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Examine Factors Influencing the Intention to use Mobile Learning in Yemen Public Universities

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Abstract: The wide spread use of mobile gadgets among the young generation has spurred researchers to investigate more deeply into the factors that impact the adoption of mobile learning among university students with many focusing on technological factors more than social or organisational factors such as subjective norms, self-efficacy and organisational support. One of the most important features provided by mobile learning for learners and instructors is the delivery of information regardless of time and place constraints. The objective of this study is to examine the factors that affect the intention to use mobile learning among university students in the Republic of Yemen using the Technology Acceptance Theory (TAM) as the underpinning theory. For a quantitative assessment, questionnaires were distributed to undergraduate students from different educational backgrounds in three public universities in Yemen. About 320 usable responses were analyzed using Analysis of Moment Structure (AMOS) Version 21. Descriptive and structural equation model techniques were employed to fulfill the proposed hypothesis of the research. The results revealed the applicability of TAM constructs in the higher educational context of Yemen. Further, subjective norms and self-efficacy were found to have a significant relationship with intention to use mobile learning.

Key words: Mobile learning, TAM, self-efficacy, subjective norms organisational support, significant, Yemen

INTRODUCTION

The availability of mobile gadgets like touch mobile phones, PDAs and tablets has given citizens the opportunity to use what they want, where and when it is required (Trifonova and Ronchetti, 2006). Mobile devices have reduced substantially in price and are practical and easy to use (Nassuora, 2013). Smart devices are able to amplify the advantages of electronic learning (e-learning) systems (Motiwalla, 2007) by allowing students to access course materials and ICT and learn in a collaborative environment (Nassuora, 2013) besides receiving lecturer assessment and evaluation (Crawford, 2007). They are able to extend the education process way beyond physical university boundaries, offering flexibility, portability and autonomous learning to the remotest areas yet still maintaining communication between students and their colleagues as well as with their lecturers (Khaddage *et al*., 2009). Additionally, they also give students and lecturers an opportunity to perform assigned work or prepare lessons during free-time or while travelling (Virvou and Alepis, 2005).

Mobile learning is a new era in the maturation of computer support and distance learning and introduces a new educational paradigm formulated by the advent of mobile devices and wireless networks to support reachable and collaboration education at all levels of learning, from schools to colleges and universities. It is perceived as subsequent to e-Learning and distance learning, further enhancing the reach of learning in time and place (Motiwalla, 2007) and takes conventional schooling which generally relies on the premise that both lecturer and students are tangibly in the same location to a whole new level. Salmon (2012) considered mobile learning as the 4th generation of the electronic learning environment, defined as any type of learning that takes place when the instructors are not restricted by a particular location or period of time. It can occur any time or anywhere, thanks to the functions provided by mobile technology gadgets that introduce learning concepts and permit wireless communication among academic instructors and students bringing more flexibility into the learning process and expanding the boundaries of traditional learning.

Mobile learning enhances self-study (Eschenbrenner and Nah, 2007; Jacob and Issac, 2008) by making course

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subjects and learning resources easily accessible and retrievable. Further, mobile learning promotes interaction between students and instructors in the classroom and enables information exchange off-campus (Lam *et al*., 2011). It is anticipated to be a major and effective means to deliver higher education materials in the near future (Hussein and Cronje, 2010). Regardless of the rapid and widespread use of mobile gadgets and wireless networks inside university campuses and the obvious benefits of m-Learning in higher education, mobile learning will not replace conventional classroom or an e-Learning system. However, it can act as supplementary support and add value to existing models of learning (Motiwalla, 2007).

Liu *et al*. (2010) pointed out that mobile learning has not reached its full potential and there is still a gap between what is available from this technology and what is actually used. There are many concerns confronting its acceptance including technical restrictions regarding connectivity, small-screen size, insufficient memory and network speed delay (Park, 2011; Wang *et al*., 2009). There are also educational concerns that the use of mobile devices in a lecturing hall could distract the learning routine (Corbeil and Valdes, 2007; Park, 2011), alongside end-users intention to embrace and use this technology.

The intention to use modern technology is an predominant concern for academy management when considering investment in technology. User hesitance to embrace modern technology can lead to system defeat and no longer any benefit to the university (Davis and Venkatesh, 1996; Taylor and Todd, 1995). The success of a mobile learning system may depend on user's employment and use of a new technology which is different' from what they are used by Wang *et al*. (2009).

