Investigating the gender influence on technology adoption model towards smart phones – evidences from emerging economies

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Abstract: The paper investigates the influence of gender (male and female) over technology acceptance model (TAM) towards using smart phones. The study conducted in the Sultanate of Oman among 296 smart phones users (male and female). The study used SEM approach to identify the influence. The results are: 1) gender (male and female) elicit a negative influence over perceived usefulness towards using smart phones; 2) male respondents elicit a positive influence over perceived ease of use; 3) female respondents elicit a negative influence over perceived ease of use. The model revealed the male influence over perceived ease of use towards using smart phones.

Keywords: technology acceptance model; TAM; perceived usefulness; perceived ease of use; gender influence; structural equation modelling; Sultanate of Oman.

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1 Introduction

The technology acceptance model (TAM) is an information systems theory that models how users come to accept and use a technology. The model suggests that when users are presented with a new technology, a number of factors influence their decision about how and when they will use it. TAM (Davis, 1989) has been widely researched and enhanced over a period of years (Venkatesh and Davis, 2000; Venkatesh et al., 2003; Venkatesh and Bala, 2008, Venkatesh et al., 2012). Albeit, the model was criticised by some researchers, however, the model has opened the new vistas of research studies due to the revolution of technology in different fields and the requirement of understanding the adoption of such technologies by the users. The model envisaged the users understanding and adoption of new technologies in terms of two broad aspects such as perceived usefulness (PU) and perceived ease of use (PEU). Several studies attempted later to apply TAM to test the adoption and acceptance of new technologies around the world. Pikkarainen et al. (2004) conducted a study on Consumer acceptance of online banking: an extension of the TAM and found PU and online information about bank on the website were the primarily influencing factors towards accepting online banking. Liu et al. (2005) examined the influence of TAM over online e-learning user's acceptance behaviour and found PU primarily on online text-audio-video presentations which enhanced e-learning. Al-Gahtani (2008) conducted one of the vital studies with reference to Middle Eastern region through empirically examined an extended TAM by incorporating gender, age and educational level as moderators of the model's core relationships. The findings of the study emphasise that most of the key relationships in the model are moderated. Age moderates all the influences of computers usefulness and ease of use on attitudes and intention to use and gender and educational level only moderate the influence of ease of use on attitudes. The aforesaid research acted as a precursor to research related to TAM model in this region. Numerous studies attempted to capture the commercial side of TAM in influencing new online aspects such as online purchase, online services, online consumer behaviour towards adopting new technologies (Baron et al., 2006; Çelik and

Yılmaz, 2011; Johar and Awalluddin, 2011; Pantano and Pietro, 2012; Nunkoo et al., 2013; Alharbi and Drew, 2014). Especially Celik and Yilmaz (2011) added new constructs to existing TAM model with focus on e-shopping. Whilst assessing the research works on gender influence over TAM, we come across several studies used such construct (Morris and Venkatesh, 2000; Al-Gahtani, 2008). Albeit the studies used gender as one of the variables among other variables such as age and educational level, such studies provided a much-needed direction to the present study. With the development of mobile phone technology during the past decade, mobile phone experienced a tremendous growth and became a mass phenomenon across the globe. The rapid evolution and innovation in mobile phone technology lead to the rise of smart phones. Such phones now become a part and parcel of mobile phone users. Therefore, the authors intend to attempt a study to identify the influence of TAM model towards using smart phones. There were studies attempted to identify the influence of TAM over smart phones which focused mostly on assessing the classical constructs used in the model with reference to different consumers, environments and sectors (Sek et al., 2010; Ismail et al., 2012; Pan et al., 2013; Kim, 2014; Moon and Chang, 2014; Kim and Shyam Sunda, 2014; Kang, et al., 2014; Iqbal and Bhatti, 2015; Faqih and Jaradat, 2015).

