The development of mobile telecommunication devices having the Internet capabilities have supported the growth of mobile commerce (m-commerce) services. The purpose of this paper is to empirically examine key determinants that affect consumer intention to adopt m-commerce services in Oman. Based on the Technology Acceptance Model (TAM) and the unified theory of acceptance and use of technology (UTAUT) model, the research model is developed. The proposed research model was empirically tested using online survey data. The modelling methods, neural network and structural equation models were employed for testing hypotheses. The findings of this paper suggested that social influence and variety of services are the most important predictors of mobile commerce in the context of a developing country such as Oman.
and connecting to social networks (Khalifa & Shen, 2008; Hanafizadeh et al, 2014). Yet a large proportion of mobile users show lower utilization levels of the mobile services with respect to leveraging the services for purposes other than entertainment and social networking. Despite the various tasks that can be done using mobile devices, the number of mobile phone subscribers, conducting business transactions for goods and services are abysmally low (Wei et al, 2009). Moreover, patterns of m-commerce adoption among different countries vary significantly. The adoption of mobile services including m-commerce is significantly high for countries, Japan, Singapore, South Korea and Taiwan (Zhang et al, 2012). It is attributed largely due to superior mobile telecom infrastructure, high degree of technology adoption readiness and pro-government policy to boost basic telecom infrastructure in these countries. In contrast to this the emerging economies show lower levels of adoption of m-commerce and have failed to exploit the opportunities offered by m-commerce (Chong, 2013). Hence it may be imperative to study these factors to understand the reasons for lower adoption of the mobile technologies by users for conducting various m-commerce related activities. Studies in this regard have focused on technical aspects on m-commerce (Lee et al, 2007; Ngai & Gunasekaran, 2007; Chong, 2013). An understanding of user-related factors would help policy makers and practitioner to develop a strategic framework to utilize the inherent benefits of m-commerce.

The study investigates factors influencing the adoption of m-commerce by consumers in an emerging economy, Oman. This investigation employs constructs drawn from established models in the information systems literature, namely, TAM (Technology Acceptance Model), and DOI (Diffusion of Innovation). The paper further integrates neural network model into the methodology for predictive modeling whereas the explanatory modelling is achieved through SEM (structural equation modeling) (Shmueli & Koppius 2010; Hanafizadeh et al, 2014). In this study SEM approach is used for testing hypotheses and results obtained from SEM will act as input variables to the neural network model for prediction.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

The growth of m-commerce has been relatively recent as compared to other IT/IS such as online banking, e-commerce, e-government services and e-learning platforms. Largely, the literature on adoption of online technologies has relied on the intention-based models including Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975), Technology Acceptance Model (TAM) (Davis, 1989), and Theory of Planned Behaviour (TPB) (Ajzen, 1991). Rogers (1995) proposes a multiple stage analysis of technology diffusion involving knowledge, persuasion, decision, implementation and confirmation stages. The majority of the studies in this area over the past three decades show wide use of these models for investigating adoption related behaviors (Safeena et al, 2013). The motivation behind this study is to propose an integrated model that can improve parsimony and predictive ability and overcome the drawbacks of the existing models. This would entail an understanding of the intention of mobile commerce adoption using an integrated framework and extending the existing models for IT/IS adoption.

Perceived ease of use

Perceived ease of use (PEOU) is one of the primary constructs of the original TAM model proposed by Davis (1989). The degree of ease of use perceived by users can vary with respect to various demographic variables. Davis (1989) defines PEOU as “the degree to which a person believes that using a particular system would be free from efforts”. This construct is frequently included in modeling the adoption in a large number of other IT/IS adoption studies.
This study hypothesizes that the lower the complexity, higher would be the intention to adopt m-commerce.

H1 PEOU has a positive relationship with mobile commerce adoption.

**Perceived usefulness**

Perceived usefulness (PU) is an integral part of original TAM proposed by Davis (1989) and defined as “the degree to which a person believes that using a particular system would enhance his or her job performance. PU is one of the some important construct in the available literature which explains the adoption of various information systems studies (Zhang et al, 2012; Chong, 2013). The young generation who are frequent consumers of smart phones prefer to complete their e-commerce activities. This construct motivates mobile phone consumers to use activities pertaining to information systems studies (Venkatesh et al, 2003). The following hypothesis is proposed:

H2 PU has a positive relationship with mobile commerce adoption.

