The Future of M-commerce: Prediction of the adoption of m-commerce in underdeveloped countries using the extended Technology Acceptance Model (TAM)

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ABSTRACT:

The aim of this paper is to develop a model for predicting the user’s acceptance behaviour of m-commerce (e.g. e-commerce through mobile phone) in underdeveloped countries. The Technology Acceptance Model (TAM) has been chosen for this purpose because it is widely used and tested both theoretically and empirically in the field of m-commerce. Our proposed model takes up TAM determinants of perceived usefulness and perceived ease of use and then extends these with the inclusion of perceived risk, cost and public awareness to predict the adoption of m-commerce in underdeveloped world. The model will be tested as part of the extension of this research project. The outcomes of this research will help the key participants of m-commerce such as mobile companies and networks, financial organizations, business planners and government agencies to investigate the influential factors that can affect the customers’ behaviour in adoption of mobile commerce in underdeveloped countries.

Key words: M-commerce, Technology Acceptance Model (TAM), Underdeveloped Countries

M-commerce has been a rapidly growing market in recent years and there are signs of growth for the future. Widespread penetration of mobile phones coupled with some of their key characteristics including versatility, portability, personalised, 24/7 connectivity and ease of use has made m-commerce a potential trading tool for the global marketplace. M-commerce, though in its early stage has made the turnover $6.86 billion in 2003 and was predicted to reach $554.37 billion in 2008 (Bigne et al., 2007). The number of mobile phone subscribers’ world wide has surpassed 3 billion and is expected to double by the end of 2011 (Stump et al., 2008). The last two decades have witnessed a gradual shift of e-commerce towards m-commerce. The lack of explosive growth of e-commerce, as predicted in 1990, makes scholars and entrepreneurs to turn their attention towards wireless e-commerce i.e. mobile commerce (Anckar et al., 2003). Reports show that mobile phones are not being used only for conversation today, but that 40% of subscribers are accessing different mobile services such as SMS, games, video, news, sports etc (Srivastra et al., 2008).

On average there are now more mobile subscribers in developing countries than in developed countries (Kalil, 2008). Europe as a whole has a mobile penetration rate of 103 percent but China and
India are the two largest mobile markets in the world, with 261 million subscribers in India (Banerjee and Charles, 2008) and 0.48 billion in China (Feng et al., 2006). Understandably the underdeveloped countries fall behind the developed world in utilising the power and potentialities of m-commerce. However the sheer size of the mobile user market in underdeveloped countries like Bangladesh provides many opportunities for exploration of m-commerce applications in these regions. According to Dholakia (cited in Harris et al., 2005) adoption and usage of m-commerce services and applications have been highly variable among different countries without following any specific universal logic or pattern. Mobile banking and shopping, mobile advertising, mobile ticketing, mobile movies and videos are commonly used applications within developed countries, while in the developing world mobile phones are still only being used as a tool for personal communication. Therefore the researchers, the key players of m-commerce and the government agencies are in need of investigating the reasons for low growth market of m-commerce in the underdeveloped countries (UDC). In this research the authors intend to extend the TAM model by adding three more main determinants: perceived risk, cost and public awareness for predicting more accurately the future of m-commerce in UDCs.

1. E-COMMERCE AND M-COMMERCE

M-Commerce can be defined in many ways: Most often m-commerce is considered to be as mobile e-commerce (Donegan 2000; Liebmann 2000; Schwartz 2000 cited in Zhang and Yuan, 2002). Smith (2006) defines m-commerce as buying and selling goods and services through wireless handheld devices such as cellular phones and Personal Digital Assistants (PDA). According to Paavilainen (2002 cited in Feng et al., 2006) mobile commerce is the exchange of goods, services and information using mobile ICT. Others view m-commerce as the use of wireless technology, particularly handheld mobile devices and mobile Internet, to facilitate transaction, information search and user task performance in various communications (Chan & Fang 2001; Kannan, Chang, & Whinston 2001; Varshney & Vetter 2001 cited in Chan et al., 2002). Table 1 shows the difference between m-commerce and e-commerce from user’s perspective.

(Take table 1 here)
Today m-commerce applications are not limited to communication only, but also include web browsing and watching news, sports, videos, music through mobile internet, performing wireless transaction for banking, shopping, ticketing etc. via cellular phone. Location tracking of goods and people is also one of the latest applications of m-commerce. Figure 1 shows the different types of m-commerce applications.

