study.

3. Theoretical Basis and Hypotheses Development

In the IMPS context, the banks would seek insight into factors that considerably influence the use of IMPS. India already has existing systems for pursuing financial transactions such as the internet banking, telebanking, and physical banking. What in IMPS would make the customers choose it over the existing financial systems? In answering this question, developing an understanding of the variables that potentially impact the consumers' adoption/rejection decisions is critical. The pace of diffusion is also an equally important concern for any innovation in its early stages. To address these issues of innovation-diffusion, our study chooses to study the many different attributes influencing the usage intentions of the potential consumers, and in turn, influencing the actual adoption of IMPS in India.

The existing literature houses many models that offer to predict the use intention and adoption of a given innovation, for instance – Technology Acceptance Model (TAM), Theory of Reasoned Action (TRA), Unified Theory of Acceptance and Use of Technology (UTAUT), Theory of Planned Behaviour (TBP) and more (Dwivedi et al., 2008 ; Rana et al., 2013). It is interesting to note that all of the mentioned models use more or less the same attributes. The Diffusion of Innovations theory (DOI), on the other hand, is the most established and more frequently used theory in the field of innovations. Rogers introduced the DOI theory in 1962 where he identified five innovation attributes – *relative advantage, compatibility, complexity, trialability, and observability* to explain the adoption of a given innovation. The literature is proof that the attributes from the DOI theory have been adapted by a number of studies (Kapoor et al., 2014) investigating the adoption of different technologies, for instance – mobile data services (Grepott, 2011), mobile ticketing (Mallat et al., 2008), environment (Sia et al, 2004), health service industry (Greenhalgh et al., 2004), clinical practice (Legare et al., 2008), wiki technology Hester and Scott (2008) and many more. The attributes from the DOI theory was therefore deemed important and chosen to be examined under this study.

There are many other innovation-attributes apart from Rogers' five attributes that have been used and reviewed in the past, but not as much as Rogers' attributes. After Rogers, Tornatzky and Klein (1982) made the next significant contribution in this field with their meta-analysis that remarkably reviewed and listed more of such innovation-attributes. Apart from Rogers' five attributes, they identified 25 other innovation-attributes that were being extensively used by the studies to examine IT innovations. These 25 attributes were also concluded as relevant and considered to be examined under this study.

Another remarkable contribution in the field of innovations was then made by Moore and Benbasat's *Perceived Characteristics of Innovating* theory in 1991. They focussed more on developing an instrument to measure individual perceptions of adopting an IT innovation by taking a total of eight attributes into consideration – *voluntariness*, *image*, *relative advantage*, *compatibility*, *ease of use*, *result demonstrability*, *trialability*, and *visibility*. These attributes used here were either borrowed from Rogers' innovation-attributes, or they formed their basis from Rogers' attributes. These were also concluded to be appropriate from this study's perspective and hence included to be examined in the IMPS context. Three out of these eight attributes were the same as Rogers' attributes, leaving five attributes that had been newly introduced. Out of these five, *ease of use* was considered to be an exact opposite measure of the *complexity* attribute already present in the attribute-set from Rogers'. Thus, four attributes of these eight were eliminated, and the remaining four formed the third attribute-set for this study with - *voluntariness*, *image*, *result demonstrability*, and *visibility*.

Two attributes of the 25 of Tornatzky and Klein's attributes were eliminated because they were present in the attribute-set from Moore and Benbasat. This study was therefore looking at 32 innovation-attributes coming in from three sources - (a) five from Rogers' *Diffusion of Innovations* theory; (b) 23 from Tornatzky and Klein's *meta-analysis*; and (c) four from Moore and Benbasat's *Perceived Characteristics of Innovating* theory. In order to doubly ensure the

usage, and hence the practical implication of these three attribute-sets, the current usability of these 32 attributes was verified. To arrive at a realistic estimate, all publications citing Rogers' diffusion of innovations theory post-release the fifth edition of his book in 2003 were retrieved. It was noted that some publications continued citing the fourth edition of his book from 1996 even after the release of the 2003 edition, and hence publications from 1996 onwards were retrieved. It was found that only 16 of these 32 attributes had been used in the extracted publications. Three out of these 16 were used by only one publication each, and hence were discarded from out final list of study. Therefore, only 13 of the 32 attributes made their presence in the recent literature. More specifically, 19 of the 23 attributes from the Tornatzky and Klein study failed to make a noteworthy presence and were hence discarded; this attribute-set was thus shrunk to comprise of only four attributes – *cost*, *communicability*, *riskiness*, and *social approval*.

In summary, three attribute-sets were developed for this study, whilst ensuring no overlapping of attributes in these three sets. Each attribute-set explaining individual attributes and their associated hypotheses have been presented in the paragraphs that follow.

Attribute Set I – Rogers' attributes

Relative Advantage

"Relative advantage is the degree to which an innovation is perceived as being better than the idea it supersedes" (Rogers, 2003, pp 229). The usage of this attribute in the literature is vast (Sia et al., 2004; Shih, 2008). Some of such studies have been briefly exemplified for better insight – a study on electronic data interchange examines relationships between different innovation characteristics and different diffusion attributes of EDI in organizations; their results show relative advantage as an important predictor of internal diffusion (Premkumar et al., 1994). Hsu et al. (2007) in studying the adoption of mobile internet found for relative advantage to significantly influence adoption intentions. Ha and Stoel (2009) extend the technology acceptance model to study e-shopping acceptance, and Kim and Garrison (2009) in studying mobile wireless technology adoption conclude that perceived usefulness (relative advantage) significantly influences use intentions of the consumers. Since IMPS supersedes systems like physical banks, telebanking and e-banking, this attributes is deemed relevant and hypothesized as follows,

H1: *Relative Advantage has a significant impact on the behavioral intentions of the consumers.*

Compatibility

"Compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters" (Rogers, 2003, pg 240). Carter and Belanger (2005) in their study on e-government services found that compatibility was a significant predictor of consumers' use intentions. Chen (2008) in their mobile payment acceptance study also found for compatibility to be the strongest predictor of consumers' use intentions. Another study on the acceptance of mobile payment services found strong evidence for compatibility having a significant impact on the use intentions (Schierz et al., 2010)

H2: *Compatibility has a positive impact on the behavioral intentions of the consumers.*

Complexity

"Complexity is the degree to an innovation is perceived as relatively difficult to understand and use" (Rogers, 2003, pg 257) which Frambach et al. (1998) in empirically studying the adoption of a service innovation showed that perceived complexity negatively and significantly influenced adoption. A Malaysian study investigated factors influencing use intentions of e-government services to conclude that perceived complexity had a significant negative relationship with the intention to use (Lean et al., 2009). Brumec (2006) used structural equation modelling to study the factors influencing internet's use and found that complexity had a direct negative impact on the intentions to use the internet. This attribute is thus hypothesized as,

