

An Empirical Analysis of End User's Adoption of ICT in a Developing Country

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ABSTRACT

Information and Communication Technologies (ICT) have the power to provide substantial economic and social benefits. Thus, it is important to be familiar with the process of technology diffusion among end users for efficiently implementing adoption along with frequent changes in the environment. This study composes a theoretical framework to identify the influencing determinants on the adoption of mobile Internet - as a mean of ICT - in a consumer context in Saudi Arabia. The proposed model incorporates eight constructs: performance expectancy, effort expectancy, facilitating conditions, social influences, perceived value, perceived playfulness, attention focus, and behavioral intention. Individual differences—namely, age, gender, and experience—are hypothesized to moderate the effects of behavioral intention towards the use of mobile Internet. It was found that performance expectancy and perceived playfulness have the strongest significant effect on the behavioral intentions towards the use of mobile Internet. The findings of this study provide several crucial implications for mobile Internet service providers, practitioners, consumers and researchers.

KEYWORDS

Adoption, Behavioral Intention, Mobile Internet, ICT, Saudi Arabia, UTAUT.

1 INTRODUCTION

Understanding end user's acceptance and use of Information and Communication Technologies (ICT) is considered to be one of the most mature streams of information systems research. In Information Technology and Information System research, numerous theories are used to understand consumers' adoption of new technologies.

Over the previous years, the business world has promptly changed that one can no longer imagine managing in a steady state. In no other field has this observation been more applicable than in the field of ICT. Not just only the generation of new technologies, but its diffusion throughout the business environment which affects productivity growth at the smallest level. It was showed that to capture the benefits of ICT it is not necessary to dispose of an ICT producing sector [1]. Timely diffusion of new technology or its adoption is a cornerstone in maintaining economic growth.

According to a recent study by on global mobile data traffic forecast, Smartphones represent only 12% of total global handsets in use today, but they represent over 82% of total global handset traffic [2]. Moreover, the amount of cell phone subscriptions reached nearly 6,000 million by 2012, representing a penetration global rate of 86.7% and 78.8% in developing countries [3]. Hence, during the period from Sep. 2011 to Sep. 2012, on an average around 265,000 applications were registered in the US App Store [5], and 140,000 application were registered in Android Market during same period [6].

Timely diffusion of new technology or, from the firm's point of view, its adoption is a key element to securing economic growth. As mobile Internet plays an important role in the explosion of ICT, consumers' acceptance behavior needs to be understood. A greater understanding of the factors that impact this behavior could help organizations develop appropriate ICT adoption strategies. What little research there has been on ICT acceptance is general and this research aims to expand this field by probing the consumers' acceptance of information and communication technologies.

In the technologically developed world, IT adoption is faced by barriers, such as the lack of top management support, poor quality IS design and inadequately motivated and capable users [7]. In the developing world, the same barriers appear to be often impenetrable [8][9]. In addition, problems found in developing countries are attributed to a lack of national infrastructure [10], capital resources, or government policies set in place to prevent technology transfer [11].

2 LITERATURE REVIEW

Numerous theories were used to understand consumers' adoption of new technologies. The researcher has attempted to predict and explain user behavior across many IS and IT domains,

seeking to investigate and develop theory as to how to improve usage and examine what inhibits usage and intention to use the technology [12]. To develop the conceptual framework for the model, it is useful to draw comparisons between the various theories. Table 1 shows the theories based on intention of ICT adoption such as Technology Acceptance Model –TAM- [13], [14] and Theory of Planned Behavior –TPB- [15][16] have shown that the adoption and usage of an IT system is eventually determined by the users' personal beliefs and attitudes toward the technology. Other models such as IDT state that user's perception of the characteristics of an innovation is more significant [17].

Table 1. ICT Adoption Theories

Theory	Description
<p>Innovation Diffusion Theory (IDT)</p>	<p>Innovation Diffusion Theory (IDT) notes that relative advantage, complexity, compatibility, trialability and observability predict user adoption [18]. [17] Defined an innovation as an idea or practice that is perceived as new by the adopting organization. [19] Argued that Rogers Innovation Diffusion Theory (IDT) analyzed the process of diffusion, and mapped the impact of a combination of social, economic, and technical forces on that process. There is a general agreement among researchers that IDT is a suitable and valid theory for examining the process of adoption.</p>
<p>Theory of Reasoned Action (TRA)</p>	<p>The theory of reasoned action (TRA) is a widely studied model from social psychology which is concerned with the determinants of consciously intended behaviors [20] [21]. The foundation of the TRA conceptual framework is provided by the distinction between beliefs, attitudes, intentions, and behaviors. The major concern of the conceptual framework, however, is with the relations between these variables. According to TRA, a person's performance of a specified behavior is determined by his or her behavioral intention to perform the behavior, and behavioral intention is jointly determined by the person's attitude and subjective norms concerning the behavior in question.</p>