(Take figure 1 here)

2. OBJECTIVE AND JUSTIFICATION OF THE RESEARCH

2.1 Research Objective:
The followings are the two main objectives of this research:

1. To undertake a critical assessment of Technology Acceptance Model (TAM) and its evolutions
2. To extend the TAM model to describe m-commerce adoption in underdeveloped countries.

The proposed enhanced model will facilitate forecasting the adoption of m-commerce in underdeveloped countries.

2.2 Justification of the Research:

Why is this research needed?
The success or failure of an information system project is usually determined by one of the most pivotal factors called “user acceptance” (Davis, 1993). Lack of user acceptance is considered to be a stumbling block to the success of new information system (Gould, Boies & Lewis, 1991; McCarroll, 1991; Nickerson, 1981 cited in Davis, 1993). There are few studies on user acceptance of m-commerce in underdeveloped countries (e.g. Meso et al 2005; Yang et al 2008; Boadi et al. 2007; Lu et al; Albadvi et al 2009;) while in case of developed world these are abundant (Meso et al., 2005). This research addresses this shortcoming by providing more information on influences on the adoption of m-commerce in UDCs.
Why has Technology Acceptance Model been picked up?

Technology Acceptance model (TAM) is one of the most widely used models both empirically and theoretically in the field of m-commerce (Mahatanankoon et al, 2007, Okazaki, 2005, Biljon et al 2008, Anckar et. al. 2003). TAM has not only been used but also extended in many studies of various disciplines by many researchers over time (see Lu et al, Kiloppiing et al 2004, Chismar et al 2003, Singletary et al. 2002, Boadi et al., 2007). TAM has been applied to predict the adoption of different technologies (e.g. text editor, Email, Word processor, spread sheet, telemedicine software and m-commerce) with different subjects (e.g. students, professional, managers, physician etc) under different situations and regions (see Davis 1993; Szajna 1996, Hu et al. 1999, Wua and Wanga, 2004).

Although TAM is widely used model for user acceptance of Information Technology, it is not developed enough for m-commerce research as trust and risk have not been considered among its determinants (Anckar et al., 2003). Recently some mixed results have been found in adoption of mobile services while using TAM model (Hu et al., 1999; Kwon and Chimbaram, 2000, Lee et al., 2002 cited in Pedersen et al 2003), that let us think about the extension of TAM model for mobile services (Pedersen et al 2003).

3. MODEL DEVELOPMENT

A number of models each with different sets of acceptance determinants have been developed in the field of information technology acceptance research (Venkatesh and Davis, 2000). Among them Technology Acceptance Model (TAM) is widely used and accepted as one of the most successful models for predicting user acceptance of information technology. TAM is based on Theory of Reasoned Action (TRA).

Theory of Reasoned Action (TRA), proposed by Fishbein and Ajzen (1975) was derived from social psychology (Davis et al., 1989) to predict and explain human behaviour and intention in various fields (Wua and Wanga, 2004). According to TRA, a person’s actual behaviour is determined by his or her behavioural intention (BI) to perform the behaviour, which is in turn measured by the combination of the person’s attitude (A) towards that behaviour and subjective norm (SN) (Davis et al., 1989).

(Take Figure 2 here)
Technology Acceptance Model (TAM) which has its base on Theory of Reasoned Action (TRA) was introduced by Fred D. Davis (1989) for predicting user acceptance of information system. The purpose of TAM was not only to predict but also to explain the user acceptance of Information System (IS) (Leong, 2003). TAM consists of two primary determinants, perceived usefulness and perceived ease of use which play a major role in user acceptance of new technology (Venkatesh and Davis 2000, Kllopiqing et al 2004, Venkatesh et al. 2003, Leong 2003, Gorsche and Knospe, Davis et al., 1989).

- Perceived usefulness (U) is defined as “the degree to which a person believes that using a particular system would enhance his or her job performance” (Davis, 1989, p.320).
- Perceived ease of use (EOU) referred as “the degree to which the perspective user expects the target to be free of effort.” (Davis, 1989, p320)

(Take Figure 3 here)

TAM has gained substantial empirical support over time, successful in predicting 40% of the variance in usage intention and behaviour (Venkatesh and Davis, 2000). However it is insufficient to explain a user’s intention to accept technology just by two determinants: perceived ease-of-use and perceived usefulness proposed by TAM (Mathieson, 1991 cited in Gu et al., 2009). Especially in an m-commerce transaction consumers’ intentions to participate should be seen as multidimensional behavioural factor (Pavlou, 2002 cited in Anckar et al., 2003) and hence TAM2 puts effort in making the original TAM stronger in prediction.