H3: *Lower complexity has a positive impact on the behavioral intentions of the consumers.*

Trialability

"Trialability is the degree to which an innovation may be experimented with on a limited basis" (Rogers, 2003, pg 258). Lee et al. (2011) found in their study that trialability significantly influenced the employees' intention to use the e-learning systems. Odumeru (2012) in a Nigerian study found that trialability was significantly and positively related to the attitude towards the online recruiting technology. Mahmod et al. (2005) in their study concluded that trialability was a significant predictor of the behavioral intention of the users towards the e-MBA adoption. Thus the hypothesis for trialability is,

H4: *Trialability has a significant impact on the behavioral intentions of the consumers.*

Observability

"Observability is the degree to which the results of an innovation are visible to others" (Rogers, 2003, pg 258). Vishwanath and Goldhaber (2003) in their study on technology products found that observability significantly impacted use intentions. Ajili et al. (2012) investigate the attitude and intention of experts in agricultural organizations; they also found that observability had a direct effect on the intention to use. Rezaei-Moghaddam and Salehi (2010) another agricultural study on the adoption of precision agricultural technologies found for observability to have a direct impact on the adoption intentions of the users. Observability has therefore been hypothesized as,

H5: *Observability has a significant impact on the behavioral intentions of the consumers.*

Attribute Set II – Tornatzky and Klein's attributes

Cost

Mallat (2007) in their study on mobile payments adoption concluded that a premium price associated to the payments acted as a barrier of adoption. Shin (2010) in their mobile virtual network study found that cost places a negative effect on the adoption. Shiu et al. (2009) explored the 4P's of marketing in studying the effect of government policies directed towards reducing smoking; they found that price elaboration, that is, an increase in the price had a positive effect on the user's intention to quit smoking. Thus, an increase in cost has a negative effect on the adoption intention. An empirical study on mobile searches found for perceived cost to significantly influence use intentions of the users. All transactions on IMPS have a certain charge associated to them and IMPS is fully compatible with only smart phones. This is indicative of the multiple cost elements linked with this application which has a direct effect on the adoption of IMPS. Therefore, the hypotheses formulated for our study are

H6: *Lower cost has a positive impact on the adoption intention of IMPS.*

H7: *Lower cost has a positive impact on the actual adoption of IMPS.*

Communicability

According to Gerpott (2011, pg. 2151), "this characteristic refers to the degree of simplicity which users of an innovation note when they demonstrate benefits of a new good to their social reference groups and thus make the results of the novelty observable for others". In their mobile internet acceptance study they reported a positive significant relationship of communicability on adoption. Not much evidence of the use of this attribute can be found in the existing literature. Thus to gain more clarity on the influence of this attribute on the use intentions, it has been formulated as follows,

H8: *Communicability has a positive impact on the adoption of the IMPS application.*

Riskiness

Rijsdijk and Hultnik (2003) cite Jacoby and Kaplan (1972) in describing perceived risk as a multidimensional component spread across the aspects of psychological risk, performance risk, social risk, financial risk, physical risk, and risk of time loss. Teo and Pok (2003) refer to perceived risk as either a psychological risk, or a general risk that is associated to a product and its performance. Hansen (2006) in an online context elaborates on perceived risk as a consumer's apprehension of suffering a negative outcome, or losses associated with e-commerce. Tan and Teo (2000) pointed at the lack of internet security and privacy to have a negative impact on the adoption decision. Mobile marketing and ticketing studies have focussed on the security and privacy risks significantly affecting consumer intentions (Mallat et al., 2008; Tanakinjal et al., 2010). Therefore, perceived risk is almost always hypothesized to negatively influence an innovation's adoption decision. As Reay et al. (2013) suggest, in transacting online consumers are faced with apprehensions of incomplete and imperfect information, which is multiplied by the fear of surrendering personal information to the unknown. These past studies reveal that the hesitations concerning the internet and mobile securities still persist. Hence riskiness was sought after as a suitable attribute to be focussed on, in the interbank mobile payment service context.

H9: *Riskiness has a negative impact on the behavioral intentions of the consumers.*

Social Approval

Tornatzky and Klein (1982) refer to social approval as a non-financial aspect of reward, indicating it to be the status gained by a subject in their reference group. Lu et al. (2008) in a wireless mobile data service adoption study show for social approval to have a significant effect on adoption intentions. Kim and Park (2011) in studying the effect of social influence on the voluntary adoption of high technology product and services find that social influence has a significant role in prompted adoptions. Kulviwat et al. (2009) examine the moderating effect of a given product's public or private

status on consumer's adoption intentions of high-tech innovations to conclude that social influence has a positive effect on consumers' intentions to adopt a given innovation. Thus it can be argued that greater the social approval, positive will be the influence on consumers adoption intentions.

H10: *Social Approval has a significant impact on the behavioral intentions of the consumers.*

Attribute Set III – Moore and Benbasat's attributes

Voluntariness

Voluntariness, by definition is the degree to which the use of any given innovation is perceived as being voluntary, or of free will (Moore and Benbasat, 1991). Internet banking and mobile internet studies view voluntariness to positively affect user intentions and adoption (Gounaris and Koritos, 2008; Hsu et al, 2007). This attribute has also been studied in the IT context where usage and adoption of most innovations was found not to be necessarily voluntary (Karahanna et al., 1999; Kishore and McLean, 2007). Moore and Benbasat (1991) also emphasize that it is often not the actual voluntariness which will influence behaviour, but rather the perception of voluntariness. According to Aubert and Hamel (2001) innovations introduced on a voluntary basis are accepted more easily, while mandating adoption only introduces resistance. Thus, voluntariness is assumed to be positively related to adoption.

