Factors Influencing the Utilization of Mobile-Based Technologies: An Empirical Analysis in Kuwait

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This paper uses the Technology Acceptance Model (TAM) to investigate the major factors influencing students' intentions to use mobile-based technologies (MBT). Using hierarchical regression analysis, results indicate that the perceived ease of use does not have the expected impact on the intentions to use MBT, whereas usefulness, compatibility, subjective norms and attitudes are directly linked to the intentions to use MBT for academic activities. This study is the first to analyze factors influencing students' utilization of MBT in Kuwait. Our understandings of factors that influence user intentions are enhanced especially in the context of MBT in a developing economy.

INTRODUCTION

Mobile devices innovations are pervasive landmarks of everyday life (Farberov, 2012; Elmer-DeWittt, 2013; Higgins, 2013). Given the affordability, popularity, flexibility and portability of such devices, educators have widely considered exploiting such technologies both inside and outside the classroom for instructive purposes (Henderson and Chapman, 2012).

Throughout the study, MBT is used to signify any mobile device that could be utilized to perform a scholastic action. Examples include tablets, cellular telephones (i.e. IPhone, IPad, IPod, and so on) or any comparable device. Those are also often referred to as M-learning technologies. Utilizing mobile devices in education as portable learning tools is a creative and effective educational instrument at numerous levels of higher education (Dykes and Knight, 2012, pp. 12-27). In fact, Mueller, Wood, De Pasquale and Archer (2011) study argued that m-learning technologies should be utilized as an integral part of the learning process in business education. Moreover, Mobile technologies allow students to create self-directed learning abilities (Paris and Paris, 2001).

Previous research involving TAM has focused mainly on conventional applications (Davis, 1989; Dykes and Knight, 2012; Ahn, Ryu, and Han, 2004; Bruner and Kumar, 2005). The various areas in which the model has been applied have used almost exactly the same constructs as in the original model. This paper expands the TAM (Davis, 1989, pp. 319-340) to the MBT in nonconventional settings and the coordinated TAM (Fagan, Neill, and Wooldridge, 2008) to evaluate students' intentions to use MBT in Kuwait. This paper is organized as follows. First, a literature review of the TAM and the integrated TAM is presented. The study's research model, along with the research hypotheses, is introduced in the second section. Methodology section dealing with the research design follows. Next, results are presented in section four. This section is followed by discussion, implications, limitations and future avenues.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Perceived Ease of Use

Perceived ease of use deals with the extent to which a potential client anticipates that the targeted system will be free of effort (Davis, 1989, pp. 319-340). TAM further recommends that apparent convenience is instrumental in clarifying the variance in perceived usefulness. Perceived simplicity of adoption can increase the likelihood of adopting the technology (Wang and Qualls, 2007). Several studies have shown a direct impact of perceived ease of use on the attitude towards the adoption and use of a technology (such as Ahn, Ryu and Han, 2004; Bruner and Kumar, 2005; Hsieh and Liao, 2011; Masrom, 2007; Mostafa, 2013). Moreover, Klopping and McKinney (2004) found that perceived ease of use is positively related to the intention to use online shopping. Similarly, King and He (2006), in a meta-analysis of the TAM, showed the existence of strong positive relation between perceived ease of use and behavioral intention. This positive link was also found in government agencies (Hamner and Qazi, 2009, pp. 128-136) found in their study of technology adoption in government agencies. They pointed out that the ease of use has a strong weight in the formation of users' attitudes. It follows that

H1. Perceived ease of use positively influences students' intention to use such MBT services.

Perceived Usefulness

Perceived usefulness has been constantly found to represent a strong determinant to embrace technology (Mostafa, 2013, pp. 86-95). Davis (1989) used the term 'perceived usefulness' to refer to end user's subjective probability to use a specific application such as MBT services. Perceived benefits from MBT-related services occur when the new framework is regarded as more beneficial than the paper-based system it supersedes. In their exploratory examination of MBT, Bretschneider, Gant and Ahn (2003) found that perceived merit is the focal point of convergence in using MBT services. Raman and Leckenby (1998), found a positive connection between utilitarianism and length of visit to web page promotions. This utilitarianism is firmly identified with perceived helpfulness highlighted in TAM-related research. Previous research investigating internet shopping practices found that apparent usefulness is directly linked to web shopping (Klopping and McKinney, 2004; Hsieh *at al.,* 2011; Chiu, Lin, Sun and Hsu, 2009). Masrom (2007) found that perceived usefulness is positively linked to Malaysian undergraduate students' intention to use e-learning technologies inside a scholarly setting. Finally, Tornatzky and Klein (1982), in a meta-analysis of the innovation research literature found that relative merit was positively linked to adoption. Similarly, King and He (2006) in a comparable meta-analysis of the TAM, found a solid positive connection between perceived usefulness and behavioral expectation. It follows that

H2. Perceived usefulness positively influences students' intention to use such MBT services.