Technology Acceptance Model 2 (TAM2), an extended model of TAM was proposed by Venkatesh and Fred D. Davis (2000). TAM2 added two theoretical constructs: cognitive instrumental processes and social influence processes on original TAM. The four cognitive factors are job relevance, output quality, result demonstrability, and perceived ease of use and the three social forces are subjective norm, image, and voluntariness (Chismar et al, 2003, Singletary et al., 2002). TAM2 explained up to 60% of the variance in perceived usefulness (Venkatesh and Davis, 2000). Subjective norm was found to be moderated by experience for mandatory use, but not for voluntary (Venkatesh and Davis, 2000). The definitions of some major determinants of TAM2 are as follows:
• **Subjective norm**: Subjective norm is defined as "person's perception that most people who are important to him think he should or should not perform the behaviour in question" (Fishbein and Ajzen 1975, p.302).

• **Image**: If someone has a belief that using a specific system will enhance his or her status at work because most of the important members of his or her social group at work believe that he or she should use the same system (Venkatesh and Davis 2000, Chismar et al, 2003, Singletary et al., 2002, Chismar et al, 2002).

• **Job relevance**: Job relevance is an individual's perception of the degree to which the technology is applicable to his or her job (Venkatesh and Davis, 2000)

• **Output quality**: Output quality will come after job relevance. After a person gets his/her job relevance matched then he or she will think about the output quality of that system that means how well the system performs those tasks (Venkatesh and Davis, 2000).

• **Result demonstrability**: Result demonstrability is defined by Moore and Benbasat as the "tangibility of the results of using the innovation,"(Venkatesh and Davis, 2000, p.192).

(Take Figure 4 here)

**Unified Theory of Acceptance and Use of Technology (UTAUT)** was formulated by four mentors of different user acceptance models; they are V. Venkatesh, Michael G. Morris, Gordon B. Davis and Fred D. Davis (2003). Eight prominent adoption models were studied, reviewed, empirically compared in their research before formulating and empirically validating Unified Theory of Acceptance and Use of Technology UTAUT (Venkatesh et al., 2003). These eight models are Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Motivational Model (MM), Theory of Planned behaviour (TPB), Innovation Diffusion Theory (IDT), Social cognitive theory (SCT), Model of PC utilization (MPCU), Combined model of TAM and TPB (C-TAM-TPB) (Venkatesh et al., 2003).

(Take Figure 5 here)

UTAUT model explains how individual differences influence technology adoption (Raaij et al 2008, Marchewka et al 2007). The researchers of UTAUT showed how the relationship between perceived usefulness, ease of use, and intention to use can be moderated by age, gender, and experience (Venkatesh et al., 2003, Marchewka et al 2007). For example, the link between perceived usefulness and intention to use is more significant for male and younger workers (Raaij et al 2008). On the other hand the effect of perceived ease of use on intention is more significant for female and older workers.
and it starts decreasing with experience (Marchewka et al. 2007). The UTAUT model explained 70 percent of the variance in usage intention, better than TAM studies alone (Marchewka et al. 2007, Raaij et al. 2008, Venkatesh et al. 2003). The comparison among these three models is given in Table 2.

(Take Table 2 here)

TAM has also been extended in the field of m-commerce and mobile ICT over time by various researchers. Chen (2008) proposed a research model for m-payment which is an extended form of TAM and Innovation Diffusion Theory (IDT). Perceived Risk, Security, Privacy, Compatibility, speed and convenience are the added determinants of his model. Wu and Wanga (2004) proposed their model for m-commerce by extending TAM with Perceived risk and cost. Adoption model for 3G multimedia services was proposed by Pagani (2004). It’s another modification of TAM, which shows the importance of determinants differs by age groups or segments. Meso et al. (2005) proposed adoption model of mobile ICT in least developed countries. It extends TAM by joining more additional determinants such as level of education, age, gender, cultural influence, accessibility and reliability. The flow chart of how these models have evolved as extensions of TAM is shown in Figure 6, and the Table 3 lists a range of added determinants of TAM which have been empirically tested by various researchers with their test results.