H11: *Voluntariness has a positive impact on the behavioral intentions of the consumers.*

Image

It is the degree to which the use of an innovation is considered to enhance one's image or status in one's social system (Moore and Benbasat, 1991). In an internet banking adoption study, Gounaris and Koritos (2008) showed, consumers were more likely to become adopters if doing so enhanced their image. Hsu et al. (2007) in their mobile internet adoption study also showed image to positively impact adoption intention. Since image is a social element, any decision favouring improvement in social image is always appealing to the consumers. This attribute is assumed to be positively related to adoption (Moore and Benbasat, 1991). The hypothesis therefore is,

H12: *Image has a significant positive impact on the behavioral intentions of the consumers.*

Result Demonstrability

Moore and Benbasat (1991) view this attribute as a dimension of tangibility of the results of using a given innovation, including its observability and communicability. The more observable and communicable an innovation becomes, increased are the chances of it being readily adopted. This attribute is thereby considered to have a positive influence on adoption. Earlier studies on e-commerce (Slyke et al. 2005; Slyke et al. 2010) and mobile internet (Hsu et al., 2007) have reported a positive significant influence of result demonstrability on use intention. The hypothesis thus is,

H13: *Result Demonstrability has a significant impact on the behavioral intentions of the consumers.*

Visibility

Moore and Benbasat (1991) derived visibility while analysing Rogers' definition of observability. Studies from the past attribute the early use of this variable to the Moore and Benbasat study from 1991 (Slyke et al., 2005; Hsu et al., 2007). This attribute is this defined as the degree to which the use of an innovation is apparent. An empirical study on the Mobile internet showed how different adopter groups are influenced to adopt by seeing how a given innovation is already being used by many others (Hsu et al., 2007). Another e-commerce study showed that higher visibility increases awareness, and in turn greatly impacts user intentions (Slyke et al., 2005). Therefore this attribute was chosen to study the existing level of use and its influence on adoption of the IMPS application.

H14: *Visibility has a significant impact on the behavioral intentions of the consumers.*

Behavioral Intention

Apart from the 13 shortlisted attributes, studying the influence of behavioral intention on adoption was considered important and hence behavioral intention was included as the 14th innovation attribute for this study. Behavioral intention measures the likelihood of a person getting involved in a given behaviour (Ajzen and Fishbein, 1980). Gumussoy and Calisir, (2009) regard this attribute to be the immediate determinant of actual use; they also showed in their study that the adoption of e-reverse auction was directly predicted by its use intentions. Chen et al (2002) in their study found that behavioral intention significantly influenced the online consumers towards the adoption of virtual stores. Higher the intention to use, higher will be the adoption of a given innovation; it therefore has been posited as,

H15: *Behavioral Intention has a positive impact on the adoption of IMPS.*

The next section will provide insights into the survey instrument, pilot study and the data collection methods followed in this research.

4. Research Method

4.1. *Survey Instrument*

For data collection purposes we used a questionnaire comprising of 68 questions in total. Questionnaires were distributed both online and as hardcopies. Eight of these 68 questions were demographic, with four of those being multiple choice questions aimed at gathering respondents' personal information and the remaining four being multiple choice questions aimed at gathering information on respondents' use of IMPS application. The remaining sixty questions were seven point likert scale questions required to be rated by the respondents for measuring their attitude over a range of responses (Dwivedi et al., 2006; Jamieson, 2004). These 60 questions were designed to cover all of the fourteen shortlisted attributes of this study. These questions were structured at gathering data required for testing the hypotheses posited for this study. The seven points on the likert scale were: 1 = Extremely Disagree; 2 = Quite Disagree; 3 = Slightly Disagree; 4 = Neutral; 5 = Slightly Agree; 6 = Quite Agree; 7 = Extremely Agree. All constructs comprised of four items each, forming sixty questions in total, overall. All items against their respective attributes have been presented in table 1.

Table 1
Attribute-Item Mapping

Constructs	Questions	Source(s)
Behavioral Intention	BI1: I plan to continue using IMPS.	Karahanna et al. (1999); Teo and Pok (2003); Shih and Fang (2004)
	BI2: My willingness of continuing to use IMPS is high.	
	BI3: I intend to continue using IMPS.	
	BI4: The likelihood that I will continue using IMPS is high.	
Voluntariness	V1: People I monetarily transact with expect me to use IMPS.	Moore and Benbasat (1991)
	V2: My use of IMPS is voluntary.	
	V3: People I monetarily transact with do not insist on my using IMPS.	
	V4: Using IMPS is certainly not compulsory for my financial transactions.	
Visibility	VS1: I have seen what others do using IMPS.	Moore and Benbasat (1991)
	VS2: Today's financial transactions see IMPS being used by many people.	
	VS3: I have seen IMPS being used outside my social circle.	
	VS4: It is easy for me to observe others using IMPS within my social circle.	
Trialability	T1: I know the bank which provides/offers IMPS.	Moore and Benbasat (1991)
	T2: IMPS mobile application for was easily available to get familiar with.	
	T3: I did not have to expend much effort in trying the IMPS.	
	T4: I did not have adequate opportunities to try the IMPS application.	
Social Approval	SA1: In using IMPS, you were concerned of your friends thinking of you as showy.	Dwivedi and Irani (2009); Claudy et al. (2011)
	SA2: My family thinks that I should continue using IMPS.	
	SA3: People I monetarily transact with think I should continue using IMPS.	
	SA4: Merchants I buy goods/services from, think I should continue using IMPS.	
Riskiness	R1: Mobile phones are reliable for performing financial transactions.	Tan and Teo (2000); Mallat et al. (2008)
	R2: In using IMPS, I am concerned about the consequences of a mistake.	
	R3: My Internet banking transaction Information will be known to others.	
	R4: My Internet banking transaction Information can be tampered.	
Relative Advantage	RA1: IMPS provides quicker access to the transactions that I need to make.	Moore and Benbasat (1991)
	RA2: IMPS provides greater flexibility.	
	RA3: IMPS helps me gain greater control over my finances.	
	RA4: IMPS helps me complete all my financial transactions on time.	
Compatibility	CT1: IMPS is compatible with all of my financial transfer needs.	Moore and Benbasat (1991)
	CT2: IMPS fits well with the type of financial transfers that I perform.	
	CT3: Using IMPS fits well with my lifestyle.	

	CT4: My mobile phone is compatible with the IMPS application.	
Complexity	CP1: Using IMPS is challenging and frustrating.	Moore and Benbasat (1991); Shih and Fang (2004); Yang et al. (2006)
	CP2: Learning to use IMPS is easy for me.	
	CP3: Easy to operate interbank service is important to me.	
	CP4: I find it easy for me to be skilful at using the IMPS mobile application.	
Cost	C1: IMPS is inexpensive.	Mallat et al. (2008); Koenig-Lewis et al. (2010)
	C2: The cost of making a financial transfer with IMPS is reasonable.	
	C3: Buying a phone compatible with this IMPS application is expensive.	
	C4: Transactions made on the IMPS application are the most affordable single transfer type for me.	
Image	IM1: Using IMPS improves my image within the society.	Moore and Benbasat (1991)
	IM2: People in my social circle using IMPS have more prestige that those who do not.	
	IM3: The people in my social circle who use IMPS have a high profile.	
	IM4: Using IMPS is a status symbol in my social circle.	
Observability	O1: Being seen as a user of IMPS is good for my image.	Meuter et al. (2005); Richardson (2009)
	O2: People who use IMPS are not very visible in my social circle.	
	O3: I have seen others using IMPS.	
	O4: I do not know anyone who uses IMPS.	
Result Demonstrability	RD1: I would have no difficulty telling others about the results of using IMPS.	Moore and Benbasat (1991)
	RD2: I could communicate to others the consequences/outcomes of using IMPS.	
	RD3: The results of using IMPS are apparent to me.	
	RD4: I would have difficulty explaining why IMPS may/not be beneficial.	
Communicability	CM1: Explaining advantages and disadvantages of IMPS would be difficult.	Compeau et al. (2007)
	CM2: I think that I could very easily describe the effects of using IMPS.	
	CM3: A person with experience of using IMPS could explain its impact to me.	
	CM4: I could communicate to others the consequences of using IMPS.	