**Variety of Services**

The mobile commerce has several applications. The mobile applications include mobile ticket purchasing, downloading various applications, mobile advertisements etc. Moreover, the literature on the variety of services in relation with technology adoption is limited. The variety of services offered by mobile commerce might affect significantly. The problem lies in terms of adopting value added services such as mobile banking, purchase and sale of products and services and mobile phone based promotion (Chong et al, 2012; Chong 2013). Hence, it is important to understand the effect of variety of services on the mobile commerce adoption. The mobile commerce service providers need to understand the importance of the variety of services offered by this technology. It is hypothesized that

H3 Variety of services has a positive relationship with mobile commerce adoption.

**Perceived Trust**

Trust construct in this study is basically representing trust on mobile commerce providers. Trust in this study is defined as “a person’s feeling or belief that the processes, systems and environment in which he/she transact has appropriate safeguards and measures” (Vance et al, 2008). There are many personal information on the mobile device available and all transactions are conducted in a virtual environment. It is quite risky for mobile users to share personal information with a third party (Lu et al, 2003). There is no face to face interaction between users and service providers. Hence, the study posits the following hypothesis

H4 Trust has a positive relationship with mobile commerce adoption.

**Social Influence**

Social influence (SI) is defined as “the degree to which an individual user’s perception is affected by the belief of most others who are important to him/her towards the use of an innovation”(Fishbein & Ajzen, 1975; Lu et al, 2005; Sharma & Govindaluri, 2014; Sharma et al.,
Social influence is important because users will use only some applications if their peers and relatives are already using it. In Oman, many studies have suggested that social influence plays important role in the adoption of new technology. The study attempts to understand the effect of family and friends on the m-commerce adoption decision. Hence, it is hypothesized that

H5 SI has a positive relationship with the mobile commerce adoption.

THE RESEARCH MODEL

In this section, a conceptual model showing the relationship between the dependent variable, behavioral intention to use m-commerce and five independent variables namely PEOU, PU, perceived trust, variety of services, and SI affect dependent variable. The proposed research diagram is given in figure 1.

![Research Diagram](image)

Figure 1 Research diagram

RESEARCH METHODOLOGY

Participants
A questionnaire survey was administered to graduate students of a reputed university in Oman. These younger age individuals tend to show a greater inclination to use modern technology (Hanafizadeh et al, 2014). Moreover, the young consumer has been observed to be more innovative and risk-taking compared to their older counterparts and play an active role in influencing the purchase decision making process for various goods and services in the family.
Undoubtedly, the use of mobile phones is significantly higher among young age consumers. Therefore, the sample of the study was considered as a good representative of the population under consideration (Sharma, 2015).

**Survey Instrument**

The survey instrument used was a close-ended questionnaire divided into two sections. The first section solicited data on m-commerce adoption using statement format. The second section captured details regarding gender, age, education and similar variables. The questionnaire was pre-tested in a pilot study with fifteen respondents and three faculty members having expertise in technology management. The feedback obtained from the pilot study was utilized to modify and redesign the instrument.

**Variables measurement**

The measurement scales used in this study were adopted from the studies discussed in the literature review and the development of the theoretical framework section. Seventeen measurement items were used to measure independent variables and 3 measurement items were used to measure mobile commerce adoption. All these questions were measured on the five point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Some questions were asked to measure demographic details of mobile commerce users in Oman.