(Take figure 6 here)

(Take Table 3 here)

Our proposed extended TAM model was derived from the critical assessment of TAM and its evolutions discussed above by extending the model as indicated below. Majority of the UDCs have some common basic characteristics, such as poverty, low literacy, lack of infrastructure, lack of technical skills etc. With this in mind various models of user acceptance for those countries have been extended and developed over time. “Cost” or “price” has been added to TAM model to address poverty (Wu and Wanga 2004, Pagani 2004); someone stressed on “level of education” (Meso et al. 2005) where as perceived risk, compatibility and social influence are frequently studied to take on the challenges of lack of infrastructure and cultural differences in the society of developing countries (Chen 2008, Wu and Wanga 2004, Venkatesh et al. 2003). To contribute more in this area “Public
Awareness” has been considered in our model as another main determinant for adoption of m-commerce in UDCs. Although public awareness has not been used precisely in designing m-commerce business model, it is not a new phenomenon in other disciplines. Lack of awareness has been noticed as one of the major barriers of e-government to reach its milestone (Verdegem and Verleye, 2009). In Bangladesh, the lack of awareness of ICT is found to be so great that it affects every sector from government officials to the general public (Imran et al., 2008). Cancer screening research has pointed out “lack of awareness” as the most common barrier for patient’s intention in participating screening test (Rutten et al., 2004). Figure 7 depicts the proposed model with the additions of TAM indicated as greyed. The definitions of all the determinants of the proposed model are listed in the table 4. As this is an extension of the existing TAM model results obtained through its testing will be directly comparable with the findings of previous research.

(Take figure 7 here)

(Take table 4 here)

The hypotheses made for the proposed model are summarized here which will be verified at the time of empirical research. Customer support and vocational training positively affect the perceived ease of use. Media, trade fair and subjective norm positively affect public awareness, the added determinant of TAM. To summarize the three major determinants included in our extensions of the TAM model, perceived ease of use, perceived usefulness and public awareness are proposed to positively affect the intention to use but perceived risk and cost will negatively affect that intention. Finally intention to use positively affects the actual usage.

4. PROPOSED METHODOLOGY

4.1 Sampling and data collection:

Mixed methodology approach will be taken for data collection in this research. 25 in-depth interviews will be conducted to gain preliminary insights into what people of different social categories think and believe about m-commerce. People from different groups who are actively involved in m-commerce arena will be the target of our interviews; they are among the enthusiastic users, business personal,
corporate and government officials etc. A survey instrument – questionnaire will be developed from these interviews, also drawing upon the previous researches on technology adoption. Each question will be measured by five-point Likert scale ranging from strongly disagree as “1” to strongly agree as “5”. The respondents will be ensured of the anonymity and confidentiality of their responses. The most common constructs such as perceived usefulness, perceived ease of use, behavioural intention to use will be adapted in our model from prior studies of TAM. Survey items of perceived risk, cost and public awareness will also be adapted from previous studies, although public awareness is found to have less studied so far. The survey questionnaire will then be refined by a pilot survey to ensure that it is consistent, clear and understandable. Table 5 is a sample of measurement items which includes the survey questions of some (but not all) of the major constructs. The constructs such as perceived usefulness, perceived ease of use and intention to use are adapted from Davis, 1989, Davis et al., 1989, Venkatesh and Davis, 2000, Boadi et al., 2007, Taylor and Todd, 1995, Chismar and Wiley-Patton, 2003, Wua and Wanga, 2004. Another construct, Perceived risk, is adapted from Wua and Wanga, 2004, Chismar and Wiley-Patton, 2003, Featherman and Pavlou, 2003. A further major construct, Cost, is adapted from Boadi et al., 2007, Wei et al., 2009, Pagani, 2004, Moon and Kim, 2001 and public awareness from Verdegem and Verleye, 2009. The findings of these interviews and surveys will be used to structure our preferred extensions of the TAM model

( Take table 5 here)

Bangladesh has been chosen as a representative of underdeveloped countries for data collection because of its promising trend in mobile penetration, the precondition of m-commerce. A translation of each question will be written in Bangla (the first language of Bangladesh) for the convenience of the participants. Cluster sampling will be used to include participants from different subject categories, for example literate and low literate, young and aged, rich and poor etc. The sample size would be around 500. Obviously the sample will have some common characteristics for our convenience such as they are the mobile users living in one city or town. Survey questionnaire will be delivered to the students in the class room, to the employees in the office, to the members of clubs or organizations of different professions ranging from low income earner to high. The participants will
be encouraged to complete the survey and return to us on spot to ensure higher response rates but postage paid envelope with return address will be provided for those who are willing to do it later.