Most of the research related to mobile learning has been done in developed countries with few conducted in the less developed including the Republic of Yemen where there is also a distinct contrast between social and technological factors. Tarhini *et al*. (2013) recommended in their study to focus more on the social factors than the technological ones in the context of developing countries. Because the TAM factors of perceived usefulness and perceived ease of use do not fully explain student intention to use mobile learning, this study introduces three more factors (organisational support, self-efficacy and subjective norms) which influenced intention to use different technology in previous studies.

As earlier mentioned, there is a lacks of studies investigating the effect of subjective norms, self-efficacy and organisational support on intention to use mobile learning in the context of Yemen. The main objective of this study is therefore to examine the applicability of TAM constructs in Yemeni public universities. In addition, the impact of organisational support, self-efficacy and subjective norms on intention to use mobile Learning among the students in Yemeni public universities was also investigated.

Literature review:

Perceived usefulness and intention to use: Perceived usefulness is one of the core factors which has shaped TAM. It is defined as 'the degree to which a person believes that using a particular system would enhance his or her job performance (Davis *et al*., 1989). There are also many previous researches showing the strong effect of perceived usefulness on intention to use (Al-Adwan and Smedley, 2013; Cheng, 2015; Daud *et al*., 2011; Kowitlawakul *et al*., 2015). Daud *et al*. (2011) studied the critical factors that impact the intention to use to use mobile banking in Malaysia and concluded that perceived usefulness has a significant impact on intention to use. Further in a study by Cheng (2015) investigating the factors that affect the acceptance of mobile learning in Taiwan, there was a positive relationship between perceived usefulness and intention to use. Kowitlawakul *et al*. (2015) reflected on how student perceived usefulness had an influence on intention to use electronic health records for nursing education in Singapore. Similarly, a study of Al-Adwan and Smedley (2013) about the acceptance of e-Learning in Jordanian universities, revealed that perceived usefulness had a significant influence on intention to use e-Learning. Finally, Alrajawy examined the factors that affect the intention to use mobile learning in Yemen, there was significant effect of perceived usefulness on intention to use. Based on the previous studies, the following hypothesis is proposed:

- H_1: perceived usefulness has a significant effect on intention to use mobile learning

Perceived ease of use and intention to use: Perceived ease of use is defined as 'the degree to which a person believes that using a particular system would be free of effort' (Davis, 1989). Perceived ease of use is considered to be one of the essential factors of TAM. The bulk of previous studies which used TAM as the underpinning theory shows perceived ease of use as an important antecedent of intention to use technology (Callum and Jeffrey, 2013; Chen and Tseng, 2012; Chung *et al*., 2015). For instance in their study of the acceptance of the web base e-Learning among the teachers in Taiwan, Chen and

Tseng (2012) concluded that perceived ease of use had a significant effect on intention to use web based e-Learning. Callum and Jeffrey (2013) reported a strong influence of perceived ease of use on intention to adopt mobile Learning among students in New Zealand and a similar finding was reported by Chung *et al.* (2015), that perceived ease of use had a positive and strong effect on intention to use mobile learning among college students in Taiwan. It is therefore, stimulating for this research to examine the relationship between perceived ease of use and intention to use mobile learning. The following hypothesis is suggested:

- H_2: perceived ease of use has a significant effect on intention to use mobile learning

Perceived ease of use and perceived usefulness: The significant effect of perceived ease of use on perceived usefulness was proposed by TAM theory (Davis, 1989), where both factors were considered as belief of users in the technology boosting intention to use and leading to actual use of the technology (Daud *et al*., 2011). Davis (1989) concluded there is a mediation relationship between external variables and the intention to use through perceived ease of use and perceived usefulness and there is much previous research confirming the significant relationship effect of perceived ease of use on perceived usefulness (Teo *et al*., 2011). Teo *et al.* (2011) found perceived ease of use has a significant effect on perceived usefulness among pre-service teachers in a Turkish university, Mahat studying the acceptance of mobile learning in Malaysia, found the effect of perceived ease of use on perceived usefulness was the strongest effect among other relationships and a similar findings was reported by Isaac and Mutahar that perceived ease of use have effect on intention to use internet usage and mobile banking in Yemen. For purpose of this study, the above mentioned relationship was tested and the following hypothesis was proposed:

- H_3: perceived ease of use has a significant effect on perceived usefulness

Organizational support and intention to use: Organisational support is an important factor that convinces a student to adopt mobile learning (Akour, 2009), defined as 'the extent to which the organisation values its employees and how the organisation contributes to their wellbeing (Eisenberger *et al*., 1986). In this study it is referred to as the university commitment to provide students with technical support and relevant training together with the necessary resources to help them raise their awareness of mobile learning and then facilitate the adoption process. Haderi (2014) found the support provided to employees in government organisations influenced the intention to use ICT in Yemen. Further, a study by Shahsavari and Sajadi (2013) concerning the acceptance of the enterprise resource planning ERP system adopted by car production companies in Iran, found an impact of organisational support on the intention to use ERP. A similar finding was obtained by Al-alak and Alnawas (2011). Inconsistence to the previous studies (Shropshire *et al*., 2015) were reported organisational support has insignificant effect on intention to adopt information security behaviour. To test such a relationship, the following hypothesis is proposed:

- H_4: organisational support has a positive effect on the intention to use mobile learning

Self-efficacy and intention to use: Bandura defined self-efficacy as 'people's judgments of their capabilities to organise and execute courses of action required to attain designated types of performances'. In this research, the self-efficacy is concern with how skill and ability to use mobile devices will affect the intention of students to use mobile learning and this concept is reflected in their experience in using mobile applications and functions. There are researchers who have already studied the effect of self-efficacy on the intention to use the technology. For instance Park (2009) studied the intention to use e-Learning among the University's students in South Korea and found a significant effect of self-efficacy on intention to use e-Learning. Cheng *et al.* (2013) examined the factors that affect the intention to use a Web-Based Instruction (WBI) system among the vocational university's student in Taiwan and reported that self-efficacy has a significant effect on intention to use WBI. A third study conducted by Alalwan *et al.* (2016) examined the adoption of a telebanking system by Jordanian customers and confirmed the significant effect of self-efficacy on intention to use telebanking. These findings substantiate the hypothesis and the following is suggested:

- H_5: self-efficacy has a positive effect on the intention to use mobile learning

Subjective norms and intention to use: Many studies in the literature of technology acceptance confirm the importance of the subjective norm defined by Fishbein and Ajzen (1975) as 'a person's perception that most people who are important to him think he should or should not perform the behavior'. For the purpose of this research, the subjective norm comprises the interpersonal influence of family members, friends, colleagues, lecturers

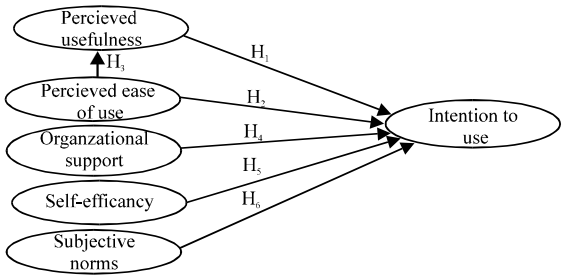

Fig. 1: The proposed research model

and any other social relationships considered important. There are many studies in the literature that confirm the importance of the subjective norm as an antecedent of intention to use technologies. For instance, when Park *et al.* (2012) studied the factors that affect the intention to adopt mobile learning among South Korean university students, they reported that the subjective norm had a significant effect on intention to use mobile learning. Similarly in the study of Tarhini *et al.*, (2013) about e-Learning acceptance in Lebanon, they concluded that subjective norm is determinant of intention to use mobile learning. Further, Ho *et al.* (2015) found that the subjective norm is the primary antecedent of intention to use university smart cards among students in Taiwan. Accordingly, the following hypothesis is proposed:

- H_6: the subjective norm has a positive effect on intention to use mobile learning

In summary, if university students perceive mobile learning to be useful, this will lead to intention to use it (H_1). If they university's student perceive mobile learning to be easy to use, this will lead to intention to use it (H_2). If they perceive mobile learning to be easy to use, this emphasises their perception of the usefulness of mobile learning (H_3). Organisational support has a significant effect on intention to use mobile learning (H_4). The self-efficacy, on the other hand will have significant effect on intention to use mobile learning (H_5). Finally, the subjective norm has a significant effect on intention to use mobile learning (H_6). Figure 1 shows the research framework developed and depicts the six main hypotheses to be tested in this research.