**Data Collection**

The respondents in this survey participated those who had prior knowledge of mobile commerce. All respondents were mailed online survey link to many groups of university. The collected sample in this study was 240. These online links were sent to students in the months of Feb-March 2015. The summary of demographic variables is given in table 1.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>160</td>
<td>67</td>
</tr>
<tr>
<td>Female</td>
<td>80</td>
<td>33</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 30 years</td>
<td>178</td>
<td>74</td>
</tr>
<tr>
<td>Between 30 &amp; 40 years</td>
<td>40</td>
<td>17</td>
</tr>
<tr>
<td>More than 40 years</td>
<td>22</td>
<td>9</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diploma</td>
<td>74</td>
<td>31</td>
</tr>
<tr>
<td>Bachelor degree</td>
<td>128</td>
<td>53</td>
</tr>
<tr>
<td>Masters or higher degree</td>
<td>38</td>
<td>16</td>
</tr>
</tbody>
</table>

**SEM-Neural network modeling**

As mentioned in the introduction, the study employs a two stage method involving the use of SEM and neural network models. Whereas linear relationships are modeled adequately using SEM and hypotheses can be tested, the approach does not work well when the relationship between decision variables is other than linear. Under such conditions neural network approach can be employed for modeling the nonlinear relationships associated decision variables. Neural network are flexible and not restricted by the choice of distributions for input variables. They also have the capability to adapt without interference from the user. On the other hand, the disadvantages of using neural network modeling include the concern of "black box" approach; further, it is difficult to use neural network models to test hypotheses and understand causal relationships (Chong, 2013, Sharma et al., 2015). The results of the first stage after application
of SEM to test proposed research hypotheses are presented in table 2. The statistical significance of variables was tested at the 5% level of significance as recommendations made in Hair et al, (2010).

The second stage is a work in progress where the independent variables would be used as an input to the neural network model for the prediction of mobile commerce adoption.

Table 2: Structural results

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Variables</th>
<th>Estimates</th>
<th>S.E.</th>
<th>t-values</th>
<th>p-values</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>Perceived ease of use</td>
<td>0.084</td>
<td>0.058</td>
<td>1.448</td>
<td>0.152</td>
<td>Not-Supported</td>
</tr>
<tr>
<td>H2</td>
<td>Perceived usefulness</td>
<td>0.193</td>
<td>0.053</td>
<td>3.642</td>
<td>***</td>
<td>Supported</td>
</tr>
<tr>
<td>H3</td>
<td>Variety of services</td>
<td>0.273</td>
<td>0.055</td>
<td>4.964</td>
<td>***</td>
<td>Supported</td>
</tr>
<tr>
<td>H4</td>
<td>Perceived trust</td>
<td>0.154</td>
<td>0.056</td>
<td>2.750</td>
<td>***</td>
<td>Supported</td>
</tr>
<tr>
<td>H5</td>
<td>Social Influence</td>
<td>0.231</td>
<td>0.051</td>
<td>4.529</td>
<td>***</td>
<td>Supported</td>
</tr>
</tbody>
</table>

Note: Significant at 5% level of significance

DISCUSSION

This study attempted to understand the relationship between dependent and independent variables related to mobile commerce adoption. Based on the structural equation modeling results variety of services and social influence are the important constructs affecting the mobile commerce users’ intention towards mobile commerce adoption. It was further observed that perceived ease of use had no significant relationship with mobile commerce adoption and contradict previous studies (Hsu et al, 2009; Lee et al, 2011). This contradiction may be because most of the participants in the survey belonged to the younger generation. This age group spends significant time with the latest technology. Furthermore, the smartphones have now become a necessity to billions of people around the world and especially among the youngsters who spend significant time in mobile applications such as networking, gaming, chatting, and sending SMS (Chong, 2013). Therefore, perceived ease of use or difficulty level of using m-commerce shows insignificant influence on the adoption of m-commerce. The other important constructs along with variety of services, social influence were perceived trust and perceived usefulness.

CONCLUSION AND FUTURE RESEARCH

Marketers and mobile phone operators have made investments in recent years to develop m-commerce infrastructure worldwide. However, merely offering m-commerce as an additional delivery model may be insufficient to get desired results. It may be essential to encourage more users to use m-commerce services. Hence, this study provided a multi- analytical approach to predict the m-commerce adoption. This multi-analytical modelling may be important to many stakeholders such as government, service providers, operators, academicians, and researchers. On the basis of the results obtained in this study, decision makers may formulate an appropriate to attract, educate and retain the customer towards the use of m-commerce.

This study has some limitations and these limitations pave the way for the future research. The respondents in this study belonged to younger generation. Further study can be conducted using a sample of all age group respondents. Such studies will help to generalize the results of some similar studies in the domain of mobile commerce.
References