4.2 Data analysis and expected Result:

Once the data is collected confirmatory factor analysis (CFA) will be used to test reliability and validity of these data. It is expected that all the hypotheses can be tested with this data analysis. At this stage we are optimistic the test will show all of the items are significant, especially those related to perceived usefulness, perceived ease of use, cost and perceived risk but a bit sceptical about the public awareness because of lack of sufficient empirical research conducted with this determinant in the field of m-commerce. For the same reason hypotheses related to public awareness and other independent variables such as media, subjective norm and trade fair could be found significant or insignificant. Therefore the impact of those independent variables can’t be well predicted until the data is gathered and analysed. We are, however, competent that the proposed extension will be proven to be significant influences of consumer attitudes, and thus their actual usage of m-commerce application.

5. CONCLUSION AND FUTURE RESEARCH

The research model proposed is mainly suitable for the underdeveloped countries, those who have some common problems, such as low literacy, poverty, poor infrastructure, lack of awareness of new technology and scepticism about online transaction and so on. These problems need to be addressed before designing any business model for them. To tackle these problems TAM has been extended to include public awareness, cost and perceived risk determinants. It is argued that media, trade fair and subjective norm can play a major role in raising awareness about m-commerce to the public. Cost should be taken as another main determinant of intention to use because of poverty being dominating factor in the underdeveloped world. The expected benefits to industry will be:

- Guidance for business promotion to Telecommunications
- Regulation advice for Government
- Service better tailored to requirements of consumers within under developed countries
- Advice on required training of users and users and business for faster uptake of m-commerce.
At this stage the proposed model is in conceptual form and has yet to be tested. Bangladesh has been selected to represent the underdeveloped countries because of its substantial achievement over time in mobile phone penetration. It comprises of 44.64 million subscribers by the end of December 2008 (Daily Star, 2009), the penetration rate of which goes up to 31.8% (as per population of 140 million). Once the main factors which influence user's intention to accept m-commerce are known precisely it will be easier for the key players of m-commerce to design more customer oriented applications, business plans and strategies to reach a vast majority of people of underdeveloped countries.

This research faces several limitations. Firstly, it is neither a technical paper of m-commerce nor does it discuss the government policies or regulations; rather the adoption behaviour of this technology is studied in a wide range of population of UDCs. Secondly, although Bangladesh has been selected as an example of an underdeveloped country, what it works in Bangladesh may not be universally transferable to other UDCs. Thirdly, although this is a mix methodology based research but heavily relies on surveys. This approach may not be the best for detail understanding of the research problem considered. More qualitative approach such as field study or case study would be better options to get deeper understanding of the problem.

Future research could turn in various directions from the current state. Media is considered as a strong determinant of public awareness. If this is found to be the case then more research will be needed about how this media can be used in raising public awareness. All the proposed determinants of our model could be tested by some moderating variables such as age, gender and experience to see how these could moderate the intention to use and the actual usage. Perceived risk alone is worthy of research since this affects negatively the users intention to use m-commerce.

REFERENCES:


TIWARI1, R., BUSE, S. & HERSTATT, C. FROM ELECTRONIC TO MOBILE COMMERCE. Institute of Technology and Innovation Management, Hamburg University of Technology (TUHH).


Fig 1: Applications of m-commerce, complied from (Coursaris et al. 2003; Tiwari et al.)

Figure 2: Theory of Reasoned Action (TRA) (Davis et al., 1989; p.984)

Figure 3: Technology Acceptance Model (TAM) (Davis et al., 1989; p.985)
Figure 4: TAM2: Extension of Technology Acceptance Model (Venkatesh and Davis, 2000, p.188)

Figure 5: Unified Theory Acceptance and Use of Technology Model (UTAUT) (Venkatesh et al., 2003; p.447)
Figure 6: extension and modification of technology acceptance model (TAM) in a flow chart:
M-commerce model
(Major determinants, ref: 010)
- Perceived Usefulness (PU)
- Perceived ease of use (PEOU)
- Perceived Risk (PR)
- Compatibility (C)
- Cost
- Intention to use (I)
  Cost is new but subjective norm, age, gender and experience are omitted here as well