4.2. *Pilot Study*

After completing the survey instrument design, a pilot test was carried out with a sample of thirty respondents. The respondents were asked to pick on the difficulties associated with filling the questionnaire. The 30 respondents confirmed on the ease of understanding and clarity, but complained about the length of the questionnaire and its repetitiveness. Other minor suggestions that were made were addressed and the questionnaire was amended suitably, but there was no escape to the length of the questionnaire. Despite the concern of length being the strongly made comment by all of the pilot study respondents, elimination of any or few questions in this regard was considered inappropriate. The final questionnaire comprised of all of the 68 questions.

4.3. *Data Collection*

To evaluate the adoption of IMPS in India, it was necessary to gather the data from all over India. Therefore, the data was collected from respondents residing in different cities across India. Four most populous cities in India, one each from the northern (Delhi), southern (Bangalore), eastern (Kolkata), and western (Mumbai) parts of India were shortlisted. The citizens in these cities were then randomly reached out to, irrespective of them being the adopters or non-adopters of IMPS. A question on the circulated questionnaires asked the respondents if they were the adopters or the non-adopters of this technology to measure its diffusion and awareness in the Indian context. The questionnaires were carefully and appropriately designed that made it convenient for both, adopters and non-adopters to provide responses from their respective perspectives. The all-India data collection was aimed at to gain an understanding of the factors that steered the diffusion and adoption of the IMPS application in India.

When it comes to selecting an appropriate sample size for regression analyses, whilst some recommendations in the literature suggest that a size of 300-400 is appropriate when moderate number of predictor variables are involved (Nunnally, 1978), the others recommend going by a 10:1 subjects to predictors ratio (Wampold and Freund, 1987). As addressed by Maxwell (2000), such discrepancies in the made suggestions have more often than not left the researchers confused about the appropriate sample size. However, for this research a safer number of 300+ was being aimed at.

Given that four major cities in India were being targeted, the target number of 300+ was equally spread across these four cities, and rounded off at a minimum of 80 respondents from each city.

We received a total number of 330 filled questionnaires. Out of these, seven were found to be incomplete, and hence discarded as invalid, leaving us with a total of 323 valid and usable questionnaires which were analysed to deduce findings for this study. The SPSS statistical analysis tool was used for data analysis, the findings from which have been laid out in section 5. Section 5 makes available results from for different tests which will help interpreting the adoption of IMPS in India. First, *frequency tests* were done on the demographic features identified for the study. Second, a *reliability test* was done on the items those make up each of the 15 attributes, for measuring their internal consistencies. Third a *descriptive test* was run to arrive at the means and standard deviations of all shortlisted attributes. Fourth, *regression analyses*, both, *linear* and *logistic regressions* were run to test the study's hypotheses. Lastly, a *multicollinearity test* was done to check for the correlation amongst the predictor variables.

5. FINDINGS

5.1. *Frequency Tests*

The first frequency test was run for respondents' personal characteristics, i.e. their age, gender, and educational qualification, as shown in table 2. Most respondents (32.2%) belonged to the 18-24 age group. Equal spread of male and female respondents was found, with the male group being slightly larger at 53.6%. Most respondents were graduates (38.1%) and postgraduate-taught (22%).

Table 2
Frequency Test I

Variable	Group	Frequency	Percentage
Age	18-24	104	32.2
	25-34	101	31.3
	35-44	51	15.8
	45-54	46	14.2
	55-64	21	6.5
	65-74	0	0
	Above 75	0	0
	Total	**323**	**100.0**
Gender	Male	173	53.6
	Female	150	46.4
	Total	**323**	**100.0**
Education	Secondary School	3	0.9
	Higher Secondary	62	19.2
	Diploma	31	9.6
	Graduate	123	38.1
	Postgraduate – Taught	71	22.0
	Postgraduate – Research	12	3.7
	Other	21	6.5
	Total	**323**	**100.0**

The second frequency test was run for respondents' IMPS use characteristics, i.e. the type of IMPS application, their use duration, and the use frequency, which is shown in table 3. While only 74 adopters were found, 249 respondents turned out to be the non-adopters. Person-to-merchant (13%) type transaction was the most used. Most adopters were using IMPS from 12-24 months and most of these adopters used it only once or twice a week (6.2%).

Table 3
Frequency Test II

Variable	Group	Frequency	Percentage
Application Type	Person to Person	32	9.9
	Person to Merchant	42	13
	Non Adopters	249	77.1
	Total	**323**	**100**
Usage Duration	<=12 Months	30	9.3
	12-24 Months	37	11.5
	25-36 Months	4	1.2
	>36 Months	1	0.3

	Other	2	0.6
	Non Adopters	249	77.1
	Total	**323**	**100**
Usage Frequency	Several times a day	1	0.3
	Once a day	7	2.2
	1-2 days a week	20	6.2
	3-5 days a week	19	5.9
	Once every few weeks	16	5
	Less often	11	3.4
	Non Adopters	249	77.1
	Total	**323**	**100**

5.2. *Reliability Test*

Reliability test results are presented in table 4. This test provided an insight into the internal consistencies of the items making up the individual attributes of our study. The *Cronbach's alpha* values along with the number of items for each attribute have been tabulated. For a total of nine constructs one item each was deleted to arrive at an improvised new alpha value. Hinton et al. (2004) extended four different reliability types across which different Cronbach's alpha values could be read – excellent reliability (≥ 0.90), high reliability (0.70-0.90), moderate reliability (0.50-0.70), and lastly, the low reliability (≤ 0.50).

Out of the 14 constructs in total, there were six constructs with high reliability, six with moderate, and two with low reliabilities. High alpha value of a given attribute means higher consistency amongst items forming that attribute. *Image* and *Behavioral Intention* were the attributes with the highest reliabilities at alpha values of 0.883 and 0.850 respectively.