Theory	Description
<p>Theory of Planned Behavior (TPB)</p>	<p>The theory of planned behavior (TPB) goes beyond the theory of reasoned action (TRA) and incorporates a further construction, specifically perceived behavior control (PBC); this accounts for those situations where control over the target behavior is not fully volitional [22]. TPB is considered as to be among the more influential of the theories in predicting and explaining behavior [23]. Various studies showed the applicability of TPB to various domains, and verified the ability of this theory in providing a valuable framework to explain and predict the accepting of new IT [24].</p>
<p>Technology Acceptance Model (TAM)</p>	<p>Originally introduced by Fred Davis as early as in the 1980s, the Technology Acceptance Model (TAM) sought to measure the willingness of people to accept and adopt new IT innovations of that era, such as the electronic mail systems [13]. The model had two main determinants which explained IT adoption: Perceived Usefulness and Perceived Ease of Use. In his work, [13] defined them as “the degree to which a person believes that using a particular system would enhance his or her job performance” and “the degree to which a person believes that using a particular system would be free of effort”, respectively. Contrary to his hypothesis, [13] reported that the relationship between perceived usefulness and adoption was significantly stronger than that of between perceived ease of use and adoption. Furthermore, he noted that perceived ease of use might even precede perceived usefulness, suggesting the existence of a causal relationship instead of the independence of the determinants. In 2000, Davis collaborated with Professor Venkatesh to bring about the first overhaul of his original theory [14] introduced two sets of additional processes in TAM2 compared to the previous model: social influence process and cognitive instrumental process.</p>
<p>Unified Theory of Acceptance and Use of Technology (UTAUT)</p>	<p>Prediction of user IT adoption was the main goal behind developing the UTAUT model. It incorporated eight theories, including IDT, TRA, TPB, TAM, the motivational model, a model combining the TAM and TPB, the model of PC utilization and social cognitive theory. Moreover, the model yielded that performance expectancy, social influence, effort expectancy, and facilitating conditions were the main influences shaping user adoption [12].</p> <p>However, while the UTAUT model was a further improvement from TAM2, there were still clear limitations and even drawbacks that came with the added complexity. Although UTAUT reportedly explained up to 70% of variance in usage, one of the limitations the authors reported has to do with the practicalities and the way the analysis was conducted: According to [12], they only used those research questions, whose</p>

Theory	Description
	<p>answers carried most weight in analyzing each of the core constructs (e.g. performance expectancy, effort expectancy etc.).</p> <p>UTAUT actually became a complex system whose individual constructs (specifically social influence and facilitating conditions) were combinations of too many different factors and therefore representative of none. They also claimed that the 70% explanatory power is only achieved by introducing the moderating elements, so inherently the model was not much better than TAM or TAM2.</p>

3 RESEARCH MODEL AND HYPOTHESES

Adoption of IT is defined as the use, or acceptance of a new technology, or new product [25]. In Information Technology and Information System (IT/IS) research, many theories are used to realize users' adoption of new technologies. Identifying the influential factors behind consumer's intention or actual use of IT was the main goal of those models. This research has paid more attention to prior work of [12], [26] and [27] when identifying the factors affecting mobile user behavior, due to the relatively low adoption rate of mobile services.

3.1 Performance Expectancy (PE)

PE demonstrates the utility linked with using the technology. Mobile Internet enables users to be free of temporal and spatial limitations, and allows them to obtain information or services at anytime from anywhere. As a result, users' living and working performance and efficiency will be improve. In addition, performance expectancy will also affect continuance intention.

H1: Performance Expectancy will have a significant effect on behavioral intention towards using Information and Communication Technology.

3.2 Effort Expectancy (EE)

EE demonstrates the difficulty of using the technology. The obstacles of mobile devices such as tiny screens and inconvenient input have made it relatively difficult for users to search for information in the Internet on mobile devices [28]. If consumers want to spend much effort on learning to use mobile Internet, they cannot be satisfied.

H2: Effort Expectancy will have a significant effect on behavioral intention towards using Information and Communication Technology.

3.3 Social Influence (SI)

SI demonstrates the effect of referees' view on the user behavior [27]. Based on the social influence theory, users lean towards go along with other important referees' opinions [29]. Thus people will follow the suggestions of others who are important to them.

H3: Social Influence will have a significant effect on behavioral intention towards using Information and Communication Technology.

3.4 Facilitating Conditions (FC)

FC reflect the users' possession of the essential knowledge and means to use the technology. Users need to bear the expenses of using the service -mobile Internet- such as subscription fees

and other charger. In addition, they need to have to the basic knowledge on how to operate mobile Internet, which represents an emerging technology. Without such resources and knowledge, they may stop using their mobile Internet service.

H4: Facilitating Conditions will have a significant effect on behavioral intention towards using Information and Communication Technology.

3.5 Perceived Value (PV)

PV is reflects the consumer's general evaluation of the product utilization based on perceptions of what is gained and what is given. In mobile Internet, likely users would probably make a comparison on all the features of mobile Internet usage with prices of previous mobile phone calls and immobile Internet access.

H5: Perceived Value will have a significant effect on behavioral intention towards using Information and Communication Technology.

3.6 Perceived Playfulness (PP)

PP reflects the enjoyment and pleasure related to using the technology. Perceived enjoyment is an essential incentive that stresses the usage process, whereas perceived usefulness is an extrinsic drive that highlights the result [30]. Users are supposed to obtain enjoyment when they adopt mobile Internet to gain information and services.

H6: Perceived Playfulness will have a significant effect on behavioral intention towards using Information and Communication Technology.

3.7 Attention Focus (AF)

AF demonstrates user's engagement when using the technology. Cell phone users usually do many tasks while in motion, such as listening to music and surfing the Internet. Hence, their focus on mobile Internet may be restricted. If they are not able to focus their attention, their experience may be affected [27].

H7: Attention Focus will have a significant effect on behavioral intention towards using Information and Communication Technology.

3.8 Behavioral Intention (BI)

BI reflects the users' subjective probability that they will engage in a given behavior. The greater the experience of the consumers, the better opportunities to emphasize their habit since they have greater time to encounter the indications and perform the related behavior.

H8: Behavioral Intention will have a significant effect on consumers' use of Information and Communication Technology.

3.9 Moderating variable

Mediating Variables: Age, Gender, and Experience have been found to exist in the context of technology adoption. When observing gender and age influence, it is interesting to note that [47] proposes that previous literature of gender differences can be ambiguous without linking it to age. Moreover, [13] suggest that gender, age, and experience have controlling effects on the acceptance of technology, hence

H9: Age, Gender, and Experience will mediate the relationship between behavioral intention and the use of Information and Communication Technology.