M-Payment model
(Major determinants, ref: 23)
- Perceived Usefulness (PU)
- Perceived ease of use (PEOU)
- Perceived Risk (PR)
- Compatibility (C)
- Intention to use (I)
  Perceived Risk and Compatibility are new but subjective norm, age, gender and experience are omitted

UTAUT (Major determinants)
- Performance Expectancy (≡ PU)
- Effort Expectancy (≡ PEOU)
- Social influence (≡ SN)
- Experience
- Age
- Gender
- Intention to use (I)
  Age, Gender are included in UTAUT

TRA (Major determinants)
- Subjective Norm (SN)
- Attitude (A)
- Intention to Use (I)

TAM (Major determinants)
- Perceived usefulness (PU)
- Perceived ease of use (PEOU)
- Attitude (A)
- Intention to use (I)
  Subjective norm omitted

TAM2 (Major determinants)
- Perceived usefulness (PU)
- Perceived ease of use (PEOU)
- Subjective Norm (SN)
- Experience
  Job Relevance
  Output quality
  Intention to use (I)
  Subjective norm is back but Attitude is omitted

Mobile multimedia model
(major determinants ref: 012)
- Perceived usefulness (PU)
- Perceived ease of use (PEOU)
- Price (≡ Cost)
- Enjoyment
- Intention to use (I)
  Enjoyment is new but subjective norm, age, gender and experience are omitted here as well

M-commerce model for LDCs (major determinants)
- Perceived usefulness (PU)
- Perceived ease of use (PEOU)
- Accessibility of mobile ICT
- Cultural influence (≡ SN)
- Age
- Gender
- Level of education
  - Accessibility of mobile ICT and Level of education are import for developing countries
  - Age, gender and Subjective norm are back but cost is missing
  - Surprisingly Intention to use (I) not shown in the diagram, which is very unusual.
Figure 7: Proposed extended TAM model for m-commerce adoption in underdeveloped countries

Table 1: differences between e-commerce and m-commerce, compiled from (Zhang and Yuan, 2002)

<table>
<thead>
<tr>
<th></th>
<th>Internet Based E-commerce</th>
<th>M-Commerce</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device</td>
<td>Mostly PC with internet connection</td>
<td>Cell phone and PDA</td>
</tr>
<tr>
<td>Demographic</td>
<td>Most are highly educated</td>
<td>Less educated, young and business people</td>
</tr>
<tr>
<td>Leading Region</td>
<td>North America</td>
<td>Europe and Asia</td>
</tr>
<tr>
<td>Transaction process</td>
<td>Complete and Sophisticated</td>
<td>Simple, often yes or no choice</td>
</tr>
<tr>
<td>Transaction Volume</td>
<td>Huge</td>
<td>Small</td>
</tr>
<tr>
<td>Service Range</td>
<td>Global</td>
<td>Local / on Spot</td>
</tr>
</tbody>
</table>

Table 2: Comparison among TAM, TAM2 and UTAUT:
<table>
<thead>
<tr>
<th>Subject</th>
<th>TAM</th>
<th>TAM2</th>
<th>UTAUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of model</td>
<td>Adoption model for computer</td>
<td>Adoption model for Information system</td>
<td>Adoption model for Information system</td>
</tr>
<tr>
<td>Subjective Norm</td>
<td>Not considered</td>
<td>Considered and tested to be moderated by experience for mandatory use but not for voluntary use</td>
<td>Considered and found to be moderated by not only experience &amp; voluntariness but also by gender and age.</td>
</tr>
<tr>
<td>PU &amp; PEOU</td>
<td>Major determinants</td>
<td>Major determinants but PU is effective than PEOU</td>
<td>Major with different name, i.e. PU as PE and PEOU as EE</td>
</tr>
<tr>
<td>Experience &amp; Voluntariness</td>
<td>Not considered</td>
<td>Considered and found to be influential for mandatory use.</td>
<td>Considered and found to be influential for mandatory use</td>
</tr>
<tr>
<td>Age &amp; Gender</td>
<td>Not considered</td>
<td>Not considered</td>
<td>Considered, PE is stronger for men, particularly for younger men</td>
</tr>
<tr>
<td>Prediction accuracy</td>
<td>Explains 40% of the variance in intention to use</td>
<td>“TAM2 explained up to 60% of the variance in perceived usefulness” (Venkatesh and Davis, 2000)</td>
<td>“Where as UTAUT accounts 70% of the variance in intention to use” (Venkatesh et al., 2003)</td>
</tr>
</tbody>
</table>