MATERIALS AND METHODS

Overview of the proposed research model: This study has developed a research model that investigates factors that influence intention to use mobile learning among students at public universities in Yemen based on TAM (Davis, 1989) using TAM as the underpinning theory where perceived usefulness and perceived ease of use are considered as TAM constructs that mainly measure individual belief. As this study aims to examine the applicability of TAM to a new trend in educational technology (mobile learning in the context of Yemen), it will simultaneously add those other factors like organisational support, self-efficacy and subjective norms into the research model which have been found to significantly affect the intention to use technologies as discussed previously.

Development of instrument and data collection: This study is quantitative in nature and used a self-administered questionnaire to collect data from respondents as the tool to assess the proposed hypotheses The original questionnaire in English was translated into the Arabic by the translation center in Sana'a university, the only centre certified by the Ministry of Higher Education. The questionnaire (please refer to Appendix A) was divided into six divisions to specifically address the hypotheses that were proposed for the study as follows:

First division: Five items capturing the demographic characteristics of the respondents such as gender, age, marital status, university name, mobile experience and income.

Second division: Six items on perceived usefulness (Karaali *et al.*, 2011; Tarhini *et al.*, 2013).

Third division: Six items on perceived ease of use (Alenezi, 2011; Karaali *et al.*, 2011).

Fourth division: Four items on self-efficacy (Nasri and Charfeddine, 2012).

Fifth division: Six items on organisational support (Akour, 2009; Lee *et al.*, 2010).

Sixth division: Five items on subjective norms (Pedersen, 2005) and six items measuring intention to use mobile learning (Hung and Chou, 2014; Park *et al.*, 2012) .

All the items for this study were measured using a likert scale with 7 points (where 1 represents strongly disagree and 7 represents strongly agree). The respondents of this study were undergraduate students at three public universities, namely: Sana'a, Dhamar and Aden. Total 320 usable questionnaires were returned and analysed using Structural Equation Modelling (SEM) via. AMOS Program.

RESULTS AND DISCUSSION

Data analysis and results

Respondents demographics profile: Table 1 reveals the

Table 1: Respondents demographics profile

Demographic item/Categories	Frequency	Percentage
Gender		
Male	24	76.6
Female	575	23.4
Age group (years)		
>20	22	6.9
20-29	235	73.4
30-39	63	19.7
40 years and above	0	0.0
Marital status		
Single	173	54.1
Married	139	43.4
Divorced	4	1.3
Widowed	2	0.6
Others	2	0.6
University name		
Sana'a University	128	40.0
Dhamar University	104	32.5
Aden University	88	40.0
Monthly income in YER		
<10,000	49	15.3
10,001-20,000	57	17.8
20,001-30,000	48	15.0
30,001-40,000	34	10.6
40,001-50,000	19	5.9
50,001 and above	113	35.3
Mobile experience (years)		
<1	14	4.4
from 1 = <3	72	22.5
from 3 = <5	107	33.4
5 years and above	127	39.7

characteristics of the respondents. In terms of gender, 245 (n = 76.6%) are male with 75 (n = 23.4%) being female. In terms of age, 22 are <20 years (6.9%), 235 (73.4%) are between 20-29 and the remaining 73 (19.7%) are between 30-39. For marital status, 173 (54.1%) respondents are single, 139 (43.4%) are married, 4 (1.3%) are divorced, 2 (0.6%) are divorced and 2 (0.6%) are didn't state their marital status. About 40% of respondents come from Sana'a University, 32.5% from Dhamar University and 27.5% from Aden University. Monthly income in Yemeni riyals is based on gross household monthly income with 35.5% earning above YER50,000, 17.8% between YER10, 001 and YER20,000 and 15.3% less than YER10,000, 15% between YER20,001 and YER30,000, 10.6% between YER30,001 and YER40,000, 5.6% between YER40,001 and YER 50,000. In terms of mobile phone experience, 39.7% of respondents have >5 years, 33.4% from 3-5 years, 22.5% from 1-3 years and 4.4% <1 year.

Descriptive analysis: Table 2 shows the mean and standard deviation of each construct in this current study indicating that perceived usefulness, perceived ease of use organisational support, self-efficacy, subjective norms and intention to use mobile learning are moderate. The analysis suggests that the respondents have a satisfied level regarding the easiness and usefulness of mobile learning while the support provided by the university and those the respondents consider as important to them in developing their skills to deal with mobile gadgets as well as their intention to use mobile learning was also regarded as satisfactory.