4 SURVEY RESEARCH DESIGN AND METHOD

Information technology research includes the study of management, development, operation, the use, and influence of computer-based information systems [31]. Quantitative research methods vary according to research objectives. Survey research is one of the most commonly used quantitative methods in IT research.

Survey methods and practices, which have grown rapidly with the development of computers, comprise a powerful tool for collecting data from multiple units of analysis and cases [31]. The

researcher has also defined survey research according to the research objectives and disciplines. Fink defines 'survey' as "a system of collecting information to describe, compare, or explain knowledge, attitudes, and behavior" [33]. It is a way of collecting information about the characteristics, attitudes, actions, or opinions of a large sample of people, cluster, organization, or other units referred to as a population. Survey research can be either cross-sectional or longitudinal.

The research model includes eight main factors. Each factor was measured with multiple items. All items were adapted from extant literature to improve content validity [34].

The questionnaire included 32 different types of questions, such as dichotomous questions (yes/no) and these were used when the researcher was seeking the demographic profile of the respondents. Multiple-choice questions were used when the questions might have more than one possible answer. Measurement items in the questionnaire that covered the proposed constructs in the research model were derived from extant literatures as follows: Performance Expectancy (3 questions), Effort Expectancy (4 questions), Social Influence (2 questions), Facilitating Conditions (4 questions), and Behavioral Intentions (3 questions) were adapted [12]. Perceived Playfulness (3 questions), and Attention Focus (3 questions) were adapted from adapted from [35], while the Perceived Value (3 questions) adapted from [26]. Each items was measured on a five-point Likert scale (i.e., 1 = Strongly Agree; 5 = Strongly Disagree).

5 DESCRIPTIVE STATISTICS

There were 624 usable responses collected out from an online questionnaire. To analyze the respondents' profiles, the SPSS software was used by applying a descriptive analysis on the collected data.

There were 85.7% male and 14.3% female respondents. Thus, the majority of the respondents were male. This ratio is consistent with cultural norms of the Saudi society. 10.4% of the

respondents were less than 20 years, 66.5% were in the range of 20 - 29 years old, 16.7% were in the range of 30 - 39 years, 5.6% were in the range of 40 - 49 years of age, and less than 1% were over 50 years old. This shows that the majority of the respondents, about 77%, were young - less than 29 years of age.

The educational level of the majority of the respondents was Bachelor's degree 52.7%, 10.3% were highly educated with a Master's degree and higher, 10.4% have diploma degree or still pursuing their first degree, 25.2% have a high school diploma, and less than 1.4% of the respondents have not yet earned their high school degree. In comply with the education and age profiles of the major respondents slice; it shows that the majority of respondents have an income of less than 1000 Saudi Rials (1 USD = 3.75 SAR), 29% within the range of SAR 1000 - 4000, 9.8% within the range of SAR 4001 - 8000, 15.2% within the range of SAR 8001 - 14000, 3.8% within the range of SAR 14001 - 20000, and less than 3.4% of the respondents were enjoying the highest income rate of SAR 20000 and more.

Regarding the respondents' occupations, 47%, were students, while construction and maintenance people were the lowest with less than 0.2% of the respondents. Around 11% were from computer and IT related fields while the rest occupations scattered in different categories with less than 5% each. In terms of the respondents' experience with mobile Internet services. 26.6%, of the respondents have been using mobile Internet services since 2007 and before, 33.3% have been using it for about 3 - 5 years, 24.7% for about 1 - 2 years, and 15.4% have just started using it this year. Finally, it shows that the majority of the respondents, 40.5%, were frequent users with many uses per day, 37.7% were daily users, 9.3% are using mobile internet around 2 - 5 times a week, 3.4% and 3.7% were using it once per week and once per month respectively, while 5.4% have never used it before.

6 DATA ANALYSIS

Regression analysis is one of the most common statistical ways in identifying the relationships

between a dependent and independent variables [36]. It could be used to establish the relationship, then to evaluate its strength, and finally to anticipate the behavior of the dependent variable through moderating the independent variables [37].

Using structural equation modeling, the hypothesized relationships in the proposed research model were tested and analyzed. The results showed that the χ^2 value of 469.99 (d.f. = 247) with a p-value of .001 indicated a good model fit. In addition, fit indices such as the Normalized Fit Index (NFI = 0.87), Non-Normed

Fit Index (NNFI = 0.91), Comparative Fit Index (CFI = 0.93) and Incremental Fit Index (IFI = 0.93) almost all exceeded the suggested level of 0.9, indicating a good model fit. Furthermore, it was suggested that if the Root Mean Square Error of Approximation (RMSEA = 0.062) is less than 0.08 [38], this represents a reasonable error of approximation. The Root Mean Square Residual (RMR) in this study was equal to 0.054, which is below 0.08; hence, it is regarded as evidence of good fit [39]. In summary, the overall results suggested that the research model offered an adequate fit to the data.

Table 2. Reliability, correlation matrix and square roots of AVEs

	Comp. Reliab.	Cron. Alpha	AF	BI	EE	FC	PE	PP	PV	SI
AF	0.87	0.71	0.88							
BI	0.89	0.82	0.25	0.86						
EE	0.89	0.83	0.12	0.37	0.81					
FC	0.81	0.70	0.13	0.39	0.63	0.72				
PE	0.88	0.80	0.21	0.50	0.38	0.38	0.85			
PP	0.94	0.90	0.30	0.50	0.41	0.43	0.47	0.91		
PV	0.86	0.82	-0.03*	0.15	0.00*	0.11	0.14	0.16	0.83	
SI	0.90	0.77	0.22	0.34	0.26	0.23	0.29	0.23	0.17	0.9
Notes:	<ul style="list-style-type: none"> • AF: Attention focus; BI: Behavioral intention; EE: Effort expectancy; FC: Facilitating conditions; PE: Performance expectancy; PP: Perceived playfulness; PV: Perceived value; SI: Social influence. • * Insignificant values. • Diagonal elements are square root of the AVEs and off-diagonal elements are correlations. 									

7 SCALE RELIABILITY

To assess the reliability of the model different measures needed to be calculated considering the fact that both formative and reflective measures were used. Factor loadings of reflective constructs should exceed a threshold value of 0.5. That way, half of the variance of an indicator can be explained through the construct [40]. For the reflective constructs the item loadings indicate a high degree of item reliability since the reflective measures are significantly above the lower bound. Performance Expectancy [Min: 0.828; Max: 0.856], Effort Expectancy [0.729; 0.840],

Facilitating Conditions [0.743; 0.761], Social Influences [0.888; 0.912], Perceived Value [0.723; 0.801], Perceived Playfulness [0.886; 0.915], Attention Focus [0.689; 0.898], and Behavioral Intention [0.675; 0.928] all satisfy the minimum restrictions indicated by [41]. Concerning the composite reliability of the constructs all results are significant as shown in table 2.

8 CONVERGENT VALIDITY

Convergent validity measures the correlation between the pointers devoted to one construct. In order to evaluate convergent validity, two

measures are used: Cronbach's α and internal consistency measure, where the Cronbach's α value should be greater than 0.7.

The larger the number of indicators used in the construct the higher the Cronbach's α tends to be higher due to its mathematical formulation. Therefore, composite reliability outputs - which are not biased - should be taken into account before driving conclusions.

Next to the restrictions imposed by the threshold value of the composite reliability, all reflective constructs in the research model also exceed the lower bound of 0.7 for Cronbach's α except for facilitating condition which has an edge value of 0.70 as shown in table 3.

9 PERCEIVED LEVEL OF MODERATING VARIABLES

Introducing the level of moderating variable; gender, age, and experience, perceived by the survey respondents in the SmartPLS model requires establishing a direct relationship between the moderating variable and the outcome variable, USE. Due to this, the output when calculating the revised path coefficients and t-test necessary to evaluate the moderating effect also includes the direct effect of the new construct on USE construct. Therefore both, the moderating influence as well as the direct effect was assessed in order to improve the research model. As shown in figure 1, the β coefficients the PLS algorithm revealed significant moderating influences with path coefficients of -0.179. However, bootstrapping results indicated a small t-value and subsequently a significantly greater than 0.05 p-value as shown in figure 2. Other model characteristics such as AVE, composite reliability and Cronbach's alpha remained either unaffected or experienced only marginal change. Thus, no moderating effect could be confirmed.

10 HYPOTHESES TESTING

To test the hypotheses, a structural model was built using the SmartPLS program. The path coefficients are produced using a bootstrapping procedure. The bootstrapping procedure is essentially a re-sample using the available observations as a basis. The bootstrapping results in a larger sample which is claimed to model the unknown population [42]. The new sample provides the data from which conclusions can be drawn. The sample size of 624 observations was increased to 700 re-samples using this bootstrapping method.

Using the results from the model validation in the previous sections, six hypotheses could be confirmed as opposed to two hypotheses that could not be proven based on the data collected.

The results indicate that out of the behavioral intention constructs developed for ICT use, the performance expectancy has the strongest impact on behavioral intention towards using ICT ($\beta=0.264$; $p<0.001$), and attention focus has the weakest supported impact on behavioral intention towards using ICT ($\beta=0.067$; $p<0.05$), whereas no support for H2 (effort expectancy), H5 (perceived value), or the moderating variables H9 (age, gender, and experience) could be provided.

The hypotheses were tested by examining the β s in the ordinary regression and path analysis model, the β s in structural model, and their statistical significance. Each hypothesis is restated below and evidence for support or otherwise is then presented as shown in table 4. The models depicting significant paths are shown in figure 3.

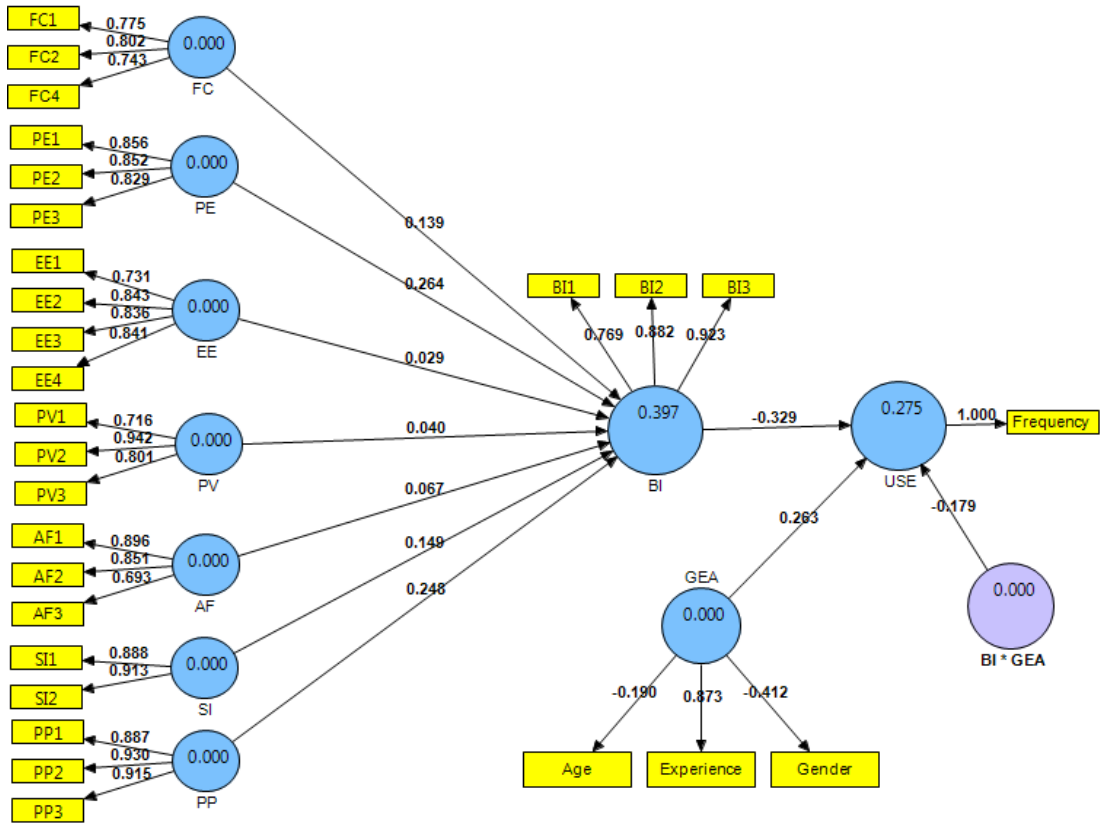


Fig 1. Moderating Variable Path Coefficients

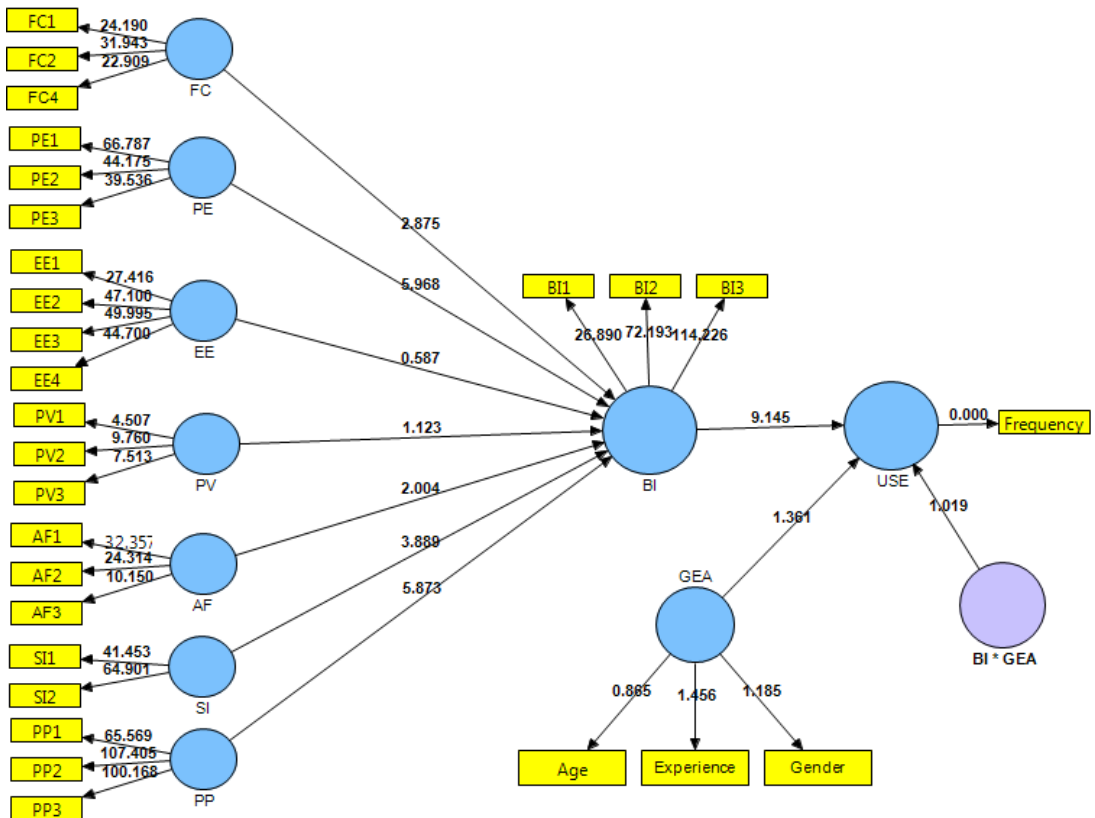


Fig 2. Moderating Variable Bootstrapping Analysis

Table 3. Loadings and Cross-Loadings (Highest Loadings in Bold)

	AF	BI	EE	FC	PE	PP	PV	SI
AF1	0.8981	0.2528	0.1387	0.168	0.2415	0.3445	0.0316	0.2233
AF2	0.8483	0.1807	0.0534	0.0387	0.1044	0.1484	-0.0999	0.1576
AF3	0.6895	0.0612	0.0521	0.0307	-0.0273	0.1086	-0.0539	0.1554
BI1	0.2387	0.7580	0.3323	0.3362	0.314	0.3666	0.0409	0.2003
BI2	0.198	0.8854	0.2786	0.3117	0.4683	0.4459	0.1728	0.3445
BI3	0.1891	0.9284	0.3408	0.3674	0.5025	0.4753	0.1665	0.3193
EE1	0.0515	0.248	0.7298	0.398	0.211	0.2826	-0.0753	0.1572
EE2	0.0981	0.2827	0.8435	0.5185	0.3207	0.3123	0.0192	0.2404
EE3	0.1363	0.339	0.8369	0.5589	0.4079	0.3768	-0.0113	0.2381
EE4	0.0726	0.3083	0.8406	0.5453	0.2841	0.3571	0.062	0.2155
FC1	0.1718	0.3178	0.4247	0.7611	0.3258	0.3007	0.1364	0.1782
FC2	0.0162	0.3066	0.5626	0.7806	0.2462	0.3112	-0.0402	0.1256
FC3	0.052	0.1509	0.2991	0.5610	0.1748	0.3019	0.1386	0.2806
FC4	0.0949	0.3032	0.472	0.7435	0.305	0.3525	0.1088	0.1459
PE1	0.1512	0.5067	0.3321	0.3383	0.8564	0.3831	0.1193	0.2867
PE2	0.2048	0.3804	0.3716	0.3308	0.8517	0.4405	0.1257	0.233
PE3	0.1156	0.3727	0.2665	0.2798	0.8289	0.3672	0.1201	0.1959
PP1	0.2245	0.4185	0.3611	0.3662	0.4022	0.8866	0.1443	0.1825
PP2	0.2499	0.4774	0.4149	0.4508	0.4628	0.9303	0.1871	0.2369
PP3	0.3021	0.4729	0.3482	0.3661	0.4101	0.9151	0.1176	0.2171
PV1	-0.0111	0.0119	-0.0496	0.0618	0.0759	0.1052	0.723	0.0965
PV2	-0.0657	0.1699	0.0104	0.1245	0.1572	0.1623	0.9412	0.1336
PV3	0.0384	0.0937	-0.0071	0.0454	0.0784	0.1203	0.8017	0.1922
SI1	0.1894	0.2891	0.2319	0.2066	0.2982	0.1983	0.214	0.8888
SI2	0.2123	0.3239	0.2435	0.2074	0.2246	0.2224	0.1021	0.9125

Table 4. Hypotheses Testing Results

Hypothesis	Significance
H1: Performance Expectancy (PE)	PE will have a significant effect on behavioral intention towards using ICT. There was a very strong support for this hypothesis ($\beta=0.264$; $p<0.001$). The resulting implication is that consumers' expectations of their performance when using mobile Internet play a strong role in determining its acceptance and use.
H2: Effort Expectancy (EE)	EE will have a significant effect on behavioral intention towards using ICT. Effort expectancy was expected to impact the intentions to use ICT, however, neither its path coefficient nor its p-value revealed significance of this relationship. Thus this hypothesis is not supported.
H3: Social Influence (SI)	SI will have a significant effect on behavioral intention towards using ICT. This hypothesis was supported ($\beta=0.149$; $p<0.001$). Hence, people tend to follow the suggestions of others who are important to them when recommending to use mobile Internet. Moreover, the social influence effect was found to be significant on the ongoing intention of Internet data services [43].
H4: Facilitating Conditions (FC)	FC will have a significant effect on behavioral intention towards using ICT. There was a very strong support for this hypothesis ($\beta=0.139$; $p<0.01$), which is rationally expected as users who do not own ICT resources and knowledge may not continue their usage of mobile Internet [27].
H5: Perceived Value (PV)	PV will have a significant effect on behavioral intention towards using ICT. This hypothesis was found insignificant due to the small value of β (0.039) as well as the high value of p-value (>0.05). Thus this hypothesis is not supported.
H6: Perceived Playfulness (PP)	PP will have a significant effect on behavioral intention towards using ICT. There was a very strong support for this hypothesis ($\beta=0.284$; $p<0.001$). Consumers are supposed to obtain enjoyment when they adopt mobile Internet to gain information and services. Thus perceived enjoyment will positively affect ICT adoption and use.
H7: Attention Focus (AF)	AF will have a significant effect on behavioral intention towards using ICT. This hypothesis was supported, although the relationship and the p-value were on the edge ($\beta=0.067$; $p<0.05$). Mobile phone users usually do many tasks while in motion, such as listening to music and surfing the Internet. Hence, their focus on mobile Internet may be restricted.
H8: Behavioral	

Hypothesis	Significance
Intention (BI)	BI will have a significant effect on consumers' use of ICT. There was a very strong support for this hypothesis ($\beta=-0.328$; $p<0.001$). This complies with the Technology Acceptance Model (TAM) [13][30], as TAM posits that a user's adoption of a new information system is determined by that user's intention to use the system, which in turn is determined by the user's beliefs about the system.
H9: Moderating Variables	Age, Gender, and Experience will mediate the relationship between behavioral intention and the use of ICT. This hypothesis was found insignificant. Although its path coefficient was acceptable, the hypothesis value of p-value (>0.05). Thus this hypothesis is not supported.

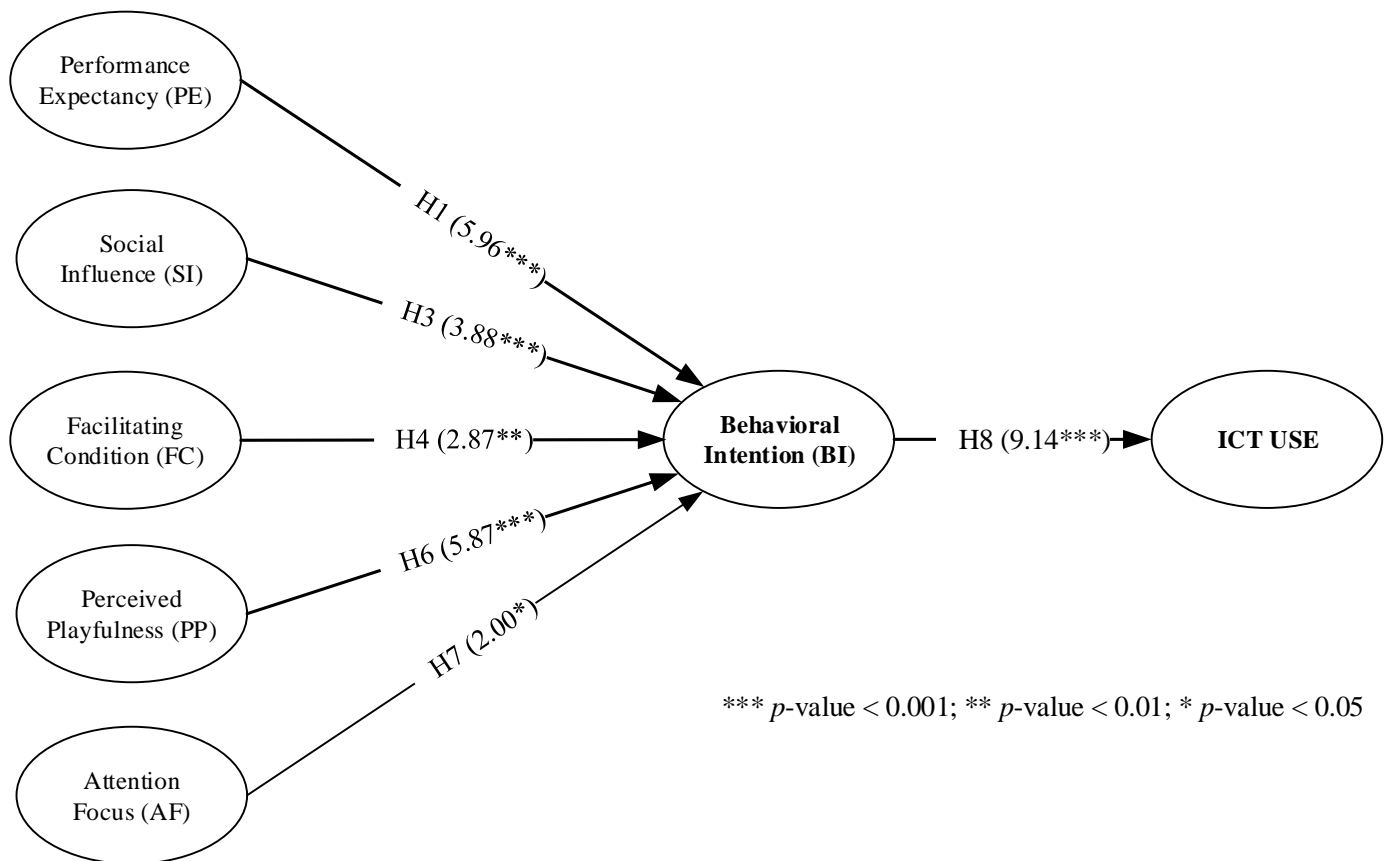


Fig 3. Supported hypotheses labeled by their significance values

11 CONCLUSION

This study analyzed the influence of 8 proposed constructs with moderated variables on the adoption and use of ICT in Saudi Arabia. Performance expectancy (t-value = 5.96) and

perceived playfulness (t-value = 5.87) have shown the highest significant impact on the consumers' behavioral intentions towards using the mobile Internet services in Saudi Arabia. Satisfaction affects continuance usage. Numerous studies have uncovered that satisfaction is a main factor

determining continuance behavior [44][45]. Among the factors affecting satisfaction, perceived playfulness has the largest effect. Thus mobile services providers should deliver an enjoyable experience to enhance user satisfaction.

Surprisingly, both perceived value and effort expectancy have shown a non-significant impact on the consumers' behavioral intentions towards the use of mobile Internet with t-values of 1.12, and 0.58 respectively. Similarly, the moderating variable of individual characteristics (i.e., different combinations of age, gender, and experience) found to be statistically insignificant with a t-value of 1.01. Those insignificant values tend to be a natural result of the respondents' profiles, which might skewed or changed when applying the model in a different geographical region.

Facilitating conditions, social influences, and attention focus were significantly influence the behavioral intentions towards the ICT use with t-values of 2.87, 3.88, and 2.00 respectively. This suggests that mobile service providers may use word-of-mouth effect to facilitate user behavior. Facilitating conditions reflect that users have the knowledge and resources necessary to use mobile Internet. It is quite likely that as facilitating conditions deals with broader infrastructure and support issues, it will always be important to those who value it even if they have significant experience with the target technology

Behavioral intention in the consumer context had a positive and strong direct effect on the use of ICT with a very high t-value of 9.14 and explained variance (R^2) of 28%. Consumers' behavioral intention toward adoption and use of ICT is also be affected by other factors such as the opinions of other important persons (social influence) [21]. Furthermore, even if users have a strong intention to perform a behavior, they will not be able to do so without the necessary resources and skills (facilitating conditions) [46]. Hence, previously confirmed effects of other constructs naturalize this result as well.

REFERENCES

1. Pilat, D. and F.C. Lee (2001). Productivity Growth in ICT-Producing and ICT-Using Industries: A Source of Growth Differentials in the OECD, *STI Working Papers* 2001/4, OECD: Paris.
2. Cisco (2012). Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2011–2016. Accessed 02/11/2014, from http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-520862.html
3. ITU (2012). Mobile industry growth forecast. Accessed 15/11/2014, from <http://www.onbile.com/info/mobile-growth-forecast>.
4. Scott, J. (2012). Count of Active Applications in the App Store. Accessed 10/12/2014, from <http://148apps.biz/app-store-metrics/?mpage=appcount>.
5. Scott, J. (2012). Count of Active Applications in the App Store. Accessed 13/12/2014, from <http://148apps.biz/app-store-metrics/?mpage=appcount>.
6. AndroLib (2012). *Distribution of Apps and Games in Android Market*. Accessed 13/12/2014, from www.androlib.com/appstatstype.aspx.
7. Kwon, T. H. and Zmud, R. W. (1987). Unifying the fragmented models of information systems implementation. *Critical Issues in Information Systems Research*, pp. 227-51
8. Danowitz, A., Y. Nassef, and S.E. Goodman. (1995). Cyberspace across the Sahara: Computing in North Africa, *Communications of the ACM*, 38(12), pp. 23-28.
9. Knight, C. H., and R. J. Dewhurst. (1994). Once daily milking of dairy cows: Relationship between yield loss and cisternae milk storage. *J. Dairy Res.*, pp.441–449.
10. Odedra, M., Bennett, M., Goodman, S., and Lawrie, M. (1993). Sub-Saharan Africa: a Technological Desert, *Communications of the ACM*, 36(2), pp. 25-29.
11. Goodman, S.E and Green, J.D (1992). Computing in the Middle East, *Communication of ACM*.35(8), pp.21-25
12. Venkatesh, V., Morris, M. G., Davis, G. B., and Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View, *MIS Quarterly*, 27(3), pp. 425-478.