However, none of the studies attempted to identify the influence of gender (male and female users) towards using smart phones. Such gaps found motivated the authors to embark on a study to identify such influence of TAM over gender towards using smart phones. Authors selected Sultanate of Oman as an area of research which recently witnessed rapid growth of smart phones representing both the genders, i.e., male and female. Moreover, affluence enabled the users to frequently switch to new smart phones whichever used to arrive at the markets. Therefore, authors selected the two major constructs representing TAM, i.e., PU and PEU and test the influence of the same among gender (male and female users) towards smart phones. The study is expected to fill gaps found, i.e., influence of gender over TAM variables towards using smart phones. The study would act as a precursor and pave a path to future research in this area. Moreover, it is first of its kind of attempt to identify the influence of gender over TAM model towards using smartphones, especially in Middle Eastern region. The authors also intend to find the influence of the selected variables over both male and female users. Thus, study attempting to provide significant contribution to the existing literature.

2 Literature review and hypotheses development

2.1 Influence of TAM over consumer behaviour

The TAM is an information systems theory that models how users come to accept and use a technology. The model suggests that when users are presented with a new technology, a number of factors influence their decision about how and when they will use it. Pikkarainen et al. (2004) conducted a study on consumer acceptance of online banking: an extension of the TAM. The study investigates online banking acceptance in the light of the traditional TAM, which is leveraged into the online environment. The study indicates that PU and information on online banking on the website were the main factors influencing online-banking acceptance. Liu et al. (2005) examined applying the TAM and flow theory to online e-learning user's acceptance behaviour and also revealed that the acceptance rate of text-audio-video based presentations is high not only because

of its PU but also because it generates the higher user concentration. Baron et al. (2006) described the key constructs of the TAM in a consumer technology based service. The existence of counter-intuitive behaviours, technology paradoxes and intense social and emotional elements in text message usage all points to the need for a review of the key TAM constructs. Çelik and Yılmaz (2011) developed a model of consumer acceptance of e-shopping in Turkey for the purpose of showing the factors not included in the classical TAM, such as enjoyment, trust and quality of e-shopping, which determine behaviour, intentions and attitudes towards e-shopping. Five new factors were added to the classical TAM consists of two belief factors (perceived trust and perceived enjoyment) and three e-quality related factors (perceived information quality, perceived service quality and perceived system quality) to explain the causal relations between these factors and their impact on consumer behaviour for e-shopping. The role of TAM in explaining effect on e-commerce application system (Johar and Awalluddin 2011), the study was to examine TAM in relation to virtual model technology offered by an online apparel retailer and also revealed that TAM offers valuable constructs (PU, PEU and perceived enjoyment) to explain the effect of e-commerce adoption. The work carried out by Pantano and Pietro (2012) advances our knowledge on the consumers acceptance of new technologies in the points of sale, in both online and offline context. Nunkoo et al. (2013) conducted a applying the extended TAM to understand online purchase behaviour of travellers. The results confirmed seven out of eight proposed hypotheses among which, PU, trusts and perceived risks have been found to be significant in influencing attitude to online purchase of tourism and travel products. Alharbi and Drew (2014) framed a theatrical work based on a robust acceptance model (TAM). The framework can be used to predict the behavioural intention to use an IS prior to the actual implementation.

2.2 Influence of gender over TAM

The research on the influence of gender over TAM began during 2000. One of the earlier studies conducted by Morris and Venkatesh (2000) which portrayed the influence of the two vital variables such as gender and age over TAM constructs. The study further revealed that men found to have more influenced by PU whereas women were more influenced by PEU. The vital study conducted by Al-Gahtani (2008) which was specific to the area of the study of taken, i.e., Middle Eastern region. The study investigated a possibility of extending the TAM constructs inculcating the three major constructs such as gender, age and educational level and tested the influence of the same as moderators of TAM model. The study revealed that age influenced both PU and PEU, whereas gender and educational level influenced PEU of computers. The present study undertaken to identify the influence of gender variable (men and women) over TAM towards smart phones. Albeit, the reviewed studies used gender as a variable, the novelty we bring in this study to test the gender influence of TAM towards using smart phones.