Table 4
Reliability Test

Constructs	Sample Size	Number of Items	Cronbach's Alpha (α)	Reliability Type
Behavioral Intention	323	3	0.850	High
Voluntariness	323	4	0.392	Low
Visibility	323	4	0.784	High
Trialability	323	4	0.569	Moderate
Social Approval	323	3	0.694	Moderate
Riskiness	323	3	0.631	Moderate
Relative Advantage	323	4	0.788	High
Compatibility	323	4	0.713	High
Complexity	323	4	0.497	Low
Cost	323	3	0.752	High
Image	323	4	0.883	High
Observability	323	4	0.523	Moderate
Result Demonstrability	323	2	0.576	Moderate
Communicability	323	4	0.516	Moderate

5.3. *Descriptive Statistics*

The descriptive statistics can be read in the ascending order of mean values from table 5. The table is also populated with the standard deviation for all attributes. While *image* was the construct with the lowest mean at 3.97, *relative advantage* was found to have the highest mean value at 4.89. Very close to this value was *voluntariness* with its mean at 4.81.

Table 5
Descriptive Statistics: Importance of various innovation-attributes

Constructs	N	n	Mean	Std. Deviation
Image	323	4	3.97	1.449
Social Approval	323	4	4.2	1.308

Observability	323	4	4.28	1.114
Visibility	322	4	4.55	1.265
Trialability	323	4	4.61	1.063
Behavioral Intention	323	4	4.63	1.242
Riskiness	323	4	4.64	1.018
Cost	323	4	4.69	1.021
Complexity	323	4	4.74	0.961
Compatibility	322	4	4.77	1.224
Result Demonstrability	323	4	4.77	1.022
Communicability	323	4	4.79	0.917
Voluntariness	323	4	4.81	0.898
Relative Advantage	323	4	4.89	1.113

5.4. *Regression analyses*

Three regression analyses corresponding to the three attribute-sets were run for all of our 323 cases. A detailing on all of the three has been provided here -

5.4.1. Linear Regression I – Effect of Rogers' five attributes on behavioral intention

In linear regression, there exists an assumption of a linear relationship existing between the dependent and independent variables (Worster et al., 2007). In the linear regression run for the first attribute set, *behavioral intention* was chosen to be the dependent variable, and Rogers' five innovation attributes were chosen to the independent variables (Table 6). The resultant model significantly predicted users' behavioral intention towards the use of IMPS: ($F(5,323) = 39.507$, $p=0.000$). The model successfully explains 62% variance (adjusted $R^2=0.620$). Four of the five independent variable were found to be significant predictor variables, while observability turned out to be insignificant (□□□□□□□□□□p=0.281).

Table 6
Linear Regression I

Model	Standardized Coefficients	t	Sig.	Collinearity Statistics	Hypotheses Support
	Beta			VIF	
(Constant)		1.335	.183		
Relative Advantage	.361	6.182	.000	1.749	H1: Supported
Compatibility	.172	2.825	.005	1.904	H2: Supported
Complexity	.149	2.685	.008	1.589	H3: Supported
Trialability	.117	2.165	.031	1.502	H4: Supported
Observability	-.058	-1.081	.281	1.456	H5: Not Supported
Model Details Adjusted R Square = 0.620; F = 39.507; Significance = 0.000					

5.4.2. Linear Regression II – Effect of four attributes from Tornatzky and Klein's study on behavioral intention

This linear regression run for the third attribute set continued to have behavioral intention as the dependent variable and social approval, cost, communicability, and riskiness as the four independent variables (Table 8). This run too had a significant resultant model to its account: ($F(4, 323) = 34.579$; $p=0.000$) with 29% variance being explained (adjusted $R^2=0.294$). While social approval, cost and communicability were seen to be significant, riskiness was found to be the only insignificant predictor variable.

Table 8
Linear Regression III

Model	Standardized Coefficients	t	Sig.	Collinearity Statistics	Hypotheses Support

	Beta			VIF	
(Constant)		3.591	.000		
Riskiness	.017	.345	.730	1.104	H9: Not Supported
Cost	.296	5.009	.000	1.593	H6: Supported
Social Approval	.161	2.944	.003	1.371	H10: Supported
Communicability	.218	3.880	.000	1.435	H8: Supported
Model Details Adjusted R Square = 0.294; F = 34.579; Significance = 0.000					

5.4.3. Linear Regression III – Effect of five PCI variables on behavioral intention

In linear regression run for the second attribute set, behavioral intention remained the dependent variables, and five of perceived innovation characteristics from Moore and Benbasat's PCI theory were considered as the independent variables (Table 7). The resultant model was again found to be significant: (F (4, 323) = 61.820; p=0.000), and it explained 43% of the variance (adjusted R^2=0.431). This second run was found to have two significant and two non-significant predictor variables.

Table 7
Linear Regression II

Model	Standardized Coefficients Beta	t	Sig.	Collinearity Statistics VIF	Hypotheses Support
(Constant)		2.368	.018		
Voluntariness	.557	11.044	.000	1.436	H11: Supported
Image	.060	1.182	.238	1.469	H12: Not Supported
Result Demonstrability	.114	2.366	.019	1.305	H13: Supported
Visibility	.041	.828	.408	1.400	H14: Not Supported
Model Details Adjusted R Square = 0.431; F = 61.820; Significance = 0.000					

5.4.4. Multicollinearty Test

A multicollinearity situation is declared when a high correlation is identified between two or more predictor variables under consideration which can potentially cause problems in investigating the roles of the independent variable(s) in the success of the model being analysed (Brace et al., 2006; Dwivedi et al., 2006). Tables 6, 7 and 8 consist of results from the multicollinearity tests. The maximum allowed VIF value is 10, which confirms that the considered predictor variables do not suffer a multicollinearity condition (Irani et al., 2009). While the VIF values for linear regression I ranged between 1.45 and 1.9, that for the second run was between 1.3 and 1.46, and lastly the third regression run showed VIF values between 1.1 and 1.59. Clearly, all these runs have values well within the maximum value of 10, and hence the variables of this study are declared to be free of the multicollinearity problem. This in turn suggests that there is a high probability that the variance explanation given by these 13 predictor variables will be very close to the real situation.

5.4.5. *Logistic Regression* – Effect of behavioral intention and cost on adoption

Logistic regression requires the outcome variable to be dichotomous with two probable outcomes (Worster et al., 2007). The logistic regression was run for *adoption* as the dependent variable, and *behavioral intention* and *Cost* as the independent variables (table 9). The resultant model for this run significantly predicted the IMPS adoption (omnibus chi-square=38.207, df=2, p=0.000).