Table 2: Mean and standard deviation

Construct/Items	M for items	M for varible	SD for varible
Perceived usefulness			
PU1	4.31	4.31	1.59
PU2	4.38		
PU3	4.20		
PU4	4.27		
PU5	4.46		
PU6	4.29		
Perceived ease of use			
PEOU1	4.90	4.71	1.47
PEOU2	4.78		
PEOU3	4.63		
PEOU4	4.54		
PEOU5	4.52		
PEOU6	4.89		
Organizational support			
OS1	4.70	4.86	1.53
OS2	5.00		
OS3	4.95		
OS4	5.05		
OS5	4.57		
OS6	4.91		
Self-efficacy			
SE1	4.66	4.78	1.45
SE2	4.68		
SE3	5.12		
SE4	4.68		
Subjective norms			
SN1	4.11	4.17	1.47
SN2	4.08		
SN3	4.46		
SN4	4.11		
SN5	4.10		
Intention to use			
INT1	4.48	4.60	1.65
INT2	4.62		
INT3	4.67		
INT4	4.67		
INT5	4.59		
INT6	4.59		

M = Mean; SD = Standard Deviation, The measurement used is 7-point scale ranging from 1 (strongly Disagree) to 7 (strongly Agree). PU: Perceived Usefulness, PEOU: Perceived Ease of Use, OS: Organizational Support, SE: Self-Efficacy, SN: Subjective Norms, INT:Intention to Use

Measurement model:

Model fit indicators: Table 3 shows the overall model fit of this study and indicates that RAMSEA, CFA, TLI and other indicators are acceptable (Kline, 2010; Hair *et al*., 2010) and AGFI are also fit. Indicators found insignificant were the Absolute fit indices (which show that the chi-square is not significant). Despite this result, the model still fits because the Chi-square statistic nearly always rejects the model when large samples are used because it is sensitive to sample sizes >200 (Byrne, 2016). However in this study, GFI indicator's doesn't fit where

Table 3: Goodness-of-fit indices for the measurement model

Fit index	Cited	Admissibility	Result	Fit (Yes/No)
χ^2			725.826	
df			335	
p-value		>0.05	0.000	No
χ2/df	Kline (2010)	1.00-5.00	2.167	Yes
RMSEA	Steiger (1990)	<0.08	0.060	Yes
GFI	Joreskog and Sorbom (1993)	>0.90	0.856	No
AGFI	Joreskog and Sorbom (1993)	>0.80	0.826	Yes
NFI	Bentler and Bonett (1980)	>0.80	0.922	Yes
PNFI	Bentler and Bonett (1980)	>0.05	0.817	Yes
IFI	Bollen (1990)	>0.90	0.956	Yes
TLI	Tucker and Lewis (1973)	>0.90	0.951	Yes
CFI	Byrne (2010)	>0.90	0.956	Yes
PGFI	James *et al.* (1982)	>0.50	0.707	Yes

χ^2 = Chi-square, df = Degree of Freedom, GFI = Goodness-of-Fit, NFI = Normed Fit Index, IFI = the Increment Fit Index, TLI = Tucker-Lewis coefficient Index, CFI = Comparative-Fit-Index, RMSEA = Root Mean Square Error of Approximation, PNFI = Parsimony Normed Fit Index, AGFI = Adjusted Goodness of Fit Index. ***The indexes in bold are recommended since they are frequently reported in literatures (Awang, 2014)

Table 4: Loading, Cronbach's alpha, Composite Reliability (CR) and Average Variance Extracted (AVE)

Construct/Item	Loading (above 0.5)	a (above 0.7)	CR (>0.7)	AVE (above 0.5)
Perceived usefulness				
PU1	0.90	0.933	0.933	0.778
PU2	0.87			
PU3	0.87			
PU4	deleted			
PU5	0.88			
PU6	deleted			
Perceived ease of use				
PEOU1	0.82	0.942	0.942	0.730
PEOU2	0.87			
PEOU3	0.85			
PEOU4	0.90			
PEOU5	0.85			
PEOU6	0.84			
Organizational support				
OS1	0.89	0.942	0.943	0.734
OS2	0.88			
OS3	0.88			
OS4	0.81			
OS5	0.81			
OS6	0.89			
Self-efficacy				
SE1	0.84	0.890	0.891	0.671
SE2	0.83			
SE3	0.79			
SE4	0.82			
Subjective norms				
SN1	0.81	0.860	0.842	0.639
SN2	0.79			
SN3	0.79			
SN4	Deleted			
SN5	Deleted			
Intentionto use				
INT1	Deleted	0.957	0.958	0.819
INT2	0.90			
INT3	0.88			
INT4	0.92			
INT5	0.89			
INT6	0.92			

a = Cronbach's alpha; CR = Composite Reliability, AVE = Average Variance Extracted

Table 5: Results of discriminant validity by fornell-larcker criterion for the model

Variables	SN	INT	OS	PU	SE	PEOU
SN	0.799					
INT	0.772	0.905				
OS	0.658	0.679	0.857			
PU	0.739	0.801	0.664	0.882		
SE	0.674	0.744	0.662	0.678	0.819	
PEOU	0.780	0.827	0.749	0.851	0.753	0.854

Note: Diagonals represent the square root of the average variance extracted while the other entries represent the correlations.

Sharma *et al.* (2005) recommended this index shouldn't be used anymore because of the index's sensitivity and it is became less popular recently.

Indicators and construct reliability: Indicator Reliability (IR) was measured by the loadings for all items which exceeded the recommended value of 0.5 (Hair *et al.*, 2010; Hair *et al.*, 2010). Accordingly, five items were deleted (PU4, PU6, SN4, SN5 and INT1) since their loading was below 0.50. Construct reliability was measured by Cronbach's alpha and Composite Reliability (CR). The results showed that each individual Cronbach's alpha coefficient for the four constructs (ranging from 0.860- 0.957) was greater than the recommended level of 0.7 (Nunnally and Bernstein, 1994). Additionally, all the CR values (ranging from 0.842-0.958) were >0.7 (Kline, 2010), indicating adequately that the CR and IR are fulfilled (Table 4).

Convergent validity: Table 4 presents the values of the Average Variance Extracted (AVE) to measure the convergent validity and the results indicate that all AVE values are >0.50 (ranged from 0.639-0.819). Convergent validity for the model is fulfilled and it exhibit adequate convergent validity.

Discriminant validity: The discriminant validity of the measurement model was checked. As shown in Table 5,

Table 6: Structural path analysis result

Hypothesis	Dependent variables/ Independent variables	Estimate B (path coefficient)	SE	C.Rp (t-value)	p-values	Decision
H_1	INT<---PU	0.279	0.074	3.791	***	Supported
H_2	INT<---PEOU	0.275	0.122	2.258	*	Supported
H_3	PU<---PEOU	0.985	0.057	17.147	***	Supported
H_4	INT<---OS	0.043	0.060	0.722	0.471	Not supported
H_5	INT<---SE	0.235	0.067	3.529	***	Supported
H_6	INT<---SN	0.267	0.080	3.348	***	Supported

***p<0.000; **p<0.01; *p<0.05, S.E = Standard Error, C.R = Critical Ratio

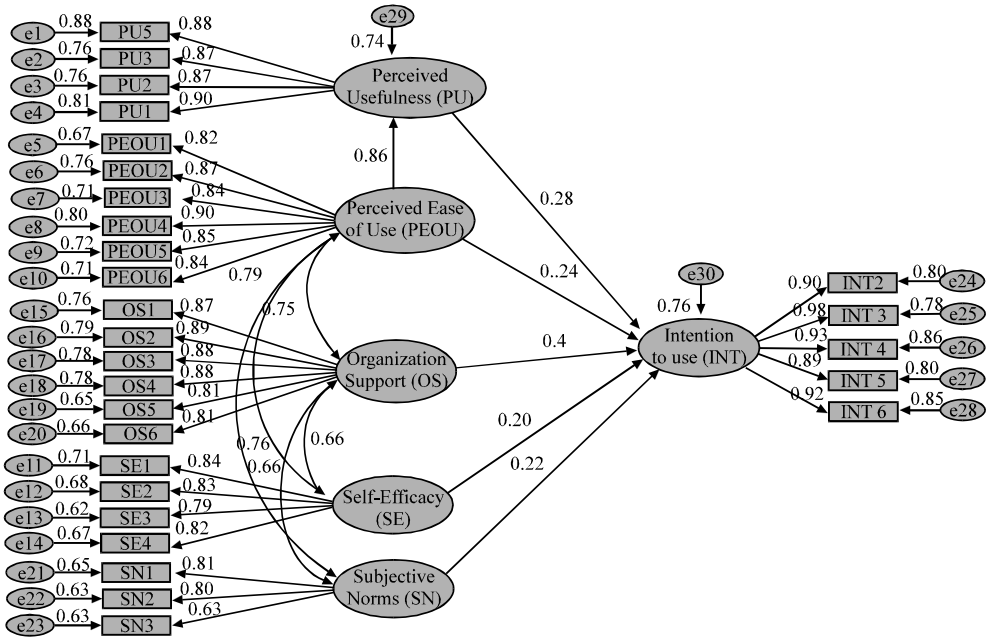

Fig. 2: Research structural model results; PU: Perceived Usefulness, PEOU: Perceived Ease of Use, OS: Organizational Support, SE : Self-Efficacy, SN: Subjective Norms, INT: Intention to use

the correlations between factors (which ranged from 0.658-0.851) were smaller than the square root of the average variance extracted estimates (which ranged from 0.799-0.905). This indicates that the constructs were more strongly related to their respective indicators than to other constructs in the model (Fornell and Larcker, 1981) and thus had good discriminant validity.

Structural model assessment

Hypotheses tests: This study evaluated the structural model to test the hypotheses. As shown in Fig. 2 and Table 6, most of the hypotheses were supported except H_4. Perceived usefulness has a positive significant effect on intention to use mobile learning ($\beta = 0.28$, $p<0.000$). In addition, the results of the analysis show that perceived ease of use also has a positive significant effect on intention to use mobile learning ($\beta = 0.24$, $p<0.05$). According to the results of the structural model analysis perceived ease of use has the strongest positive significant lationship with perceived usefulness ($\beta = 0.86$, $p<0.000$). Thus, H_1, H_2 and H_3 were supported. Organisational support, however, has an insignificant effect on intention to use mobile learning ($\beta = 0.03$, $p>0.05$) indicating that H_4 was not supported. Moreover, self-efficacy was positively related to intention to use mobile learning ($\beta = 0.20$, $p<0.000$) and this indicates that H_5 was supported. And finally, the subjective norm has a positive significant effect on intention to use mobile learning ($\beta = 0.22$, $p<0.000$), thus supporting H_6.

The variance explained for the model is given in Fig. 2 where perceived usefulness, perceived ease of use organisational support, self-efficacy and the subjective norm are able to explain 76% of the variance in intention to use mobile learning. While perceived ease of use explains 74% of the variance in perceived usefulness, according to Cohen (1988), the two values of the Coefficient of determination R^2 are substantial.

Table 6 exhibits the results of the structural path analysis of the model's variables of this study. Perceived

usefulness was found to have a positive significant effect on intention to use mobile learning and this is supported by previous literature (Al-Adwan and Smedley, 2013; Cheng, 2015; Daud *et al*., 2011; Kowitlawakul *et al*., 2015) where it is suggested that students in Yemeni public universities would intend to use mobile learning if they could feel the usefulness and this would help and facilitate their learning process.

The current study also found a positive significant effect of perceived ease of use on intention to use mobile learning and this is supported by previous studies (Callum and Jeffrey, 2013; Chen and Tseng, 2012; Chung *et al*., 2015). Further, the result suggests that where students in Yemeni public universities perceive mobile learning as free of effort, flexible and understandable, indicating the more they intend to use mobile learning.

Perceived ease of use has been found to positively affect perceived usefulness, demonstrating that the more students feel mobile learning is free of effort, the more they regard its usefulness in the learning process. This finding is consistent with previous studies (Teo *et al*., 2011). Unexpectedly, organisational support was found to have an insignificant effect on intention to use mobile learning and this is inconsistent with some previous studies (Alalak and Alnawas, 2011; Haderi, 2014; Shahsavari and Sajadi, 2013). However, Shropshire *et al*. (2015) finding's consistent with this results. In this study, the students apparently do not feel the support given by their university would enhance their intention to use mobile learning. This may result from previous impressions that the mobile phone is an entertainment and communication tool as result any technical or any sort of support provide by university wouldn't help them to perceive the mobile phones as learning tools.

Also, self-efficacy was found to have a significant effect on the intention to use mobile learning and this was recorded in some earlier researches such as Alalwan *et al*. (2016), Cheng *et al*. (2013) and Park (2009). This indicates that students who have more skill and experience in navigating the functions of mobile phones would intend to use mobile learning in their academic process more than those who have less skill and experience.

This study also found the subjective norm has a significant effect on intention to use Mobile learning and this impact is supported in some previous studies (Farahat, 2012; Ho *et al*., 2015; Tarhini *et al*., 2013). The result demonstrates the important role of family, friends and other influential people considered important to the students in positively affecting a decision to adopt mobile learning, if they feel mobile learning would benefit the students in their learning process.

CONCLUSION

This study aimed to examine the factors that affect the intention to use of mobile learning, using TAM as an underpinning theory and other factors like organisational support, self-efficacy and subjective norms. The findings suggest that perceived usefulness, perceived ease of use, self-efficacy and the subjective norm all predict intention to use mobile learning among public university students in Yemen. Moreover, the results indicate that perceived ease of use has an effect on perceived usefulness, although somewhat surprisingly, organisational support had an insignificant impact on intention to use Mobile learning. This study provides recommendations for university practitioners who wish to facilitate the implementation of mobile learning system in their institutions.

IMPLICATIONS

The findings of this study have some implications for the fields of information systems and management in public universities in the Republic of Yemen. First, the research offers evidence for the appropriateness of using the TAM constructs (perceived usefulness and perceived ease of use) to measure the intention to use mobile learning technology among the students in a new context such as in public universities. This indicate that where students feel that mobile learning would benefit them in their academic life and be free of effort, they will use mobile learning as a pedagogical tool to facilitate their learning process. For university practitioners, this is a reminder to take into consideration simplicity of system design and quality of content in order to attract the students to use it. Second, this study has adopted other constructs from previous research, namely organisational support, self-efficacy and subjective norms. The findings of this research mostly support the importance of these constructs as determinants of intention to use mobile learning, except organisational support. Thus, the social environment surrounding the student and being taught the skills to fully utilise mobile phones would encourage them to take advantage of mobile learning. Hence, university management should promote the importance of the mobile learning to the social environment of the students (such as to their families) organise training sessions for students and provide the appropriate help in order to encourage them to use mobile learning.

APPENDIX

Appendix A: Instrument of constructs

Construct/Items	Rating scale	Source
Perceived usefulness		
Using the mobile learning will allow me to accomplish learning tasks more quickly	Likert scale	Karaali *et al.* (2011), Tarhini *et al.* (2013)
Using the mobile learning will improve my learning performance		
Using the mobile learning will make it easier to learn course content		
Using the mobile learning will increase my learning productivity		
Using the mobile learning will enhance my effectiveness in learning		
I would find the mobile learning useful in learning		
Perceived ease of use		
Learning to operate the mobile 1earning would be easy for me	Likert scale	Karaali *et al.* (2011), Tarhini *et al.* (2013)
I would find it easy to get mobile learning to do what I want it to do		
It would be easy for me to become skillful at using the mobile learning		
My interaction using mobile learning would be easy and clear		
I would find the mobile learning to be flexible for interacting with my lecturer		
Overall, I would find mobile learning easy to use		
Self-efficacy		
I would likely use mobile learning If someone showed me how to do it first		Nasri and Charfeddine (2012)
I would likely use mobile learning If someone else had helped me get started		
I would likely use mobile learning If I had used similar packages before this one to do the same job		
I would likely use mobile learning If I had a lot of time to complete the job for which the software was provided		
Organizational support		
I am likely to use mobile learning if I am provided instructor led training I need		Akour (2009), Lee *et al.* (2011)
I am likely to use mobile learning if the university provides me complete instructions and practice		
I am likely to use mobile learning if I know where to turn to when I need any assistance		
I am likely to use mobile learning if the university provides good technical support		
It is important for me to encourage the use of mobile learning system within the organization		
It is important for me to provide useful resources for mobile learning system within the organization		
Subjective norms		
People who are important to me would think that I should use mobile learning	Likert scale	Lee (2009, Lee and Kim (2009)
People who influence me would think that I should use mobile learning		
People whose opinions are valued to me would prefer that I should use mobile learning		
My colleagues thinks that I should use the mobile leaning		
Management of my university thinks that I should use the mobile leaning		
Intention to use		
I intend to use mobile learning in my academic life	Likert scale	Akour (2009), Hung and Chou (2014), Lee *et al.* (2011), Park *et al.* (2012)
I intend to use mobile learning continuously in the future		
I intend to use mobile learning for more of my lives/job responsibilities		
I would enjoy using mobile learning		
I would recommend others to use mobile learning		
I have intention to perform mobile learning		

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