2.3 Influence of TAM towards using smart phones

In the past decade, mobile phone experienced a tremendous growth. With the development and innovation of technology, smart phone arises at the historic moment. Sek et al. (2010) conducted a study on prediction of user acceptance and adoption of smart phone for learning with TAM. The results indicate that actual use of smart phones for learning is significantly influenced by students' intention to use and behavioural

intention to use smart phones for learning is largely influenced by user's PU and attitude towards the smart phone. Ismail et al. (2012) investigates the PU of smart phone among healthcare personnel in a private hospital setting. The study has identified elements which have had impact on individual decision to use smart phones using TAM. The study also indicates that females reported better acceptance of smart phone use in their works. Alt et al. (2012) identified in their study, the high school students market, the smart phone penetration is 60%, higher than in case of other age and educational groups and the teenagers use smart phones from a utilitarian necessity not a hedonic one. A study on the acceptance and adoption of smartphone use among chinese college students (Pan et al., 2013) found that social influence, entertainment utility and compatibility of smart phone impact Chinese college students' PU and attitude to use. Kim (2014) found that in Korea, TAM and unified theory of acceptance and use of technology (UTAUT) are valuable tool for predicting intentions to smart phone usage. Moon and Chang (2014) in their study on technology acceptance and adoption of innovative smartphone uses among hospital employees identified that user attitude and social influence were both statistically significant with respect to intention of use, with user attitude greater than social influence. A large screen, compared to a small screen, is likely to lead to higher smart phone adoption by simultaneously promoting both the utilitarian and hedonic qualities of smart phones, which in turn positively influence PEU of-and attitude toward-the device respectively (Kim and Shyam Sunda, 2014). Kang et al. (2014) investigated that adoption factor of smart phones focusing on the differences of smart phone and feature phone users. They used TAM which incorporates service-oriented and device-oriented functional attributes as exogenous variables for a product-service system. According to Faqih and Jaradat (2015) the moderation role of individualism-collectivism at individual-level values on the adoption of mobile commerce is significant. But the gender does not have any moderation effect on the adoption process. Iqbal and Bhatti (2015) conducted a research on an investigation of university student readiness towards M-learning using TAM and the study revealed that the students' skills and psychological readiness strongly influence their PEU and PU of m-learning, whereas both these constructs positively influenced their behavioural intention to use m-learning.

H1 Male users show positive inclination towards TAM such as PU and PEU and intentions to use smart phones.

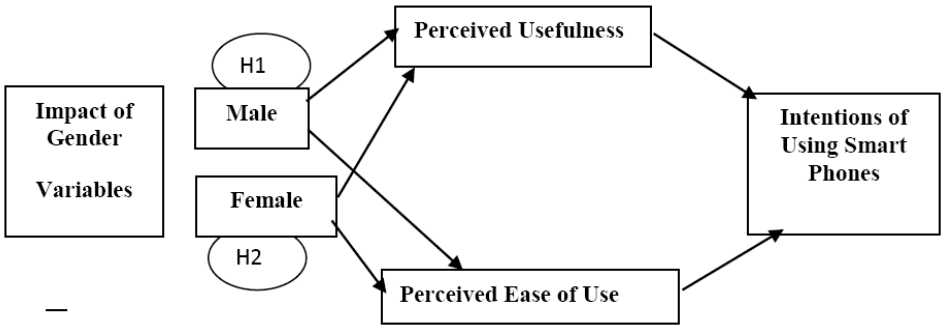
H2 Female users show positive inclination towards TAM such as PU and PEU and intentions to use smart phones.

3 Conceptual motivation of the study

3.1 Operationalisation of constructs

The study intends to identify the impact of selected variables, i.e., PU and perceived ease (Davis, 1989) of use towards smartphones among male and female users. The validity of the construct, i.e., intentions of using smart phones had been tested through a set of statements completed by the respondents. The selected variables, i.e., PU and PEU had been tested to identify the influence of the same on the intentions of male and female users towards using smartphones.

Figure 1 Conceptual motivation of the proposed model



3.2 Construct development

The authors selected the variables, i.e., PU and PEU (Davis, 1989) and test the impact of such variables towards smart phones among male and female users. The Cronbach's alpha reliability analysis had been done to validate the constructs (Sakkthivel, 2016). Table 1 denoted the variables used to development of constructs selected for the study.