Table 9

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	36.010	2	.000
	Block	36.010	2	.000
	Model	36.010	2	.000

The variance in the adoption decision accounted by this model was found to be between 10.5% and 16% (Table 10).

Table 10
Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	311.660	.105	.160

As tabulated in table 11, 95.6% non-adopters and only 4.1% of adopters were successfully predicted. Also, 74.6% of the predictions were found to be accurate, overall.

Table 11
Classification Table

			Predicted		
			Installed or Not		Percentage
	Observed		Yes	No	Correct
Step 1	Installed or Not	Yes	3	71	4.1
		No	11	238	95.6
	Overall Percentage				74.6

The coefficients, Wald statistics, degrees of freedom, and probability for behavioral intention for both behavioral intention and cost were also calculated (table 12). The tabulated numbers are evident enough to show that both, behavioral intention and cost successfully and reliably predicted the adoption of IMPS.

Table 12
Variables in the equation

Independent Variable	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)		Hypothesis Support
							Lower	Upper	
Cost	-.293	.146	4.049	1	.044	.746	.560	.992	H7: Supported
Behavioral Intention	-.536	.142	14.144	1	.000	.585	.443	.774	H15: Supported
Constant	5.288	.814	42.199	1	.000	197.94			

6. DISCUSSION

6.1. *Hypotheses testing and the validated research model*

This study undertook fifteen hypotheses for testing and validation in order to learn about the influence of fourteen different innovation attributes on the users' adoption intention and adoption of the IMPS application. Eleven of these fifteen were supported, while four hypotheses (H5, H9, H12 and H14) were rendered not supportive. Tables 6, 7, 8 and 12 show that relative advantage, compatibility, complexity, trialability, voluntariness, result demonstrability, social approval, cost and communicability significantly predicted users' intention of using IMPS; cost and behavioral intention significantly predicted the adoption of IMPS; lastly, observability, image, visibility and riskiness were found to be the insignificant adoption attributes for IMPS.

Focussing first on the non-significant attributes found in this study, this part of the section will elaborate on the behaviour of these attributes. While attribute-set I and attribute-set II had one insignificant attribute each, attribute-set III had two insignificant attributes to its account. From attribute-set I, *observability* was found to be insignificant at a p-value of 0.281 (Hypothesis 5). By definition, observability deals with the idea of the results of an innovation becoming clearly visible to others (Rogers, 2003); but with an application like IMPS, which is a mobile application, its visibility becomes comparatively limited. The existing literature houses both, studies with observability not having a significant impact on intention (Arts et al., 2011), and studies where observability has a significant effect on intention (Jung et al., 2011). The point being made here is observability can successfully predict intention only in cases when the use of innovation in question is very apparent to the people amongst the user of that innovation, for the people to be influenced by the results/outcomes from the use of that innovation. IMPS, clearly, is not one such application. Its use, advantages, and limitations can be found out only if one has an explicit interaction about the application with one of its active users, hence the non-significance of this attributes in the IMPS context.

The next non-significant attribute from attribute-set II was riskiness (Hypothesis 9). In using IMPS, users' bank accounts are accessed for completing the transactions initiated by the users. This also requires internet access, which in turn requires data acquisition from the mobile network providers. In doing so, the users may be worried of the consequences of an incomplete transaction in case of weak/bad network connectivity. The literature is rich with findings from studies that show a significant influence of riskiness on users' adoption intention (Schaupp and Carter, 2010); for instance - Taylor and Strutton (2010) in their meta-analysis on internet consumer behaviours found that perceived risk had a strong negative effect on the behavioral intentions However, in line with our contrasting findings, Claudia et al. (1994) make a point in their study stating - despite the existence of perceived risks among online consumers, some choose to overcome fear and buy online. They also suggest that perceptions of risk diminish over time. The same can be argued in the IMPS context. The frequency test results for our study (Table 2) showed that the maximum respondents were aged between 18 and 34 years. These are young, tech-savvy individuals who are well versed with the new-age technologies. Most of these respondents were graduates and post-graduates, being well educated and fully informed of the consequences of using technologies such as IMPS. They not only overcome the fear of associated risks, but are aware of potential solutions to problems that might arise upon transacting using IMPS. Moreover, carrying out financial transactions online has been in existence for a good period of time, which is quite similar to the transactions done using a mobile phone, only that the device used for making this transaction online is a mobile device and not a laptop/personal computer. The fears of making online financial transactions can thus be assumed to have diminished with time. Gupta and Xu (2010) also found an insignificant relationship between riskiness and intention; they too reiterate the point that consumers tend to adopt technologies even if there is a risk associated to them. These arguments can thus be considered to account for the insignificance of riskiness over behavioral intention in the IMPS context.

The last non-significant attribute for our study was the *image* (Hypothesis 12) from attribute-set III. There are studies in literature showcasing this insignificant relationship between image and intention - Slyke et al. (2010) found image to be an insignificant predictor variable of e-commerce adoption; Slyke et al. (2004) in their study on web based shopping argued for this insignificance to be an 'unexpected result – an inverse relationship', as opposed to the impact that image should have theoretically had on the intention to use. In our context, like in the case of observability, image also involves an element of visibility and hence its non-significant impact on intention. The second insignificant attribute from this set was *visibility.* An example from the literature is a study by Slyke et al. (2003) on the influence of users' perception on the use of groupware which also established a non-significant relationship between visibility and use intentions. However, in our context, the behaviour of this attribute is in line with the justification provided for *observability* of IMPS. Extending the same discussion with respect to the visibility of IMPS, it can be reiterated that IMPS suffers limited visibility owing to the fact that it is an application that runs on a mobile phone. While the use of a mobile phone in itself has large visibility to the audience around an active mobile phone user, the use of the IMPS application on that very mobile phone will be subject to retarded visibility unless until IMPS is overtly discussed.