13. Davis, F.D. (1989) Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13(3), pp. 319-340.
14. Venkatesh, V. and Davis, F.D (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science*, 46(2), pp. 186-204.
15. Taylor, S., and Todd, P. A. (1995). Understanding Information Technology Usage: a Test of Competing Models. *Information Systems Research*, 6(4), pp. 44-176.
16. Venkatesh, V., & Morris, M. G. (2000). Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior, *MIS Quarterly*, 24(1), pp. 115-139.
17. Rogers, E. M. (1995). *Diffusion of Innovations* (4th ed.). New York: Free Press.
18. Rogers, E. M. (1983). *Diffusion of Innovations*. New York, Free Press.
19. Braun, P. (2004). Regional Innovation and Tourism Networks: The Nexus between ICT Diffusion and Change in Australia. *Information Technology & Tourism*, 6(4), pp. 231-244.
20. Ajzen, I. and Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior*, Englewood Cliffs, NJ: Prentice-Hall.
21. Fishbein, M. and Ajzen, I. (1975). *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*, Reading, MA: Addison-Wesley.
22. Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckmann (Eds.), *Action control: From cognition to behavior* (pp. 11-39). Heidelberg: Springer.
23. Sheppard, B. H., Hartwick, J. & Warshaw, P. (1988). The theory of reasoned action: a meta-analysis of past research with recommendations for modifications and future research. *Journal of Consumer Research*, 15(3), pp. 325-343.
24. Hung, S.Y, C. M. Chang, and T. J. Yu. (2006). Determinants of user acceptance of the e-government services: the case of online tax filing and payment system. *Government Information Quarterly*, 23(1), pp. 97-122
25. Agarwal, R. (2000). Individual acceptance of information technologies. *Framing the domains of IT management: Projecting the future through the past*, 85-104.
26. Venkatesh, V., Thong, J.Y.L., and Xin, X. (2012). Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology, *MIS Quarterly*, 36(1), pp. 157-178
27. Zhou, T., (2011). Understanding mobile Internet continuance usage from the perspectives of UTAUT and flow, *Information Development*, 27(3), pp. 207-218.
28. Lee, Y.E. and Benbasat, I. (2004) A framework for the study of customer interface design for mobile commerce, *International Journal of Electronic Commerce*, 8(3), pp.79-102.
29. Bagozzi, R.P. and Lee, K.-H. (2002). Multiple routes for social influence: The role of compliance, internalization, and social identity. *Social Psychology Quarterly*, 65(3), pp. 226-247.
30. Davis, F.D., Bagozzi, R.P. and Warshaw, P.R. (1992). Extrinsic and intrinsic motivation to use computers in the workplace. *Journal of Applied Social Psychology*, 22(14), pp. 1111-1132.
31. Zmud, R. W., & Boynton, A. C. (1991). *Survey Measures and Instruments in MIS: The information Systems Research Challenge: Survey Research Methods* (Vol. 3, pp. 149-155). Boston: Harvard Business School.
32. Venkatesh, A., Vitalari, N.P. (1991). Longitudinal Surveys in Information Systems Research: An Examination of Issues, Methods, and Applications originally appeared as a chapter in Ken Kramer (ed.), *The Information Systems Challenge: Survey Research Methods*, Harvard University Press, pp. 115-144.
33. Fink, A., & Kosecoff, J. (1998). *How to conduct surveys A step-by-step Guide* (2nd ed.). Beverly Hills, Calif: SAGE Publications Inc.
34. Straub, D., Boudreau, M.C. and Gefen, D. (2004) Validation guidelines for IS positivist research, *Communications of the AIS*, 13(24), pp.380-427.
35. Koufaris, M. (2002). Applying the technology acceptance model and flow theory to online consumer behavior, *Information Systems Research*, 13(2), pp. 205-223.
36. Jokivuori, Pertti, and Risto Hietala. (2007). *Määrällisiä tarinoita: Monimuuttujamenetelmien käyttö ja tulkinta* (1st ed.). Helsinki: WSOY.
37. Malhotra, Naresh K., and David F. Birks. (2007). *Marketing research: An applied orientation* (3rd European Edition ed.). Harlow: Prentice Hall.

38. Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate Data Analysis*. Upper Saddle River, NJ: Prentice Hall.
39. Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). *Multivariate Data Analysis*. Upper Saddle River, NJ: Prentice Hall.
40. Johnson, M. D., Herrmann, A., & Huber, F. (2006). The evolution of loyalty intentions, *Journal of Marketing*, 70(2), pp. 122-132.
41. Hulland, J. (1999). Use of partial least squares (PLS) in strategic management research: A review of four recent studies, *Strategic Management Journal*, 20(2), pp. 195-204.
42. Henderson, A. R. (2005). The bootstrap: a technique for data-driven statistics. Using computer-intensive analyses to explore experimental data, *Clin Chim Acta* 359, pp. 1-26.
43. Hong, S.J., Thong, J.Y.L., Moon, J.Y. and Tam, K.Y. (2008). Understanding the behavior of mobile data services consumers. *Information Systems Frontier*, 10(4), pp. 431-445.
44. Bhattacharjee, A. (2001). Understanding information systems continuance: An expectation-confirmation model. *MIS Quarterly*, 25 (3), pp. 351-370.
45. Kuo, Y.F., & Yen, S.N. (2009). Towards an understanding of the behavioral intention to use 3G mobile value-added services, *Computers in Human Behavior*, 25(1), pp. 103-110.
46. Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, 50(2), pp. 179-211.
47. Levy, J. A. (1988). Intersections of Gender and Aging. *The Sociological Quarterly*, 29(4), pp. 479-486.