3.3 Reliability statistics (Cronbach's alpha) on the variables selected for the study – conceptual model

Table 1 Reliability statistics

Perceived usefulness	*Perceived ease of use*
0.737	0.727

Note: VS = Variable segment; figures in parentheses indicate the number of variables

4 Methodology

The study used the descriptive research design as it explores and intends to identify the impact of selected variables, i.e., PU and PEU towards smartphones among male and female users. The study was conducted among smart phone users (male and female) residing in different cities of Sultanate of Oman such as Sur, Muscat, Sohar and Niswa. The study was conducted among the respondents represent different demographic profiles such as age, marital Status, literacy, occupation, employment status, income, family size, place of living. The respondents were appropriately briefed about the purpose of the study and asked to participate in the interview. The trained women investigators were used to personally interview the women respondents and the male investigators were used to collect the data from the male respondents. The quota sampling technique has been used to collect primary data from the target respondents based on the occupation age, marital status, literacy, occupation, employment status, income, family size, place of living). The primary data had been collected from 307 respondents and finally 296

(N = 296) respondents were selected for the analysis and the rest of the responses were not considered due to inaccuracy. Structured questionnaire was used to collect the data from the target respondents (smart phone users – male and female). The questionnaire consists of the 20 statements related to the constructs (PU and PEU) selected with reference to use of smart phones. Five point Likert scale (strongly agree, somewhat agree, neutral, somewhat agree, strong disagree) has been constructed in order to identify the impact of the selected constructs with reference to use of smart phones. The variables were developed as hypotheses H1 and H2 in order to validate the same through the statistical tools used for the study. The collection tool had been translated to local language (Arabic) in order to ensure the respondents understand and respond appropriately to the queries. It ensured the face validity of the study. Structural equation modelling (SEM) had been used to identify the impact of the selected constructs, i.e., PU and PEU over gender (male and female users) towards using smart phones (Sakkthivel and Sriram, 2015). The modelling also used to check the consistency and model fit of the constructs selected. Cronbach's alpha reliability analysis had been conducted to test the validity of overall collection instrument which produced 0.768 and attitude scale secured 0.837 which proved highly reliable.

5 Analyses and discussions

5.1 Structural equation modelling

SEM is a family of statistical models that seek to explain the relationship among multiple variables. In doing so, it examines the structure of interrelationship expressed in a series of equations. These equations depict all the relationship among constructs (the dependent and independent variable) involved in the analysis.

5.2 Model specification

To identify the impact of the selected variables such as PU and PEU towards smartphones among male and female users, SEM has been developed. Based on the assumptions and hypotheses, the following expected model has been developed. Figure 2 shows the expected SEM model.

5.3 Model fit results

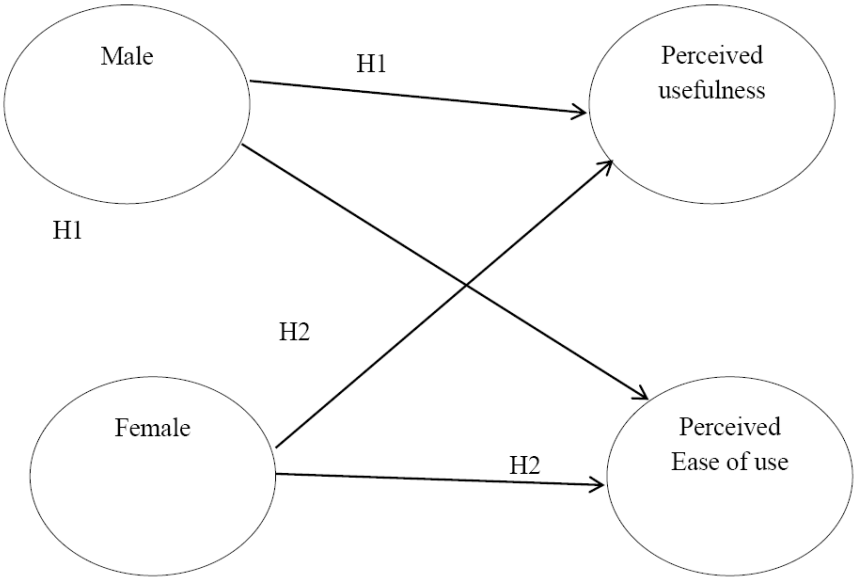
To test the model fitness, various analyses were conducted. The model fit values were found using Visual PLS software.

The following hypotheses were framed to build the model.

Hypothesis 1 Gender (male and female) has a positive influence towards PU on smartphones.