Moving on to the significant adoption variables, this part of section deals with the analysis of the possible factors that have contributed in rendering these variables significant in the IMPS context. Starting with the attribute-set I, as proposed, the gathered data supported hypotheses H1, H2, H3 and H4. There is extensive support in literature on *relative advantage* having a positive influence on intention (Slyke et al., 2002; Carter and Belanger, 2005; Hsu et al., 2007; Lee and Kozar, 2008). IMPS is an ubiquitous application that is superior in terms of accessibility, availability and speed from the already existing banking systems such as telebanking, internet banking and physical banks. Therefore, IMPS can be seen as better than the systems that it is superseding, which also has been supported by the data gathered from the respondents for our study, in turn, rendering hypothesis 1 to be true and valid. Our next attribute of interest is *compatibility*, which also has vast literature usage that supports our finding with respect to this attribute (Shin, 2010; Hsu et al; 2007; Aubert and Hamel, 2001). IMPS offers fund transfer services to its consumers via a medium relatively superior to the preceding fund transferring systems. As explained in the introduction section, IMPS allows users to make fund transfers just as they would using a physical bank or internet or telebanking. It is both, different and superlative in the fact that it supports the users' potential need in today's fast-moving world of having access to everything on-the-move. This argument is thus supportive of the positive influence of compatibility on the behavioral intention of users towards IMPS (hypothesis 2). The discussion now extends to support hypothesis 3 which deals with

the *complexity* attribute of an innovation. This hypothesis along with being supported by our study, also finds support in many past studies (Truman et al., 2003; Yang et al., 2006; Shih, 2008). IMPS is an easy to use application where users can have access to their bank accounts with a simple tap on an application on their mobile phones. Using this application eliminates the need of physically walking into a bank, or even having to browse through web-pages to login credentials and then gain access to their bank accounts to make the required transactions. The last significant attribute in this attribute-set is *trialability* that was found to significantly influence behavioral intention (Hypothesis 4). Past studies also find this effect to be true (Meuter et al., 2005; Gerpott, 2010; Suki, 2010; Arts et al., 2011). The aspect of trialability with IMPS can be considered unlimited. Since IMPS is not an application on any contractual agreement, there does not arise any potential question of a limited/free trial period. It can be viewed as having an unlimited free trial period. One could make a decision to adopt and quit adoption of this application at any time with no obligations whatsoever, which effectively makes its trialability unlimited. This therefore has a positive effect on the users' intention as it frees them from the apprehension of any kind of binding associated with the use of this application.

The discussion now concentrates on the significant variables from the attribute set-II. *Cost* was found to exert significant influence on both, adoption intention (Hypothesis 6) and actual adoption (Hypothesis 7) of IMPS. IMPS transactions come with a small fee and the past studies have found for this kind of associated transaction fee to act as a barrier of adoption (Dahlberg et al., 2007). Damanpour and Schneider (2009) in their study on innovation adoption in organizations found that their low innovation cost had a positive effect on the innovation adoption. Similar being the case with IMPS, the other costs that one could associate to its use are the price of a smart phone and charges for using data (internet) on the mobile phone. Considering the present generation consumers, using devices such as smart phones has become a trend and a regular thing. Also, mobile network providers offer internet plans at considerably affordable prices. Our findings suggest that these cost issues have been conveniently surpassed by the present day users, and they find these costs associated to IMPS very affordable. *Communicability* was also found to exert a significant impact on use intention towards IMPS (Hypothesis 8). From the findings it can be concluded that the active IMPS users found it easy to communicate to others about their interaction with this mobile application, and hence its influence on adoption intention. Lastly, *social approval* (Hypothesis 10) behaved as a significant variable in predicting the adoption intentions for IMPS. The findings from past studies for this attribute have been in-line with the findings from our study - Lee-Partridge and Ho (2003) in their study found that social factors were positively related to the adoption intention towards the internet stock trading system; Mallat et al. (2008) also found that social approval was positively related to the intention of adopting mobile ticketing services in public transportation. Our results for IMPS also conveyed that approval for the use of IMPS by its active users behaved as a positive social propellant to promote its adoption amongst its potential consumers.

This part of the paper will discuss the significant predictor variables from attribute-set III. The positive effect of *voluntariness* (Hypothesis 11) on intention has been established by past studies as well (Aubert and Hamel, 2001; Gounaris and Koritos, 2008). In the IMPS context, if consumers choose to transact via interbank money transfers, they could always operate their accounts online using their personal computers. Using the IMPS application on their mobile phones is not a mandate, but only an added choice for their convenience and thus the adoption of the IMPS application is completely voluntary, and hence its significant influence on the users' adoption intentions. *Result demonstrability*, by definition is made up of components of observability and communicability. Interestingly, both observability and communicability have been investigated by our study. While observability was a non-significant predictor of IMPS, communicability turned out to be a significant predictor. Thus, it may be assumed that the communicability element was dominant with IMPS where the active users of IMPS communicated positive outcomes of using the IMPS application. This in effect may have led to result demonstrability having a positive influence on users' IMPS adoption intentions.

Finally, hypothesis 15 confirming the significant effect of *behavioral intention* on the adoption of IMPS was validated by the empirical data for this study. The literature in this context presents studies with evidences similar to our findings (Ajzen, 1991; Taylor and Todd, 1997; Hartshorne and Ajjan, 2009; Lee and Kozar, 2008; Shin, 2010). The consumer intentions to use IMPS have been revealed to have a significant effect on the actual use of this mobile application in the Indian context.

The adjusted R^2 values of behavioral intention for the three attribute-sets under consideration were – attribute-set I: 0.620; attribute-set II: 0.294; and attribute-set III: 0.431. Researchers studying the influence of one or more of Rogers' attributes on behavioral intention have derived the adjusted R^2 values which are lesser in value in comparison to the adjusted R^2 value computed in our study for the validated attribute-set I. This in turn entitles the attribute-set I as a model delivering satisfactory performance. For reference a few studies with their adjusted R^2 values have been listed here – Hsu et al., 2007 (0.524); Mallat et al., 2008 (0.555); Li et al., 2011 (0.45). Similarly analysing behavioral intention for attribute set II, when looking into past studies that had studied the influence of either one or more of the attributes from our set II on behavioral intention, it was found that there were studies with values both, lesser (Grepott, 2011) and higher (Lee-Partridge and Ho, 2003; Mallat et al., 2008) than the value reported in our study. Therefore, we would consider the adjusted R^2 value for attribute-set II to be comparatively lower making it an attribute-set that does not very well explain the variance for behavioral intention, overall. Lastly, for the attribute-set III, the reported R^2

values have been either equivalent to, or lesser than the value reported from our study; also rendering the second attribute set from our study to be capable of delivering satisfactory performance in suitably predicting the adoption intentions for IMPS. Examples include Karahanna et al (1999) with an adjusted R^2 value of 0.384 and Kishore and McLean (2007) with a value of 0.43.

We now move onto the R^2 values reported for adoption; these were presented as Cox and Snell R^2 (0.105) and Nagelkerke R^2 values (0.160). These R^2 values were again found to be considerably lesser than the Cox and Snell and Nagelkerke values reported by the past studies in computing the influence of different dependent variables on the adoption of a given innovation – for instance, Li (2008) reported a Cox and Snell value of 0.379 and a Nagelkerke value of 0.538; Wang et al. (2010) reported for a Cox and Snell value of 0.51 and a Nagelkerke value of 0.69. These R^2 values are clearly much higher than the values calculated in our study, leading us to a conclusion that the variance for adoption here is not very well explained by the behavioral intention and cost attributes for IMPS.

