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Factors Affecting Adoption of Mobile Services

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ABSTRACT

The extent of adoption of mobile services in India has not progressed as expected. In this backdrop, the present research investigated factors affecting intention to adopt (IA) mobile services. Using researcher controlled sampling, data was generated from students enrolled in business schools. Two sets of statistical techniques were employed. The first set was used to refine and test the validity and reliability of the research instrument by using Cronbach alpha, inter-item and item-total correlation, and principal component analysis. The second set was used to estimate interrelated dependence relationships by using structural equation modelling. Mobile service adoption model was proposed. Results suggest that attitude, compatibility, subjective norm, perceived usefulness, and personal innovativeness are significant determinants of IA mobile services. The findings can be of vital importance to practitioners when developing new services and strategizing marketing campaigns. The study also opens up several avenues for additional research in the domain of adoption of mobile services.

Keywords: Mobile Services Adoption, India, Intention to adopt
JEL Classifications: M300, M310

1. INTRODUCTION

Increasingly, mobile services are becoming more important for companies and consumers due to the possibility of uniqueness and personalized interchange of information (Watson et al., 2002). The core focus of mobile services rests on the notion of reaching out to customers regardless of their location and delivering the right information to the right consumer at the right time (Barnes, 2002). However, the adoption pace of mobile services has not progressed as expected (Carlsson et al., 2006). Thus, understanding factors that affect the adoption of mobile services is of decisive importance.

2. THEORETICAL FRAMEWORK AND HYPOTHESES

From the perspective of technology acceptance theories and models, many researchers have approached and investigated the adoption of mobile banking (Brown et al., 2003; Luarn and Lin, 2005); mobile multimedia services (Pagani, 2004); mobile devices/services (Carlsson et al., 2006); mobile advertising (He and Lu, 2007); mobile banking services (Hosseini et al., 2015); multimedia message service (Hsu et al., 2007); mobile internet usage (Lee et al., 2002); mobile technologies (Park et al., 2007); wireless short messaging services (Turel et al., 2007); and mobile services adoption (Wang and Li, 2012); mobile government (Liu et al., 2014); mobile entertainment services (Kondo and Ishida, 2014); and mobile coupon service adoption (Ha and Im, 2014).

Thus, in the present study, factors pertaining to adoption have been identified from technology acceptance/adoption theories/models (Ajzen, 1991; Davis, 1989; Venkatesh et al., 2003) as well as from previous research. These factors include attitude towards mobile services (Ajzen, 1991; Taylor and Todd, 1995); subjective norm (SN) (Ajzen, 1991; Ajzen and Fishbein, 1980); perceived usefulness (PU) (Davis, 1989; Rogers, 1995); compatibility (Rogers, 1995); personal innovativeness (PI) (Rogers, 1995). In addition, adoption intention was considered as main dependent variable to predict the future usage behaviour (Ajzen, 1991; Ajzen and Fishbein, 1980; Davis et al., 1989).

Attitude (A): In consumer behaviour, attitudes refer to overall evaluations that indicate people's favourability towards action (Hoyer and MacInnis, 2004). It was found that adoption decisions of people are highly affected by their attitudes (Erumban and de Jong, 2006) and differences in attitudes of individuals affect the use and interaction with their environment (Hofstede, 2001).

In the theories of technology adoption, attitude has been considered to be very important and proposed as a main construct in the technology acceptance model (TAM) proposed by Davis et al. (1989), theory of planned behaviour (TPB) by Ajzen (1991), and theory of reasoned action (TRA) suggested by Ajzen and Fishbein (1980). In these three models, attitude was considered as a direct factor of adoption intention (Ajzen, 1991; Ajzen and Fishbein, 1980; Davis et al., 1989).

In the literature of mobile services, attitude has been found to be a determinant of intention to adopt (IA) mobile entertainment services (Kondo and Ishida, 2014), mobile coupon service adoption (Ha and Im, 2014), mobile social network games (Park et al., 2014), mobile map services (Park and Ohm, 2014), mobile devices/services (Carlsson et al., 2006), and mobile services (Bauer et al., 2005). Thus, attitude is theorized in this study to be a direct factor and expected to influence the adoption intention. In the light of the above, the following hypothesis was framed:

H_1: Attitude towards mobile services (A) has direct and significant influence on IA mobile services.

2.1. SN

It is the person's perceived pressure from other people who are important to him to perform/adopt or not to adopt the innovation (Ajzen, 1991; Venkatesh et al., 2003). However, SN has been represented as social influence in unified-theory-of-acceptance-and-use-of-technology proposed by Venkatesh et al. (2003). Taylor and Todd (1995) also considered social influence analogous with SN and defined it as peer influences, superior influences, and other people's opinions.