Hypothesis 2 Gender (male and female) has a positive influence towards PEU on smartphones.

Figure 2 Gender influence towards PU and PEU on smart phones



Each linkage in the model was set with the hypotheses to test the relationship between constructs.

Table 2 Independent and dependent variables

Hypothesis	*Independent*	*Dependent variable*	*Correlation*	*Sig.*
H1	Male	Perceived usefulness	0.1690	Not significant
	Female	Perceived usefulness	–0.1690	Not significant
H2	Male	Perceive ease of use	0.2960	Significant
	Female	Perceive ease of use	–0.2960	Not significant

Table 3 Structural model – boot strap summary

Hypothesis	*Entire sample estimate*	*Mean of subsamples*	*Std. error*	*T-statistics*	*R. sq*	*Sig.*
H1	0.1690	0.1786	0.0897	1.8845	0.029	Not significant
H1	–0.1690	–0.1786	0.0897	–1.8845	0.029	Not significant
H2	0.2960	0.3155	0.1115	2.6543	0.088	Significant
H2	–0.2960	–0.3155	0.1115	–2.6543	0.088	Not significant

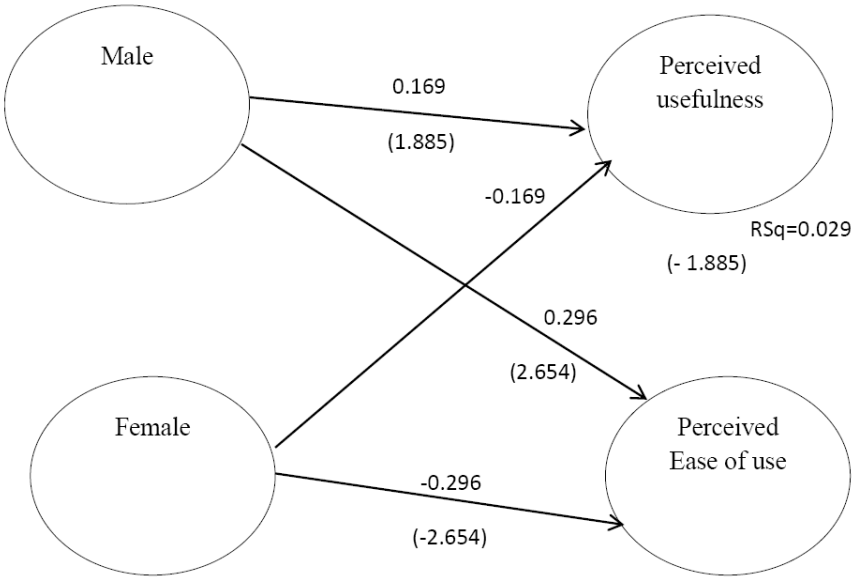
Note: The table indicates that the boot strap summary results using Visual PLS.

5.4 Results and discussions

The set hypotheses have been tested through SEM and results revealed that PU found to have negative influence over gender (male and female users) towards using smart phones with t-statistics value (1.8845) which is less than acceptance value 2. It is identified that influence of PU found to be not significant with sample (0.1690) and R^2 (0.029). It

reveals H1 is disproved. Whilst assessing the impact of PEU, it is found to elicit a positive influence over gender (male and female users) towards using smart phones with t-statistics value (2.6543) which is greater than the acceptance value 2. It is identified that impact of PEU variables found to be significant with sample estimate (0.2960) and R^2 (0.088). Therefore, H2 is proved. However, further analyses done to identify the influence of selected variables, i.e., PU and PEU of over male and female users. The results revealed that both male and female users were not influenced by PU with estimated value of 0.1690, whereas the female users found to have negative influence with estimated value of –0.1690. Whilst assessing the influence of PEU over male and female users, it is found that male users found to be positively influenced by PEU with estimated value of 0. 2960, whereas the female users found to have negative influence with estimated value of –0.2960. It is imperative to understand that gender has a positive influence over PEU towards using smart phones. However, it is found that male users found to be influenced by PEU than that of female users. Both male and female users found to be negatively influenced PU towards using smart phones. Hence, it is evident that male users are positively influenced by PEU towards using smart phones, whereas female users are negatively influenced by both PU and PEU. Therefore, it is safe interpret that male users found to be more inclined towards using smart phones than that of female users.