6.2. *Research Contributions and Practical Implications*

This study contributes to the already rich literature on innovation attributes that govern the diffusion of a given innovation into a target environment, which has now been extended by validating and testing three such different sets of innovation attributes for their influence on the diffusion of the *Interbank Mobile Payment Service* in the *Indian context*. Considering the absence of studies on the adoption and acceptance of IMPS in the Indian context, the results from our study become interesting from the future research perspective. Our study could assist in providing the initial information concerning the behaviour of different predictor variables on the acceptance of IMPS. This study extracts results for both, the intention and adoption aspects of IMPS. The growing importance of the concept of a 'mobile wallet' increases the need of studying the facilitators and barriers to the acceptance of IMPS in India.

The study's findings brought to light the following key revelations – IMPS is *relatively advantageous* than the already existing financial systems such as banks, internet banking and telebanking. It is *compatible* with the services that the aforementioned financial systems were providing, and also meets the current finance transfer needs of the consumers with added facilities. It is, at the same time easy and faster to use, using a very small fund transfer time making those funds ready for immediate use post the fund transfer. It comes with no binding contracts and allows users to *try* the application to their satisfaction to help them decide whether or not to use IMPS as a regular fund transfer medium. The use of this application is completely *voluntary* wherein the acceptance or rejection of the use of this application is at every consumer's own discretion. Coming with a minimal transaction charge and despite the few other charges associated with using it on a smart phone, it is considered affordable price-wise. The *results* of using IMPS have been positively *communicated* by the active users to its potential users. Also, the use of this application makes a good social presence with it being *accepted socially* having a positive effect on the adoption of IMPS, overall. On the other hand, IMPS suffers *visibility* issues, which in turn affects its *observability* and *image* that in effect begin to act as the barriers to the IMPS adoption.

Despite a higher number of facilitators to the IMPS adoption than the barriers, it was found that the adoption rate of this application is very low (22.9%). It cannot be ignored that the already existing financial systems have been in operation since a very long time and the customers have remained well attuned with them. These old established systems of banking that the customers are very used can be seen as one of the reasons of this low adoption rate for IMPS. Ten attributes positively influenced the adoption decision, yet the findings featured a small number against the adopters of IMPS. It can thereby be thought of as - the services and additional advantages of IMPS are not attractive enough for the target consumers for them to choose IMPS as the primary mode of making fund transfers; or the target populated is not well informed of the existence, use and benefits of using the IMPS application for them to even consider using IMPS as a fund transfer option.

7. Conclusions, Limitations and Future Research Directions

With this study on the acceptance of IMPS in the Indian context, we have attempted to test and confirm a set of pre-established ideas with respect to the effect of 14 innovation-attributes on the use intentions and adoption of IMPS. Three well established attribute-sets (Rogers' innovation attributes, perceived characteristics of innovating by Moore and Benbasat, and attributes identified by Tornatzky and Klein) were incorporated to study their influence on the IMPS adoption. Careful attention was paid to avoid studying overlapping attributes amongst these three attribute sets, and any similar attributes were identified and eliminated from this study. Eleven of the fifteen proposed hypotheses were concluded true on the basis of the accumulated data, and the statistics derived from that data using the SPSS analysis tool.

The key highlights here are - four attributes from Rogers' (attribute-set I), except observability, significantly influenced consumers' intention to use IMPS; only four attributes were studied in the attribute-set II (Tornatzky and Klein), out of which all except riskiness were found to significantly predict the consumers' intention to use IMPS; the cost of using IMPS was found significantly influencing not only the use intentions, but also the actual adoption of this application by the potential users; the attribute *ease of use* was eliminated from the attribute-set III (Moore and Benbasat) for its

potential overlap with the complexity attribute from attribute-set I; two attributes, voluntariness of using IMPS, and the result demonstrability of the application were found to be significantly influencing consumers' use intentions. On the other hand, image and visibility of the application failed to have any influence on consumers' intentions towards this application; finally the attribute, behavioral intention, was found positively influencing the actual adoption of IMPS by the potential consumers; and lastly, the adjusted R^2 values revealed that attribute-set I (Rogers') delivered the most satisfactory performance, followed by the attribute-set III (Moore and Benbasat's); attribute-set II (Tornatzky and Klein's) was the least satisfactory, failing to well explain the variance in the model formed from the attributes of this attribute-set.

The data collection was geographically restricted to only four states in total. It cannot be denied that the culture and geographical locations do impact the diffusion of a given innovation. Therefore, to explore the probable cultural influences on the adoption of IMPS in India, future researchers may consider inclusion of more number of states, whilst offering a comparison of the varying adoption rates state-wise. This should potentially provide for an in-depth understanding of the factors steering the diffusion of IMPS in the Indian context.

As discussed in section 6, the effect of *image* on the behavioral intention was contradictory with the findings from the past studies. Our study, as well, could not extend a satisfactory explanation for this insignificant behaviour of this attribute. To ascertain its behaviour, as suggested by Slyke et al. (2004), additional research is necessary to probe into the validity of this finding. The future studies may want to focus more on the influences of this attribute to bring to light more meaningful interpretations with respect to image as an innovation attribute.

Extending the discussion from section 6, the effect of riskiness was insignificant on use intention for our study. In delving into the past literature, Gupta and Xu (2010) made a point that there are different types of risks associated to a technology. Therefore, not until all of these different types of risks have been probed into, can the actual effect of riskiness be validated on a given innovation's use intention. Therefore, the future researchers might want to probe into the various risk types associated to IMPS in order to arrive at a more convincing explanation on the influences that riskiness may have on the diffusion of IMPS in the Indian context.

The discussions concerning the logistic regression run for this study suffered low Cox and Snell and Nagelkerke R^2 values. These low values can be interpreted for less satisfactory explanation of variance exhibited by the model formed for the influences of behavioral intention and cost on the adoption of IMPS. In order to overcome this problem, the future researchers could consider studying the effect of more number of innovation attributes on the *adoption* variable for IMPS.

Finally, the diffusion of IMPS in the Indian context is in the progressive stages; the influences of these discussed innovation attributes on its use intentions and adoption will differ and vary over time. Therefore, a repeat study on the effects of the innovation attributes studied here at a future time may provide interesting insights that may help us better understand the effect of the time factor on the diffusion of IMPS in the Indian context.

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