Abbreviation used in this table: PU= Perceived Usefulness, PEOU = Perceived ease of use, PE = Performance expectancy, EE = Effort expectancy
|---------------------------------------------|--------------------|--------------|---------------------------|-------------------------------|------------------------------|-----------------------------|--------------------------|------------------------|--------------------------|----------------------------|--------------------------------|--------------------------------|--------------------------------|-----------------|-------------|-----------------|------------------------|----------------|--------------|-------------------|----------------|--------------|------------------------|----------------|------------------|------------------|----------------------|----------------------|----------------|----------------------|----------------|----------------|----------------------|-----------------|----------------|------------------|----------------|
X = Most Significant, X = Significant, x = little or No Significant, 1 = Stronger for men and young workers, 2 = Stronger for women, old worker with limited experience, 3 = Stronger for old workers with increasing experience, 4 = Stronger for women, old workers in mandatory use, 5 = Stronger for mandatory use but not for voluntary

Table 4: Definitions of some major determinants of the proposed model are given as follows:

<table>
<thead>
<tr>
<th>Determinants</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Risk</td>
<td>The degree to which the perspective user thinks that using an m-commerce application is risky.</td>
</tr>
<tr>
<td>Perceived Ease of Use</td>
<td>Same as TAM model i.e. “the degree to which the perspective user expects the target to be free of effort.” (Davis, 1989;p.320)</td>
</tr>
<tr>
<td>Perceived Usefulness</td>
<td>Same as TAM model i.e. the degree to which a person believes that using a particular system would enhance his or her job performance (Davis, 1989;p.320)</td>
</tr>
<tr>
<td>Public Awareness</td>
<td>The degree to which the general population of a society is acknowledged of m-commerce applications and technologies.</td>
</tr>
<tr>
<td>Customer Support</td>
<td>The extent to which the perspective user thinks that m-commerce service providers will look after their customers by giving sufficient customer support</td>
</tr>
<tr>
<td>Vocational Training</td>
<td>User’s perception of getting hands on training for adapting m-commerce</td>
</tr>
<tr>
<td>Cost</td>
<td>The degree to which the perspective user thinks that m-commerce is not expensive to use</td>
</tr>
<tr>
<td>Media</td>
<td>The channel through which the current and attractive news and information about m-commerce can be delivered to the general population of a society that will encourage them to use it. Such as TV, Radio and Newspaper</td>
</tr>
<tr>
<td>Trade fair</td>
<td>The seasonal market place participated by a huge number of buyers and sellers of m-commerce products and services</td>
</tr>
<tr>
<td>Subjective Norm</td>
<td>Same as TAM2, It is defined as the “person's perception that most people who are important to him think he should or should not perform the behaviour in question” (Fishbein and Ajzen 1975, p.302 )</td>
</tr>
<tr>
<td>Construct</td>
<td>Measure</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Perceived usefulness (PU)</td>
<td>I believe that mobile phone will improve my performance in online transaction</td>
</tr>
<tr>
<td></td>
<td>I believe that mobile phone will increase my productivity in online transaction</td>
</tr>
<tr>
<td></td>
<td>I believe that mobile phone will enhance my effectiveness in online transaction</td>
</tr>
<tr>
<td></td>
<td>I believe that mobile phone will make my online transaction easy</td>
</tr>
<tr>
<td></td>
<td>I believe that mobile phone will be very useful for online transaction</td>
</tr>
<tr>
<td>Perceived ease of use (PEOU)</td>
<td>I believe it is easy to learn online transaction through mobile phone</td>
</tr>
<tr>
<td></td>
<td>I believe it is easy to use online transaction through mobile phone</td>
</tr>
<tr>
<td></td>
<td>I believe the process of online transaction through mobile phone is clear and understandable</td>
</tr>
<tr>
<td></td>
<td>I believe it is easy for me to be skillful in mobile commerce application and transaction</td>
</tr>
<tr>
<td>Perceived risk (PR)</td>
<td>I believe that online transaction through mobile phone is risky</td>
</tr>
<tr>
<td></td>
<td>I believe that online transaction through mobile phone is not confidential</td>
</tr>
<tr>
<td></td>
<td>I believe that online transaction through mobile phone will create unexpected problems</td>
</tr>
<tr>
<td></td>
<td>I don’t feel safe in online transaction through mobile phone</td>
</tr>
</tbody>
</table>