Subjective Norms

While TAM does not include the subjective norms construct, the Fishbein and Ajzen's (1975) theory of reasoned action (TRA) formulates attitudes and subjective norms as the primary determinants of behavioral intention. Subjective norm refers to users' perception of whether other important people comprehend that they should engage in the behavior (Fishbein and Ajzen, 1975; Schepers and Wetzels, 2007). Venkatesh and Davis (2000) extended the TAM to include subjective norms. Yi, Jackson, Park and Probst (2000) and Lu, Yu and Liu (2009) found a positive relationship between subjective norms and behavioral intention. A research examining culture-specific enablers and impediments to the adoption and use of the Internet in the Arab world (Loch, Straub and Kamel, 2003, pp. 45-63) found that both social norms and the degree of technological acculturation can impact the individual and organizational acceptance and use of the Internet. It follows that

H3. Subjective norms positively influence students 'intention to use MBT services.

Compatibility

Compatibility refers to the degree to which the use of the new technology is perceived to be consistent with the potential users' existing values, previous experience and needs (Nan, Xun-hua and Guo-qing, 2011, pp. 123-130). Compatibility was originally one of the factors determining the diffusion of innovation. Several studies have found that compatibility had strong direct impact on behavioral intention in areas such as using group support systems (Van Slyke, Lou and Day, 2002, pp. 5-12), adopting new methodology for software development (Hardgrave, Davis, and Riemenschneider, 2003, pp. 123-151), using university smart card systems (Lee and Cheng, 2003, pp. 307-325), adopting mobile entertainment services (Kim, Kim and Kil, 2009) and using E-government services (Mostafa, 2013, pp. 86-95). Chau, and Hu (2002) suggested that compatibility of telemedicine technology exerted a significant effect on perceived usefulness. In a research investigating the adoption of e-payment in China, compatibility was the only variable with a significant effect on respondents' intention to embrace the use of the technology (He, Duan, Fu, and Li, 2006, pp. 48-69). Compatibility may also influence behavioral intention through performance expectancy and effort expectancy (Schaper and Pervan, 2007, pp. 212-221). It follows that

H4. Perceived compatibility of MBT services positively affects students' intention to use such services.

Attitudes

An attitude is an individual's overall assessment of displaying a behavior (Lu ,Yu and Liu, 2009, pp. 117-126). Prior studies in the area of social psychology argued that attitudes represent an important predictor of behavior and behavioral intention (Agrawal, Sambamurthy and Stair, 2000; Aggelidis and Chatzoglou, 2009; Hsieh, Jun-Yi and Liao, 2011 and Kotchen and Reiling, 2000). The influence of attitudes on adoption may, in some cases, be influenced by intervening variables such as the indirect effect of compatibility and perceived playfulness (Lee, Tsau and Chang, 2015, pp.680-697). Although a number of studies have found that attitude is not directly reflected in behavior (Hume, 1991, pp. 46-59), many studies have established a positive relationship between attitudes and related behaviors in areas as diverse as political participation (Mohai, 1990, pp. 744-765), recreational activities (Luzar, Diagne, Gan and Henning, 1995, pp. 544-555), energy conservation (Kassarjian, 1971, pp.61-65), and ecologically conscious behavior (Balderjahn, 1988, pp. 51-56). In a recent study on the use of E-government services, Mostafa (2013) found a positive link between attitudes of Egyptian consumers and the use of E-government services. It follows that

H5. Attitude towards MBT services positively influences students' intention to adopt such services.

METHODOLOGY

Sample

Students from several departments in a private university in Kuwait participated in the study. A total of 750 questionnaires were distributed. The aim of the study was elaborated in a cover letter addressed to the respondents. Confidentiality and anonymity were ensured. The cut-off date a total of 414 individuals filled out the questionnaire with a 56% response rate. Such a response rate is not unusual in social science research (Sekaran, 2003). A chi-squared test has shown no significant difference between early and late respondents. The sample is evenly split between males (52%) and females (48%) with a mean age of 21.9 [SD=2.5].