Figure 3 Modelling gender influence towards PU and PEU on smart phones



6 Conclusions and managerial implications of the study

The study had been attempted to build a model of variables influence gender (male and female users) towards using smart phones. The study selected two major constructs such as PU and PEU (Davis, 1989) and tests the same in order to identity the influence on

gender (male and female users) towards using smart phones. We developed a separate collection tool suit to our study using the basic tool used (Davis, 1989; Venkatesh and Davis, 2000). We used SEM to test the impact of variables and model fit. The selected variables were tested among the selected respondents (male and female users) and the results revealed that PU elicits a negative influence over gender (male and female users). It is safe to interpret PU does not have influence over gender (male and female users) with regard to using smart phones. Whilst analysing the influence of PEU over gender, the results revealed a positive influence. However, we did further analyses to identify the influence of PU and PEU over male and female users. We found PU elicits a negative influence over both male and female users towards using smart phones. We found PEU elicit a positive influence over male users, whereas elicit a negative influence over female users towards using smart phones. It is evident that PU elicit a negative influence over both male and female users, whereas, PEU elicit a positive influence over male users. Therefore, it is identified that H2 is proved, whereas H1 is disproved. Hence, it is imperative to understand that male users are primarily influenced by PEU to use smart phones, whereas female users are not influenced by both the selected variables such as PU and PEU. We found our results are consistent with the previous studies (Morris and Venkatesh, 2000; Al-Gahtani, 2008; Sek et al., 2010; Pan et al., 2013; Kim, 2014; Moon and Chang, 2014; Kim and Shyam Sundar, 2014; Iqbal and Bhatti, 2015). It is understood the study disproved the results of some of the earlier studies citing the influence of PU (Liu et al., 2005; Johar and Awalluddin, 2011; Ismail et al., 2012; Nunkoo et al., 2013). The model developed and the results revealed would largely help the practicing managers to understand the variables that influence male and female users towards using smart phones. The study was primarily done Middle Eastern Region (especially at Sultanate of Oman) to identify the influence of gender variables over TAM model towards using smartphones. The results found that male users are primarily influenced by PEU rather than PU. Whilst assessing the influence of female users, it is found the female are not influenced by both PU and PEU. Such findings provide a significant direction to understanding the male and female users of smartphones perception towards identifying usefulness and ease of use. It is imperative to infer that at Middle Eastern Region (especially Sultanate of Oman); male users find ease of use towards using smartphones, whereas female users find neither PU nor PEU. Such results would help the practicing managers to work out a strategy to make the male and female at Middle Eastern region to understand and appreciate the usefulness and ease of use of smartphones. Since Sultanate of Oman is a part of Middle Eastern and all the neighbouring countries sharing the same religion and culture, the results found would be made useful in other places too. Therefore, the study found to be a highly vital to provide such insights into the one of the closed societies of the world. Moreover, the model developed would provide a cue to further researchers to explore the factors that influence of further variables over users' intentions as the rapid evolution in smart phone technology evolves by minute. It is vital to keep checking on the users' intentions towards identifying PU and PEU towards using smart phones. The results revealed that male users positively PEU towards using smart phones, whilst female users negatively PU and PEU. Such results would largely help the practicing managers to understand the users' perceptions and expectations towards using buying and using smart phones.

7 Limitations of the study

The study underwent many challenges during the research study, such as the identification of the target respondents, who could understand, emulate and contribute to the problem definition, collection of data with in the stipulated period, etc. However, the authors could identify the target respondents, who could understand and contribute to the problem definition and successfully completed the study which was proven by reliability analysis. The study did not focus on the reasons could influence the target respondents towards using smart phones in order to maintain the primary focus of the study.

8 Scope of further research

The study attempted to identify the influence of TAM variables, i.e., PU and PEU over gender (male and female users) towards using smart phones and tested the validity through testing of hypotheses. The authors stuck to the earlier constructs suggested in TAM model (Davis, 1989) and did not include new constructs. Further researchers may focus on including new constructs and test the same among the gender (male and female users) towards using smart phones. Such research works may bring new outcomes.

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