Thus, the social context may influence an individual's perception that certain important referents think that the individual should or should not perform a particular behaviour as well as the individual motivation to act in accordance with the group (Ajzen and Fishbein, 1980). Therefore, the significant others have a key and important influence on adoption intention because individuals adapt their behaviours to their social context.

Many theories of technology adoption such as innovation diffusion theory (IDT) (Rogers, 1995), TPB (Ajzen, 1991), and TRA (Fishbein and Ajzen, 1980) have theorized SNs as a direct determinant of adoption intention. However, TAM suggested by Davis (1989) has excluded SN as a determinant of usage intention. In innovation diffusion literature social influence has been considered as a key dependent variable especially in early phases of adoption where the individual has little information or no experience about the innovation (Cooper and Zmud, 1990; Hartwick and Barki, 1994; Liu et al., 2014).

In the perspective of the present study, the term SN was used to refer to the social influence and the perceived social value of mobile services that may affect individual's IA mobile services. That is, it refers to consumer perceptions concerning the adoption of mobile services by taking into account the views of the referent group such as friends or pears. Thus, SN is theorized to be a direct factor in this study and it is expected to influence the IA.

H_2: SN has direct and significant influence on IA mobile services.

2.2. PU

In the literature, PU, relative advantage and perceived utility has been used interchangeably. It is the extent to which an individual thinks that using an innovation would improve his or her performance (Davis, 1989). Moore and Benbasat (1991) defined relative advantage as the extent to which a system is observed as being superior to the previous.

In the theories of technology acceptance, PU was considered important and theorized as a main construct (direct factor) of adoption intention such as TAM (Davis, 1989, Davis et al., 1989) and IDT (Rogers, 1995). As suggested by Venkatesh et al. (2003), the PU of TAM is equivalent to the perceived relative advantage of Rogers' IDT.

A thorough review of literature shows that PU has a significant and positive effect on the IA innovation (Agarwal and Prasad, 1999; Hsu et al., 2007; Hu et al., 1999; Luarn and Lin, 2005; Park, et al., 2014; Pura, 2005; Venkatesh, 1999; Venkatesh and Morris, 2000).

It is predictable that PU will influence significantly adoption intention of mobile services. Thus, there exists sound rationale for theorizing PU as a direct factor of adoption intention in the present study.

H_3: PU of mobile services has direct and significant influence on IA mobile services.

2.3. Compatibility (C)

It is the extent to which an innovation is consistent with what people do (Rogers, 1995). Also, it is defined as the extent to which the system fits with the adopter's past experiences, current needs, and existing values (Moore and Benbasat, 1991).

In the theories of technology acceptance, compatibility was considered important and theorized as a main and direct construct of adoption intention including IDT (Rogers, 1995). Several empirical studies have confirmed that the compatibility of an innovation has a positive effect on the adoption (Cooper and Zmud, 1990; Hsu et al., 2007; Kleijnen et al., 2004; Tan and Teo, 2000).

In addition, previous findings from empirical studies have supported that compatibility was a direct factor influencing adoption (Cooper and Zmud, 1990; Hsu et al., 2007; Kleijnen et al., 2004; Tan and Teo, 2000). Also, Holak (1990) found that compatibility has a large and direct positive impact on purchase intentions and adoption of mobile internet (Hsu, et. al., 2007).

From the above discussion, it is amply clear that there exists sufficient ground to treat compatibility as direct factor influencing IA in the research model and thus the following hypothesis was considered:

H_4: Compatibility (C) with mobile services has direct and significant influence on IA mobile services.

2.4. PI

Innovativeness is an individual's propensity to be more receptive to new ideas (Rogers, 1995). It refers to a general tendency to seek, collect, and distribute novelty early (Im et al., 2003; Leung and Wei, 1998). PI varies and it has been found to have a significant influence on IA where adopter and non-adopters were distinguished significantly by PI (Busselle et al., 1999). Previous researches have also revealed that PI increases the level of adoption of mobile services (Hung et al., 2003), internet shopping (Li, 2004), and internet in a university (Busselle et al., 1999).

Strong evidence from research on innovation diffusion supports the view that highly innovative individuals have more positive intentions to adoption (Rogers, 1995). Thus, several authors argue that innovativeness is an individual trait that leads people to adopt new things (Manning et al., 1995) and that it is permissible to think of a trait that we can term consumer innovativeness.

Although, innovativeness is not listed as core construct in the theories/models considered in the present study, it would be worth investigating whether this construct influences IA mobile services. Thus, PI was theorised as a direct factor:

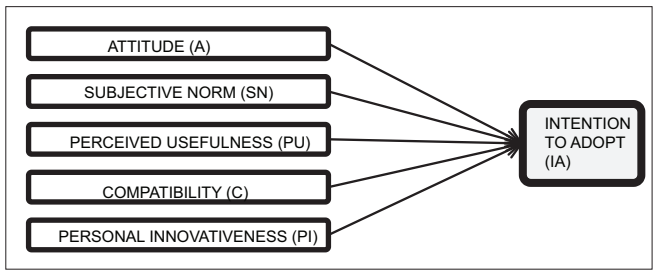
H_5: PI has direct and significant influence on IA mobile services (IA).

Therefore, the proposed research model for adoption of mobile serviecs (Figure 1) consists of five core constructs namely attitude towards mobile services (A), SN, PU of mobile services, compatibility with mobile services (C), and PI. The dependent variable considered was IA mobile services.

3. RESEARCH METHODOLOGY

The researcher controlled sample comprised students from both public and private institutions offering business management courses and located in and near to the capital city of India, New Delhi. Five institutions were covered namely Aligarh Muslim University, Jamia Hamdard University (JH), Asia Pacific Institute of Management, All India Management Association and Jamia Millia Islamia. Although such samples are not strictly representative, they are less likely to create any systematic bias (Craig and Douglas, 2005). Final sample comprised 399 Indian respondents. It is to be noted that according to Wimmer and Dominick (2000), for multivariate studies, a sample size of 300 is considered to be good.

Figure 1: Proposed mobile services adoption model



Measurement items used in this research have been adapted from adoption theories and related research including that of Agarwal and Prasad (1998), Bauer et al. (2005), Carlsson et al. (2006), Hsu et al. (2007), Merisavo et al. (2007), Moore and Benbasat (1991), Okazaki (2007), Sweeney and Soutar (2001), Sheehan and Hoy (1999, 2000), Davis (1989), Taylor and Todd (1995), and Venkatesh et al. (2003). Keeping in mind the objectives of the study, some additional items were developed and included in the research instrument. Structured closed-ended questionnaire designed specifically for the study was personally administered by the researcher on the student respondents. Pre-testing of the instrument was done to assess the items used in the survey (Hair et al., 2010) and to establish the scale's content validity (Hair et al., 2006). Pilot survey was then used to test question wording and other aspects of the survey (Ticehurst and Veal, 2000).

4. ANALYSIS

4.1. Scale Refinement

Each multi-item scale was factor-analyzed to evaluate dimensionality, and reliability analysis was performed to determine if each item contributed to scale reliability. Besides, correlational analysis was applied to confirm the validity of the construct (Table 1). We omitted items if they did not load satisfactorily with the majority of the other scale items or if they failed to improve internal consistency. Mentzer et al., (1999) suggested that a final scale may contain lesser, even one-fourth or one-fifth of the original items. During scale refinement five items were dropped (i.e. A3, A5, PU1, PU4 and PI3).

4.2. Fit Estimates

In structural equation modeling, the fit indices establish whether, overall, the model is acceptable. If the model is acceptable, researchers then establish whether specific paths are significant. Table 2 lists the fit indices and demonstrates that the results are within the acceptable thresholds.

4.3. Path Analysis

The structural model was estimated by LISREL 8.50. A standardized path estimate was used with maximum likelihood. The path coefficients are used to assess the magnitude and direction of relationships and were thus used to test the various research hypotheses (Figure 2).

5. FINDINGS

From Table 3, it is clear that all the considered hypotheses (i.e., H_1, H_2, H_3, H_4, and H_5) were supported.

Table 1: Summary of reliability and validity analysis and factor loadings for retained items of mobile services scale

Measurement items	Abbreviation	Items	Inter-item correlation	Item-total correlation	Cronbach's alpha	Factor loadings
Intention to adopt	IA	3	0.408–0.418–0.526	0.473–0.547–0.552	0.700	0.561–0.667–0.675
Attitude	A	3	0.272–0.287–0.544	0.316–0.481–0.521	0.617	0.379–0.680–0.692
Subjective norm	SN	3	0.373–0.386–0.480	0.441–0.505–0.518	0.672	0.541–0.638–0.649
Perceived usefulness	PU	3	0.306–0.328–0.610	0.354–0.582–0.592	0.686	0.404–0.714–0.730
Compatibility	C	3	0.499–0.533–0.646	0.568–0.648–0.678	0.788	0.631–0.732–0.758
Personal innovativeness	PI	3	0.364–0.393–0.424	0.449–0.470–0.493	0.657	0.565–0.597–0.626

Table 2: Results of SEM fit indices for MSAM

Fit index	MSAM	Acceptable threshold levels	Sources
χ^2 (df)	200 (120)	Lower χ^2 relative to df	Hooper et al., 2008
Normed χ^2	1.67	2:1	Tabachnick and Fidell, 2007
RMSEA	0.041	<0.07	Steiger, 2007
SRMR	0.044	<0.08	Hu and Bentler, 1999
GFI	0.947	≥0.9	Hooper et al., 2008
AGFI	0.925	>0.9	Bentler and Bonett, 1980
CFI	0.981	>0.9	Bentler and Bonett, 1980
NNFI	0.975	≥0.95	Hu and Bentler, 1999
PNFI	0.748	No threshold levels	Hooper et al., 2008

RMSEA: Root mean square error of approximation, SRMR: Standardized root mean square residual, GFI: Goodness of fit index, AGFI: Adjusted goodness-of-fit index, CFI: Comparative fit index, NNFI: Non-normed fit index, PNFI: Parsimony normed fit index, MSAM: Mobile services adoption model, SEM: Standard error of mean

Table 3: Results of SEM for MSAM

Hypotheses	Paths	Parameter estimate (β)	Results
H1	A→IA	0.47	Supported
H2	SN→IA	0.21	Supported
H3	PU→IA	0.20	Supported
H4	C→IA	0.08	Supported
H5	PI→IA	0.07	Supported

MSAM: Mobile service adoption model, IA: Intention to adopt, A: Attitude, SN: Subjective norm, PU: Perceived usefulness, C: Compatibility, PI: Personal innovativeness, SEM: Standard error of mean

MSAM posits all factors proposed in the conceptual model (Figure 3). These factors are: (1) Attitude towards mobile services (A), (2) SN, (3) PU of mobile services (PU), (4) compatibility with mobile services (C) and (5) PI.

6. SUMMARY AND DISCUSSION

6.1. Attitude towards Mobile Services (A)

It was found to be the most important motivating factor influencing IA mobile services. These results are consistent with the findings of several previous researchers (Bauer et al., 2005; Carlsson, et al., 2006; Daim et al., 2012; Erumban and de Jong, 2006; Park and Ohm, 2014). Furthermore, the results are also consistent with many theories of technology acceptance namely TRA (Ajzen and Fishbein, 1980), TAM (Davis et al., 1989) and TPB (Ajzen, 1991).

6.2. SN

It was found to be a determining factor of IA mobile services. These findings are also consistent with various technology adoption models such as TRA (Fishbein and Ajzen, 1980) and TPB (Ajzen, 1991). These findings are also in line with findings of previous researchers (Hartwick and Barki, 1994; Kazi and Mannan, 2013; Liu et al., 2014; Lu et al., 2012; Lucas and Spitler, 1999; Roger, 1995; Venkatesh and Morris, 2000). However, these findings are inconsistent with the study of Kondo and Ishida (2014) where they found that SN had non-significant effects in IA.

6.3. PU of Mobile Services

In the proposed model it was found to be the second most important determining factor of IA mobile services in the proposed model. These results are consistent with findings of earlier studies in the context of information systems where PU has significant effect on IA (Agarwal and Prasad, 1999; Hu et al., 1999; Jackson, Chow and Leitch, 1997; Kazi and Mannan, 2013; Park, et al., 2014; Venkatesh, 1999; Venkatesh and Davis, 2000; Yang et al., 2012).

6.4. Compatibility with Mobile Services (C)

Compatibility was found to be a determinant of IA mobile. Strong evidence from many related empirical studies also supports these results. In previous research, compatibility was found to be a direct factor influencing adoption (Cooper and Zmud, 1990; Hsu et al., 2007; Kleijnen et al., 2004; Tan and Teo, 2000).

6.5. PI

It was considered as a determinant of IA mobile services. These results are consistent with those of previous studies (Ha and Im, 2014; Li, 2004; Rogers, 1995; Yang et al., 2012).

7. MANAGERIAL IMPLICATIONS

The findings of the study provide valuable insights not only to academic researchers but also to marketing practitioners and telecommunication companies. The hypothesized model provides deeper understanding of the relationships between key factors and adoption intentions and can be of immense help in promoting adoption of mobile services in India.

The study identifies five factors that can play a significant role in adoption of mobile services in India. In a decreasing order of importance, they are attitude towards mobile services, SN, PU of mobile services, compatibility with mobile services and PI.

Mobile telecommunication companies attempting to motivate consumers to adopt mobile services need to utilise this information effectively while formulating marketing strategies and policies. The marketing practitioners should (1) be conscious of consumers' attitude toward mobile services (2) not lose sight of social

Figure 2: Standardized path estimates for mobile services adoption model (MSAM)

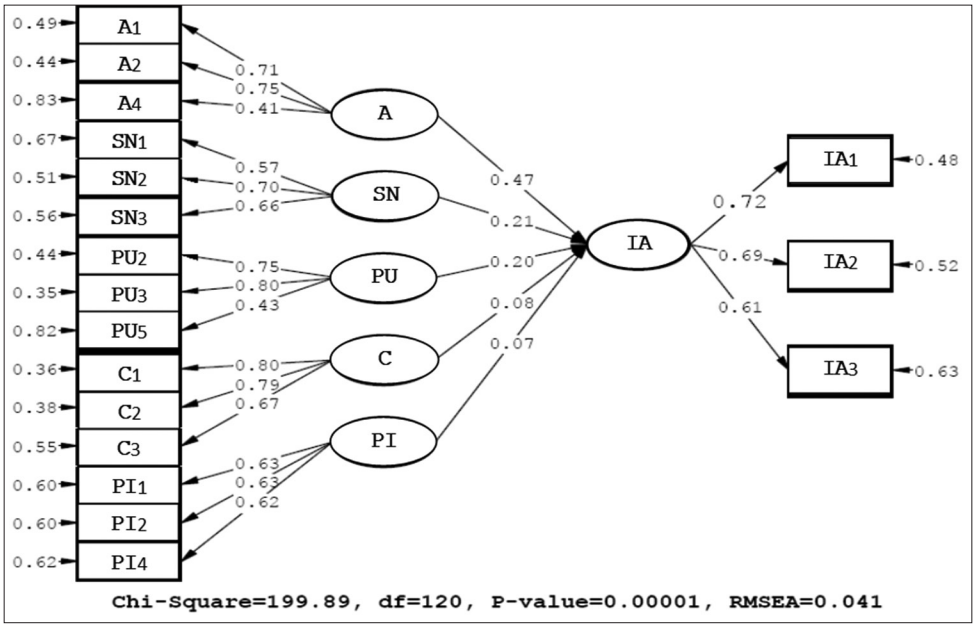
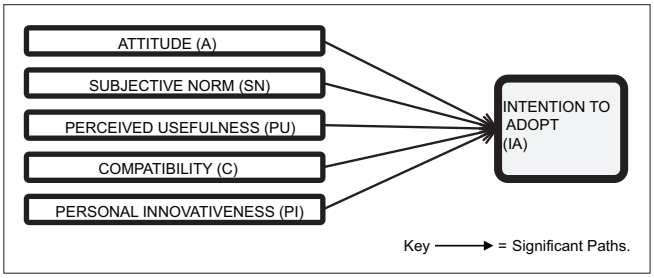


Figure 3: Mobile services adoption model



perspective in which the mobile services can be beneficial for the target audience (3) pay greater attention on highlighting utilitarian aspects/usefulness of mobile services, (4) explain how mobile services can be compatible with different consumer lifestyles, and (5) try to identity innovators, as they can play the role of early adopters of these services.

Based on the above, it can be safely surmised that key findings emerging from the suggested models considered can be of invaluable help to marketing practitioners and mobile companies alike in formulating appropriate marketing strategies that can help not only attract new customers but also retain existing ones.

8. LIMITATIONS OF THE STUDY

This study suffers from certain limitations which are discussed below. First, researcher controlled sample may limit the generalizability of the findings. Secondly, the student respondents are more acquainted with information technology than the general consumer population, and thus might consider mobile services as being more acceptable than other samples. Thirdly, this study did not include socio-demographic variables (e.g. income profile, age, rural-urban, etc.) in analysis. Fourthly, this study did not examine the causality and interrelationship between the factors influencing the IA. Lastly, it did not consider the effect of gender as a moderating variable in the model considered in the study.

9. SUGGESTIONS FOR FUTURE RESEARCH

Future researchers may consider using more general and representative samples of mobile users and investigate and examine other factors that could further explain consumer's intention towards the adoption of mobile services. Moreover, study findings suggest that PU influences adoption intention. Thus, future researcher need to focus on the benefits associated with using mobile services. In addition, since compatibility is another key determinant of intention, it is important to ensure that mobile services fit well with consumers. So, additional research is needed in the context of compatibility to explore how mobile services can be projected to be more compatible with the distinct needs of the various categories of consumers.

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