Measures

The MBT intention scale was adopted from Linan and Chen (2009). The attitudes scale is taken from Kickul and Kreuger (2004), while the compatibility scale is adopted from He *et al.* (2006). The subjective norms scale used in this study is based on Iakovleva and Kolvereid (2009). The usefulness scale is based on Davis, Bagozzi, and Warshaw (1989) and Venkatesh (2000). Finally, the ease of use scale is based on the one employed by in (Davis, Bagozzi and Warshaw, 1989, pp. 319-340). Since the research instrument has not been used before in the Arab world, we started by establishing the instrument's validity and reliability. Face validity was established by asking experts on the topic to evaluate the research instrument used to conduct this study. Initial pre-test confirmed the face validity of the instrument. Convergent validity was established using Fornell and Larcker's (1981) average variance extracted (AVE) criterion. Since AVE of each construct was > 0.50, evidence of convergent validity was established (Anderson & Gerbing, 1988, pp. 411-423). AVE for each construct was found to be greater than the correlation with any other construct, which establishes discriminant validity (Hair, Black, Babin, Anderson and Tatham, 2006, pp. 93-99). Reliability of the instrument was also evaluated. Cronbach's alpha ranged from 0.78 to 0.89. This exceeded the 0.70 threshold usually used in social sciences to establish research instruments' reliability. Cronbach's alpha is considered generally to be a moderate appraisal of a construct's reliability (Al-Salem and Mostafa, 2012, pp. 1373-1384; Carmines and Zeller, 1983, pp. 14-28).The research instrument used in this study is shown in the Appendix.

Procedures

We started by computing item-total correlations for the data pool in order to detect poor items. Items having item-total correlation of 0.35 or less were dropped. Following the recommendations of Anderson and Gerbing (1988), the retained items were the subject of an exploratory principal component analysis. Finally, the retained parameters were integrated into sum scales and reliability scores and means were computed.

RESULTS

Pearson Correlation

Although it does not prove causation, correlation can serve as a predictor of causation. Pearson correlation matrix between the variables is shown in Table 1 (Sekaran, 2003, pp. 83-94). Table 1 was constructed to check the associations among the six constructs making up the model. From the table we see that most of the correlation coefficients are significant and have the expected sign. Thus, the constructs are generally related.

Hierarchical Regression Analysis

Hierarchical regression analysis was used to formally test the research hypotheses. This technique is also referred to as incremental variance partitioning (Pedhazur, 1982, pp. 67-79). It allows the researcher to control the order in which the variables were entered into the regression model, enabling us to assess

the incremental predictive ability of any variable of interest (McQuarrie and Langmeyer, 1985, pp. 239-252). Initial diagnostic checks showed that hierarchical regression assumptions were not violated.

Table 2 shows the results of the hierarchical regression analysis used to test the MBT intentions in Kuwait. Based on the TAM theoretical framework, the ease of use variable was entered in the first step. The inclusion of this variable explained around 38% of the MBT intentions. This variable was significant at the 0.001 level. In the second step the usefulness variable was entered into the model. This has increased significantly the explanatory power of the model to around 58%, which represents an incremental change of 19%. In the third step, the subjective norms variable was entered into the model. The decision to include that variable is based on previous research reporting a positive relationship between subjective norms and intentions (Manolopoulos, Söderquist and Pearce, 2011; Al-Salem and Mostafa, 2012; Mostafa, 2011 and Mostafa, 2013). With this inclusion of the variable, the explanatory power of the model went up to 62% (a change of around 5% in the R-squared). This change is statistically significant at the 0.01 level. In the fourth step, the compatibility variable was entered into the model. This variable has increased the explanatory power of the model to 67% with an additional 5% increase in the coefficient determination. Finally, the attitudes variable was entered into the model giving around 5% further increase to the explanatory power of the model (Final R-square is 72%). This signifies that the model as a whole explains around 72% of variance in the intention to use MBT among Kuwaiti students.

Taken together, our results seem to confirm the applicability of the TAM theory in predicting MBT intentions in Kuwait.

IMPLICATIONS, LIMITATIONS AND FUTURE RESEARCH

This study has investigated the intention of students to use MBT as an educational tool. Our results show that the TAM can be applied in non- conventional settings such as MBT and that the model explains 72% of the respondents' intention to adopt MBT in the classroom. In addition, around 60% of the respondents expressed willingness to adopt MBT in a classroom setting.

Results find a statistically significant relation between perceived ease of use and the intention to use MBT. This could be explained by the general belief among the youth that MBT is easy to use. This is a powerful result that is not in line with the traditional applications of the TAM (Lee, Tsau and Chang, 2015, pp. 680-697). Davis (1989) and Davis *et al.* (1989) found that the effect of ease of use on usage was non-significant. They argued that 'ease of use operates through usefulness'. Moreover, Ma (2003) investigated the implementation of TAM in the education sector and the findings claim that ease of use plays a secondary role in technology acceptance especially for experienced users.

Since we have found a significant relationship between subjective norm, perceived usefulness, compatibility, attitudes and intention to use MBT, it is important to create a university wide culture that encourages the use of MBT in the classroom. It would be important to get faculty involved in the process of promoting the use of MBT. Also, experienced students may play a key role in the demystification of the use of MBT in the classroom.

It should be noted that all the students involved in our study did have at least one mobile device. This might not be the case in other settings where students' financial capabilities are limited. Thus, future research in different settings should test whether our results hold. The study has measured students' intention to use technology. This does not necessarily translate into behaviour. Thus, the intention-behaviour gap needs to be addressed in future research. In addition, future work needs to study the effect of how faculty members integrate MBT as a tool supporting curriculum management and diffusion on the intention to use MBT.

TABLE 1
ZERO-MOMENT CORRELATION COEFFICIENTS

	EOU	USEF	SN	COMP	ATT	INT
EOU	1					
USEF	0.505[**]	1				
SN	0.276[**]	0.545[**]	1			
COMP	0.417[**]	0.595[**]	0.538[**]	1		
ATT	0.489[**]	0.559[**]	0.454[**]	0.605[**]	1	
INT	0.417[**]	0.546[**]	0.478[**]	0.575[**]	0.609[**]	1

** Correlation is significant at the 0.01 level (2-tailed).

TABLE 2
HIERARCHICAL REGRESSION RESULTS

Model	Standardized Coefficients Beta	t	Sig.	95% Confidence Interval for B Lower Bound	Upper Bound	R Square	Collinearity Statistics Tolerance	VIF
1 (Constant)		3.109	.002	0.227	1.008			
EOU	0.620	15.58	0.00	0.656	0.845	0.384	1.000	1.000
2 (Constant)		0.664	.507	-0.221	0.446			
EOU	0.188	4.035	0.00	0.116	0.338		0.506	1.977
USEF	0.615	13.22	0.00	0.603	0.813	0.576	0.506	1.977
3 (Constant)		-.737	.461	-0.443	0.201			
EOU	0.223	5.046	0.00	0.165	0.376		0.499	2.005
USEF	0.347	5.891	0.00	0.266	0.533		0.282	3.543
SN	0.325	5.848	0.00	0.251	0.453	0.621	0.435	2.300
4 (Constant)		-.562	.575	-0.387	0.215			
EOU	0.153	3.601	0.00	0.084	0.286		0.475	2.106
USEF	0.181	3.054	.002	0.074	0.342		0.244	4.103
SN	0.179	3.703	0.00	0.091	0.297		0.366	2.733
COMP	0.407	7.609	0.00	0.328	0.557	0.671	0.297	3.362
5 (Constant)		-0.173	.863	-0.302	0.253			
EOU	0.042	1.019	.309	-0.047	0.149		0.426	2.345
USEF	0.122	2.216	.027	0.016	0.264		0.24	4.171
SN	0.148	3.323	.001	0.066	0.255		0.363	2.751
COMP	0.199	3.610	0.00	0.098	0.334		0.238	4.208
ATT	0.430	8.432	0.000	0.336	0.540	0.722	0.278	3.600

a. Dependent Variable: INT

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APPENDIX 1
The questionnaire
Questionnaire (all questions, unless otherwise indicated, had a scale of 1 (strongly disagree) to 5 (strongly agree))
We thank you for participating in this research on Mobile Based Technologies (MBT) by answering the following questions (Please circle the answer that fits most your opinion).
Throughout the questionnaire, the **MBT** are defined as any mobile device 'PDA' used to perform an academic activity, such as tablets, mobile phones, IPhone, IPad, IPod or any similar device.

1. Learning to use *MBT* is easy for me
2. It is easy for me to become skillful at using *MBT*
3. *MBT* is flexible to interact with
4. My interaction with *MBT* is clear and understandable
5. It is easy for me to get information through *MBT*
6. Overall, I find *MBT* easy to use
7. Using *MBT* enhances my effectiveness in learning
8. Using *MBT* improves my course performance
9. Using *MBT* increases my productivity in my course work
10. Using *MBT* enables me to accomplish tasks more quickly
11. Overall, I find *MBT* useful in my study
12. My friends who are important to me think I should use *MBT* in education
13. My superiors/advisors who are important to me think I should use *MBT* in my study
14. Using *MBT* in my study improves my image within my instructors
15. Students who use *MBT* in their education have more prestige than those who do not
16. Using *MBT* in my study is compatible with all aspects of my education
17. Using *MBT* in my study is completely compatible with my current level in education
18. Using *MBT* in my study fits well with the way I like to study
19. I like the idea of using *MBT*
20. I have a generally favorable attitude toward using *MBT*
21. I believe it is a good idea to use this *MBT* for my course work
22. Using *MBT* is an intelligent idea
23. I intend to use *MBT* during the semester
24. I intend to use *MBT* in my study as often as possible
25. I intend to use *MBT* frequently for my course work
26. I use *MBT* in my education

Yes   No
Please indicate:
Gender: M   F
Age:
Level of Education: