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Determining the Factors Affecting the Success of M-Learning Implementation in Jordan Higher Institution of Learning

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Abstract: The absence of a unified framework to evaluate the success of M-learning hinders its success and discourages universities to invest in the technology and despite the contributions of social influence to success of new technology, prior studies in M-learning are yet to investigate its impact on the successful implementation of M-learning. Hence, this study aims to measure the effect of the factors proposed in Delone and McLean IS success model on M-learning implementation in Jordanian higher education institutions and to measure the effects of social influence on using M-learning in institutions of higher education institutions. The study introduced social influence into the DeLone and McLean Success Model to test how this factor determines user intention and the students' satisfaction as elements of M-learning. This quantitative research sampled a total of 768 respondents studying in the Jordanian universities, and questionnaires were distributed to them. A total of 431 of the questionnaires were goodenough for further analysis. Data collected was analysed via SPSS version 18 and smart PLS 2.0 m3 software packages. Precisely, social influence, information technology, system quality and intention to use were found to be significantly and positively related to user satisfaction. User satisfaction and intention to use were positively and significantly related to net benefit. Social influence, information technology, system quality, service quality and intention to use were found to be significantly and positively related to user satisfaction. Social influence and intention were positively and significantly related to intention to use and user satisfaction and intention to use was positively and significantly related to net benefit. The research findings provide support for social influence, information technology, system quality and service quality as significant factors that affect the successful implementation of M-learning in Jordan, thus expanding the Delone and McLean IS success model on M-learning implementation. Consequently, university administrators should consider all these factors when implementing an M-learning system.

Key words: Jordan, M-Learning, higher education, factors, successful implementation

INTRODUCTION

Given the upsurge recorded in the global mobile technology in which the numbers of users of mobile devices have surpassed 6.8 billion and 96% of handheld phones are presumed to be equipped with Internet connectivity, substantial number of institutions of learning have begun providing wireless Internet service, which is otherwise known as Wireless Fidelity (Wi-Fi), in order for university members to interact with one another, gain access to learning and teaching materials, and utilize the Internet. Also, in order to provide better learning environments, educational institutions have attempted to equip students with the latest technology according to their understanding or beliefs of what the students need. This has encouraged the process known as the integration of Information and Communication Technologies (ICT) over the last decade whereby instructors would use various technology aids such as computers and the Internet in the classrooms (Hsu, 2006).

Furthermore, mobile learning (M-learning), in the recent past years, has witnessed development and become a real means of education, instead of a mere theoretical perspective in the academic field. This development has coincided with the evolution of the online world (Alzaza and Yaakub, 2011). The M-learning is a process that involves two-way communication between educators and students via a variety of learning apparatuses and by way of mobile gadgets and it is not confined to time-and-space limitations. Through M-learning, learners have a way to access information and interact with the rest of the university without having to be physically present. Because of this, a learner's

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physical presence on campus is unnecessary as mobile devices are now seen as a real method of education (Triantafillou *et al*., 2008, Kadirire, 2007).

Also, the use of mobile and wireless technologies has demonstrated to be effective in universities and in augmenting the functionality of the learning environment (Johnson and Lomas, 2005; Long and Ehrmann, 2005; Wedge and Kearns, 2005). Moreover, Information and Communications Technology (ICT) has broadened the horizons of higher education by incorporating that technology into the concept of "anywhere/anytime" learning. Mobile and wireless communication, through the use of smart mobile devices, is accommodating access to classroom information unrestricted by either time or place. In addition, these devices which assist the correspondence between students and instructors, inside and outside the classroom also have potential to change the mode of classroom interaction (Wetzels *et al*., 2009).

In the context of Jordan, the development witnessed in the M-learning implementation has seen to the integration of M-learning methods in some of the universities in Jordan in which it is meant for improving knowledge delivery. Experts' review of the efficacy of M-learning has addressed some aspects of its implementation. DeLone and McLean (1992, 2003) have created a model that accounts for prototypical contents, namely, system quality, information quality, services quality, use, user satisfaction and net benefit. A great number of practical experiments have investigated the nuances of its full-fledged implementation (Wu and Wang, 2006; Wang, *et al*., 2007). The research of DeLone and McLean (1992, 2003) guides the development of other models used in the assessment of IS implementation.

However, the models have not completely exhausted all the factors that contribute to the successful implementation of IS. From reviewed literature this study discovered that most experiments that used DeLone and McLean (1992, 2003) framework pay attention to one element of success and apply personal opinions as to how the success of e-learning is evaluated (Heo and Han 2003). The absence of a unified framework to evaluate the success of M-learning hinders its success and discourages universities to invest in the technology. The shortage of proper, necessary assessments is a primary culprit in creating successful in M-learning programs because these programs must be evaluated consistently in order to fulfil the demands of the users. Without such evaluations, universities are hesitant to invest in the technology. Thus, the development process lacks objective definitions of success and this deficiency hinders progress (McGorry, 2003). In addition, this study noted that despite the contributions of social influence to success of new technology prior studies in M-learning are yet to investigate its impact on the successful implementation of M-learning. Likewise, social factors have evaded the attention of the extant research, and the research that adopt the social factors as constructs to measure IS success is lacking (Aish and Love, 2013; Mardiana, 2014).

Consequently, this study deems it imperative to examine the factors that contribute to the success of M-learning implementation in higher institution of learning in Jordan. Hence, the study will examine the influence of the factors proposed by DeLone and McLean (1992) IS success model on M-learning implementation in Jordanian higher education institutions, and it will also examine the influence of social factor on M-learning implementation when included in the IS success model (Delone and McLean, 1992).

The findings of the study are expected to be useful in terms of supplementing the existing solutions to such problems, and consequently resulted in the successful use of M-learning among students in Jordanian higher learning institution. Also, it is hoped that the findings will convince university administration to pay attention to aspects that influence the use of M-learning.

Concept of M-learning: In its modern practice, academicians and practitioners from all over the world have defined M-learning in various ways. Table 1 shows the various definitions and their authors. According to Hussein and Cronje (2010), M-learning is any type of learning that takes place in learning environments and spaces that take account of the mobility of technology, mobility of learners and mobility of learning. Santosh and Sidho opined that M-learning is a natural extension of E-learning. It also a system and process that connects learners with distributed learning resources while distance learning takes a wide variety of forms (Horng and Horng, 2009).

Holistically, M-learning can be organized to a specific learning form through the mediation of mobile gadgets and is seen as an evolving prototype in rapid technological growth. The multiple definitions of M-learning seem to have drawn attention to its three main structures: the division of place and time between student and instructor, among learners, and/or between learner and learning resources; the interaction between the learner and the instructor, among learners and/or between learner and learning resources conducted through one or more media (whereby the use of electronic media is not necessary) and the learner is an individual or group that seeks learning experience as offered by a provider.

Furthermore, Attewell, quoted by Yousuf (2007) and Becking and coauthors, observed that were concrete rationales for using M-learning. The M-learning, in particular, can help students to improve their literacy and numeric skills, recognize their innate abilities, identify their needs for assistance and support, overcome the technological divide, create a more relaxed learning process and boost their morale. Besides, M-learning serves as a convenient form of learning with its advantage of mobility. Attewell opined that M-learning presents unique prospects for education because it can be customized to student needs, is widely available and provides convenience, personalized and protected content (Turker *et al*., 2006) and flexible and easy access to learning resources through personalized devices (Caudill, 2007). Because of these advantages, M-learning is considered to be a user-friendly mode of learning in schools, colleges and universities. The mobility of M-learning gives room for the extending the learning environment beyond the four walls of classroom interaction. The personalized element of the portable gadgets used in M-learning renders learning applications that work beyond the traditional form of education more suitable.

M-learning in the higher institutions of learning: Over the years, the implementation of M-learning has swollen in number, specifically in the developing countries (Motlik, 2008). Higher institutions of learning in Malaysia such as Universiti Utara Malaysia (UUM), International Islamic University Malaysia (IIUM), Universiti Putra Malaysia (UPM) are notable for adoption of M-learning (Karim *et al*., 2006). Also Philippines has recorded steadily growing M-learning usage (Ramos *et al*. 2006). The government of Mongolia has also taken initiatives to enhance M-learning (Batchuluun, 2007).

The doyens in the education field are moving their focus in the direction of M-learning, although E-learning has fallen somewhat short in its development (Williams, 2009). Organizations have utilized modern mobile devices and the integration of the latest education techniques joined with the application of networking links to improve work efficiency which has grown simultaneously along with a holistic learning system. Today, five out of the total of ten universities in Jordan have launched and used full-fledge M-learning methods.

In a bid to improve educational opportunities, the Ministry of Higher Education and Scientific Research in Jordan (MoHESR) has formed an e-learning bureau to formulate a nationwide e-learning program. The bureau is to expedite the comprehensive application of e-learning by institutions of higher education through the use of modern technology to revolutionize the education system and make that system student-centered. Furthermore, the Ministry also seeks to have a system that receives global recognition for its effective methods that cultivate growth and merit, as well as rendering varsity graduates with more marketable qualities in the working world. All of these objectives have been deemed to be possible due to Jordan's outstanding telecommunication sector. The country has all-round accessibility to landline and mobile telecommunication services that now reaches >93% of the p opulation, even stretching to remote areas.

In Jordan, there have been some developments in all fields of industry and in certain specified sectors. Higher Education has been named one of the most important sectors, garnering special attention from the Jordanian government. Tertiary education has benefitted from immense government support, including the construction of new universities and colleges and a handsome financial allocation from the national budget. Today, five of the ten government-supported public universities have adopted M-learning. These include: the University of Jordan, Yarmouk University, Mutah University, Jordan University of Science and Technology (JUST) and Hashemite University.

Drawn upon previous research on M-learning, it is opined that M-learning and mobile technologies and devices can supplement different learning activities in different settings and for diverse age groups. As a matter of fact, M-learning can also galvanize the value of orthodox classroom learning by supplying a blended approach.

Despite the benefits of M-learning, technical, pedagogical, or administrative obstacles to use remain a challenge which should be attended to. According to Keegan lack of adaption to M-learning in educational settings has inhibited their widespread use. The causes are mostly technical, primarily arising from the screen size of the mobile devices and the market price of mobile service. Naismith and coauthors claim that the key issues and challenges of M-learning and teaching lie in five key areas: context, mobility, informality, ownership and learning over time.

Furthermore, there has been a call by the researchers (Al-Mushasha and Hassan, 2009; Al-Zoubi *et al*., 2007) toencourage students to make more use of M-learning to be able to achieve success in education. However, there is dearth of research about what factors could lead to the success of M-learning broadly, particularly in Jordanian universities (Al-Zoubi *et al*., 2008). Successful

implementation of technology is deemed important (Sabherwal *et al*., 2006) and thorough review of extant studies have indicated that some studies have been conducted to measure IS success (M-learning success) (Petter *et al*., 2008; De Lone and McLean, 1992, 2003, 2004; Seddon *et al*., 1999; Hunton and Flowers, 1997).

Likewise, from the review of different trends of M-learning implementation in higher education institutions and the issues and challenges of M-learning implementation in higher education institutions, it is clearly discernible that there is need for a research on the main factors that predict the successful implementation of M-learning among students, specifically in Jordanian context. Such study requires the establishment of a suitable theoretical basis. The theories that are usually adopted to underpin the success of IS implementation are among others DeLone and McLean (1992)'s Theory (D and M IS Success Model), IS Effectiveness Theory (1999), DeLone and McLean (2004)'s Theory and Wang and Liu's Theory of IS in 2005, Sabherwal *et al*. (2006)'s Theory and the IS Impact Success Theory (2008).

Extant research has indicated that of all the available theories on success of IS implementation, the D&M IS Success Model survives as a main reference to the success-measurement concept that has been widely used in the body of research ever since it was published in 1992 by DeLone and McLean (1992, 2004). It also continues to be an efficient measure of IS success. Lately, a need to acknowledge the demand for assessment techniques that fit the evaluation process of technologies, namely M-learning, has appeared. The suggestion has been made that through integrating facets of customary D and M evaluation elements, a newer, more refined and updated edition of the D and M IS Success Model can be used in measuring M-learning success measurement in context of the university.

Delone and mclean's theory (D&M is success model): Of all the theories regarding in IS Success, the DeLone and McLean (1992, 2004) theories have been extensively tested and validated (Petter *et al*., 2008; Seddon *et al*., 1999; Seddon and Kiew, 1996). Some researchers have transformed the original DeLone and McLean (1992, 2003, 2004) theory to evaluate applications including knowledge management (Kulkarni *et al*., 2006; Wu and Wang, 2006) and E-commerce (Zhu and Kraemer, 2005; DeLone and McLean, 2004; Molla and Licker, 2001). When some researchers found effects of IS success on workgroups, industries and societies (Seddon *et al*., 1999; Myers *et al*., 1997), DeLone and McLean (1992, 2003, 2004) replaced individual impact and organizational impact with net benefits, thus accounting for benefits at various analysis levels. This theory enabled its application to whatever level of analysis the researcher deemed the most significant.

Pioneering attempts to provide a definition of information system success were met with challenges because of the complex, interdependent and multi-dimensional nature of the metrics. This issue was addressed during the period from 1981-1987, the result was the creation of a taxonomy of IS success by DeLone and McLean (1992) and Petter *et al*. (2008). The theory comprised six constructs, namely, system quality, information quality, use, user satisfaction, individual impact and organizational impact. The arrows depict a causal relationship and are considered to be directions of influence. Constructs are generally considered to be a high-level description of the system being developed and they are employed for modeling the business processes (Seila *et al*., 2003). The theory was built on the notions that Shannon and Weaver and Mason (1978) brought forward. Shannon and Weaver and Mason (1978) contended that issues existed in three hierarchical levels, namely, the technical level, the semantic level and, finally, the effectiveness level. First, the technical level is concerned with how the system transfers the communication symbols. Second, the semantic level entails the interpretation of meaning by the receiver in comparison to the actual meaning meant by the sender. Finally, the effectiveness level is related to the manner in which the meaning conveyed to the receiver impacts actual behaviour. In addition, system quality is covered under the technical level, while information quality is covered under the semantic level. Researchers including Hunton and Flowers (1997) and Seddon and Kiew (1996) have produced further evidence to reinforce DeLone and McLean (1992)'s theory.

Then, a refinement of DeLone and McLean (1992)'s original theory emerged in which the researchers considered the various criticisms and recommendations for improvement. This refinement is tagged Extended Information Systems Success theory. The primary changes to the first model included the introduction of net benefits (replacing individual and organizational effect), re-specification of the construct relationships and the addition of the construct service quality. The modified theory is presented Fig. 1.

The significance of DeLone and McLean's Model of IS Success is founded on a number of facets. Primarily, the model gives a framework for all the experimental

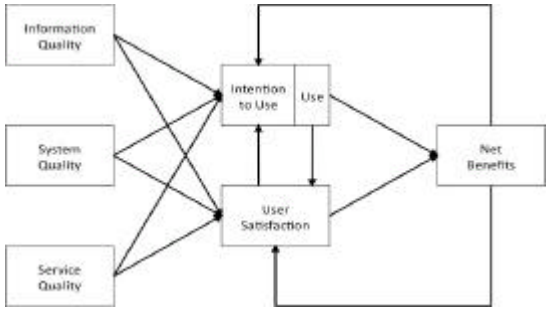

Fig. 1: DeLone and Mclean success model

methods used in the IS literature. The model also helps identify prospective stakeholders groups that could be assessed in the prototype. Heo and Han (2003) and Myers *et al.* (1997) have looked at the manner in which various parts of the model may connect with one another. However, some researchers have noted that the aforementioned prototype is incomplete (Seddon and Kiew (1996); Seddon *et al*., 1999).

To date, only a few practical studies pertaining to IS and its achievements in developing nations exist (Avgerou, 2008; Heeks, 2002). The top challenge faced by most developing countries is a lack of knowledgeable users. Therefore, a theory to be employed in a developing country needs to be simple. Simplicity has been attributed to DeLone and McLean's (1992, 2003), Sabherwal *et al.* (2006) and Gable *et al.*'s theory (2008). DeLone and McLean (2003)'s concept created a vital lens through which the successful implementation of IS is looked into. The limited studies about developing regions concerning IS success is a sign of potential to conduct further examinations of the constructs that could propel successful implementation of IS applications and the manner in which those constructs might be correlated. With this in mind, the recognition of the factors that affect IS success might bring about an understanding of what to do insure IS success in those regions.

This research suggests that Delone and Mclean (2003)'s theory can be used to look into the possible successful introduction of M-learning in Jordanian universities and colleges. A need exists to address the use of their concepts for evaluating the success of IT in developing regions (like Jordan) and the prospects of developing the model by looking at supplementary aspects (such as social influence services quality, information quality and system quality). This would account for the factors that could be included the research model. This process also acknowledges the impact of social influence services quality, information quality and system quality on Dealone and Mclean variables represented by user satisfaction and intention of use/usage as a form of internal independent variables. Moreover, it examines the net benefit of M-learning system as a dependent variable.

Furthermore, several writers have looked into the aspects of incorporation of certain variables that could possibly affect M-learning and long-distance learning, as well as their success in academic establishments. This study has acknowledged certain measures, namely, Service Quality (Al-Mushasha and Hassan, 2009), Information Quality (Petter *et al*., 2008) System Quality (Piercy, 2014), Culture Factors, Net Benefits, Social Influence (Venkatesh *et al*., 2003), Intention to Use/Usage and User Satisfaction (Seddon and Kiew, 1998). Also, some writers have begun to use re-specified editions of the D and M IS Success Model for assessment purposes (Chen, 2010; Wang *et al*., 2007; Wu and Wang, 2006). Albeit that Wang *et al.* (2007) formulated and verified a measurement founded on the D and M IS Success Model for the M-learning framework, Chen (2010) utilized constructs from previous IS studies.

Past studies (Al-Mushasha and Hassan, 2009), Petter *et al*., 2008; Piercy, 2014) have documented that the success of information system is hinged on several factors. For instance, many studies building on DeLone and McLean (1999) demonstrated that the IS success is determined by social influence, system quality, information quality, user satisfaction, individual impact and organisation impact.

Concept of social influence: Venkatesh *et al.* (2003) defined social influence as the level to which an individual feels that important others are convinced that he/she should employ a technology. Hence, social influence, as direct predictor of behaviour intention, is shown as the subjective norm in models including TRA, TAM2, TPB/DTPB, and C-TAM-TPM, social factors in MPCU and image in IDT. Two constructs, subjective norm and image, are related to social influence (IDT). Social interaction is also deemed to be significant in influencing technology use. Social influence is measured by subjective norms and image. Subjective norms are defined as "a person's perception that most people who are important to him think he should or should not perform the behaviour in question" (Ajzen and Fishbein, 1975).

Subjective norms are based on normative beliefs about referent others and the motivation to comply with referent others (Davis *et al*., 1989). On the other hand, Everett (1995) stated that status/image gain is one motivation for individuals to adopt an innovation while Venkatesh and Davis (1989) revealed that the influence of subjective norms on image was a significant measure of

system use. In the context of Windows adoption, Karahanna *et al.* (1999) found that post-adoption attitude was related to the instrumentality of beliefs of usefulness and the perceptions of image improvement. Similarly, David *et al.*, (2000) stated that a significant number of managers opted for email and, through its use, related messages to their subordinates concerning media style and individual identity.

Research has indicated social impact associates with the convictions of some people about others (Lee *et al.*, 2007). Also, social effects have long been proven to be an immediate determinant of a user's inclination to use modern technology (Venkatesh *et al.*, 2003). A large number of researchers have proven the benefits of social effects on psychological leanings towards M-learning. For instance, Gupta *et al.* (2008) discovered an important link between social effects and personal inclination to use ICT. AlAwadhi and Morris (2008) have proven that peer pressure has a vital effect on the intention of usage on an individual as well. Moreover, Shafi and Weerakkody (2009) discovered that social surroundings had a profound impact on the intention to use Qatari E-Government services. Thus, students are often inclined to adapt the M-learning system when their peers use it too.

Following the literature review on social influence, the current study deems it fit to introduce social influence as a predictor into the Delone and McLean (1992)'s model. Hence, it is theorized that social aspects serve as determinants in defining the source of a large portion of the variance in net benefits of the application of M-learning.

Based on the above exposition, this study aims to look into the applicability of the Delone and Mclean's model and inclusion of social factors that can shape the successful implementation of M-learning among varsity students in Jordan and then propose the following research framework (Fig. 2).

In consideration of the above exposition and the frame work of this study, the followings are hypothesized:

- H_1: There is a positive relationship between social impact and user satisfaction with respect to the use/usage of M-learning systems in the selected Jordanian universities
- H_2: There is a positive relationship between social impact and intention to use/usage of M-learning systems in the selected Jordanian universities
- H_3: There is a positive relationship between information quality and user satisfaction with respect to the use/usage of M-learning systems in the selected Jordanian universities

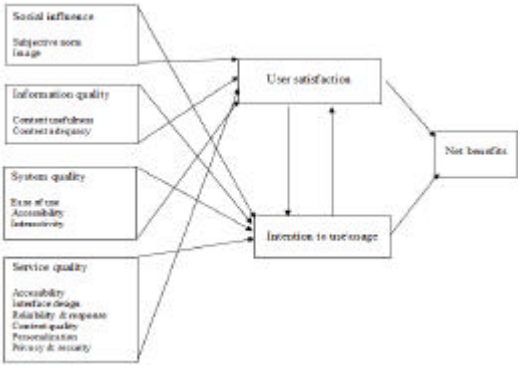

Fig. 2: Research framework

- H_4: There is a positive relationship between information quality and intention to use/usage with respect to the selected Jordanian universities
- H_5: There is a positive relationship between system quality and user satisfaction with respect to the use/usage of M-learning systems in the selected Jordanian universities
- H_6: There is a positive relationship between system quality and intention to use/use with respect to the use/usage of M-learning systems in the selected Jordanian universities
- H_7: There is a positive relationship between service quality and user satisfaction with respect to the use of M-learning systems in the selected Jordanian universities
- H_8: There is a positive relationship between service quality and intention to use/usage with respect to M-learning systems in the selected Jordanian universities
- H_9: There is a positive relationship between intention to use/usage and net benefit with respect to the use/usage of M-learning systems in the selected Jordanian universities
- H_{10}: There is a positive relationship between intention to use/usage and user satisfaction with respect to the M-learning systems in the selected Jordanian universities
- H_{11}: There is a positive relationship between user satisfaction and net benefit with respect to the use/usage of M-learning systems in the selected Jordanian universities
- H_{12}: There is a positive relationship between user satisfaction and intention to use/usage with respect to M-learning systems in the selected Jordanian universities

MATERIALS AND METHODS

Cross sectional survey method is the approach of this study. Research design in this study implies a

procedure through which data is collected and analyzed in order to test the proposed hypotheses. The survey instruments were of two parts: demographic information of the respondents and the variables' instruments prepared to elicit information. The respondents were given 1-5 options for each response using five point Likert scale: Strongly Disagree (SD); Disagree (D); Neither agree or disagree (N); Agree (A) and Strongly Agree (SA). The Cronbach's alpha values of the variables of the study were within the range acceptable for social science studies.

The population of the study comprises of 144,571 students of five Jordanian public universities who are familiar with mobile learning services. Systematic random sampling technique was used to sample the population because itavoids sampling bias as it gives individual elements in the population an equal chance of getting selected based on probability. Underpinned by Krejcie and Morgan (1970) and the fact that large sample could be generalized to the whole population (Hair *et al*., 2006) 768 samples were selected from the entire population of this study. A set of 768 questionnaires were dispatched in person to the selected respondents, however 431 questionnaires were retrieved back. 320 were undelivered while 17 questionnaires were not filled up properly, thus removed from the final analysis. Therefore, only 431 responses, representing 56%, were used for the final analysis.

The data collected were analysed using SPSS version 18 which was used to check the nature of data, smart PLS 2.0 m3 software packages and 2-steps approach as suggested by Chin (1998) was adopted to obtain valid and reliable results. The stage one entails validity and reliability of the measurement model. The second stage involves structural model which entails R2 values for the latent variables in the model (Chin, 1998); sign, magnitude, and significance of path coefficients (Henseler, *et al*, 2009); effect size (f2) of predictor variables and predictive relevance of the model (Q2), using blindfolding (a sample reuse estimation technique that excludes every dth data point to predict the excluded portions of the data) to obtain cross-validated redundancy measures described by Stone (1974) and Geisser (1974).

RESULTS AND DISCUSSION

Descriptive analysis: The descriptive analysis with regards to mobile usage indicates that mobile phones are adopted for class lecture, assignments and examinations. The overall result indicates that 100% of the respondents used mobile. Moreover, the mean values for the variables ranged between 3.61 and 3.93 while the standard deviation of the variables ranged between 0.38 and 0.78.

Measurement model: To confirm the internal consistency reliability, convergent validity and reliability and discriminant validity, measurement model analysis was conducted.

Based on the Table 1-3, results of the measurement model analysis revealed significant ($p<0.01$) loadings for all reflective indicators. However, 4 items from service quality, 1 item from information quality, 3 items from system quality and 5 items from net benefit fell below the threshold of 0.7 (Valerie, 2012) and were all removed from subsequent analysis. All remaining items showed satisfactory loadings ranging from 0.711-1.000, and composite reliability scores ranged between 0..768 and 1.000 (Hair *et al*., 2011; Valerie, 2012). Thus, indicating good convergent validity. The Average Variance Extracted (AVE) values of the reflective scales ranged between 0.524 and 1.000 and thereby exceeding minimum requirements of 0.5 (Hair *et al*., 2011). Discriminant validity was deemed satisfactory, as each latent construct's AVE emerged greater than its highest squared correlation with any other latent construct in the model, as shown in Table 3 (Hair *et al*., 2010).

Structural model: The evaluation of structural model was based on the requirements mentioned by Chin (2010), Hair *et al*. (2013), Hair *et al*. (2011) and Valerie (2012), by considering the R^2 values, effect size (f2), predictive relevance of the model, and goodness of fit (GoF). The level and significance of the path coefficients and bootstrapping were employed to test the study hypotheses. R^2 was found to be 0.916, indicating that user satisfaction can account for 91.6% of the variance in net benefit, which is in the high range. Secondly, the R^2 value of intention to use was 0.952, suggesting that 95.2% of the variance in extent of net benefit can be explained by uintention to use. Finally, the R^2 of net benefit was 0.945, indicating that net benefit account for 94.5 % of the variance in the model, which was also in the high range.

The obtained cross validated redundancy values for information quality, intention to use, net benefit, system quality, user satisfaction, and social influence and service quality were found to be 0.374, 0.199, 0.634, 0.179, 0.572, 0.346 and 0.192, respectively. These results support the claim that the model has an adequate prediction quality. In addition, the GoF value of 0.509 was compared with the baseline values as recommended by Wetzels *et al*. (2009) (small = 0.1, medium = 0.25 and large = 0.36). The result indicated that the model's goodness of fit measure was higher than the adequate validity of the global PLS model.

Table 1: Measurement model

Construct	Indicator	Loadings	Cronbach's alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
Intention to use	IN1	0.918	0.920603	0.936752	0.680030
	IN2	0.815			
	IN3	0.839			
	IN4	0.803			
	IN5	0.748			
	IN6	0.876			
	IN7	0.764			
Net Benefit	NB6	0.814	0.789302	0.877005	0.704196
	NB7	0.815			
	NB8	0.886			
Satisfaction	EU1	0.801	0.819928	0.880681	0.649057
	EU2	0.831			
	EU3	0.843			
	EU4	0.743			

Table 2: Measurment model for the second

Model construct		Indicators	Loadings	Cronbach's alpha	Composite Reliability (CR)	AverageVariance Extracted (AVE)
Social influence	Subjective	SN1	0.898	0.775412	0.890917	0.803293
		SN2	0.895			
	Image	IM1	0.718	0.767790	0.524341	
		IM2	0.738			
		IM3	0.717			
Service quality	Accessibility	AC1	0.819	0.842702	0.804177	0.635259
		AC2	0.804			
		AC3	0.721			
		AC4	0.840			
	Interface Design	ID1	0.850		0.855286	0.597224
		ID2	0.739			
		ID3	0.741			
		ID4	0.840			
	Personalization	P1	1.000		1.000000	1.000000
	Content quality	CQ1	0.872	0.864958	0.762050	
		CQ2	0.874			
	Reliability and response	RS1	0.868	0.845317	0.732119	
		RS2	0.843			
	Privacy and security	PS1	0.943	0.861107	0.759603	
		PS2	0.743			
Information quality	Content usefulness	CU1	0.742	0.924224	0.898785	0.762050
		CU2	0.852			
		CU3	0.823			
		CU4	0.739			
		CU5	0.838			
	Content adequacy	CA1	0.811		0.897525	0.688174
		CA2	0.893			
		CA3	0.712			
		CA4	0.889			
System quality	Ease of use	EU1	0.798	0.663152	0.900969	0.646349
		EU2	0.812			
		EU3	0.711			
		EU4	0.812			
		EU5	0.878			
	Accessibility	ACc1	0.779		0.874125	0.635259
		Acc2	0.788			
		Acc4	0.712			
	Interactivity	IN2	0.945		0.900671	0.819595
		IN3	0.863			

Based on the Table 4, the proposed relationship between social influence and user satisfaction was obtained (β = -0.096, t = 1.707) and that of social influence-intention to use nexus shows high significant relationship (β = 0.397, t = 10.338).

While the nexus betwen service quality and user satisfaction was highly significant (β = 0.848, t =7.857), the nexus between service quality and intention to use was low and insignificant (β = 0.049, t = 0.556). Regarding information quality factor, there is association between it and user satisfaction of mobile learnning (β = 1.029, t = 7.012). But information quality did not show any association with intention to use (β = 0.169, t = 1.582).

Table 3: Correlation among the constructs and discriminant validity

Criteria	Intention to use	Satisfaction	Net benefit	Social influence	Service quality	Information quality	System quality
Intention to use	0.680						
Satisfaction	0.633	0.649					
netbenefit1	0.445	0.406	0.704				
Social Influence	0.413	0.538	0.397	0.631			
Service Quality	0.384	0.582	0.477	0.452	0.731		
Information Quality	0.553	0.342	0.400	0.306	0.602	0.653	
System Quality	0.651	0.414	0.618	0.406	0.310	0.530	0.693

Table 4: Structural model (path coefficient)

Relationship	Path coefficient	SE	t-value
Social→user satisfaction	-0.096	0.053067	1.707
Social→Intention to use	0.397	0.045838	10.338
information→user satisfaction	1.029	0.149218	7.012
Information→Intention to use	0.169	0.116026	1.582
System→user satisfaction	-0.521	0.093664	5.328
System→Intention to use	-0.065	0.066110	0.998
Service→user satisfaction	0.848	0.112101	7.857
Service→Intention to use	0.490	0.078901	0.556
intention to use→user satisfaction	0.612	0.059647	10.151
user satisfaction→net benefit	0.206	0.045166	5.274
intention to use→net benefit	0.776	0.038901	20.555
user satisfaction→intention to use	0.449	0.050473	8.841

The proposed relationship between system quality and user satisfaction was highly significant (β = -0.521, t =5.328), but system quality did not show any significant association with intention to use (β = -0.065, t = 0.988). Also, the proposed relationship between intention to use and user satisfaction was highly significant (β = 0.612, t = 10.151) and the proposed relationship between user satisfaction and net benefit was also highly significant (β = 0.206, t =5.274). Likewise, the proposed relationship between intention to use and net benefit was highly significant (β = 0.775, t = 20.555), so also the proposed relationship between user satisfaction and intention to use was highly significant (β = 0.449, t =8.841).

The satisfaction gained from new technology usage determines the level of IS sucesss. As defined by DeLone and McLean, a sucessful IS implemetation is characterised by high level of user satisfaction which provides the intended benefits to individuals. The result of this study indicates that social influence positively affects user satisfaction. Specifically, the responsdent of this study which are students of Jordanian university confirms that social influence actually influences their intention to use M-learning, accordingly it enhances the satisfaction gained when they use M-learning apps. This is quite reasonable because peer group influence and the need to confirm with societal pressure induce their usage of the M-learning. Student will have the incentive to consider the benefits and the convenience of the usage of M-learning for their learning purpose.

Moreover, social influence refer to the extent of influence of social environment on the intention to adopt M-learning. In a high social environment, individuals will always be concious of the perception of others towards their action. Consistent with the finding of this study, social effects have long been proven to be an immediate determinant of a user's inclination to use modern technology (Venkatesh *et al*., 2003). This finding concur with previous reseacrh and theoretical postulation (Venkatesh *et al*., 2003; Gupta *et al*., 2008; ALAwadhi and Morris 2008; Shafi and Weerakkody, 2009). This clearly indicate that in term of intention to use M-learning, social influence plays a significant role and under social influence student will accept M-learning because they want to conform with social trends in the environement. Therefore, M-learning is more likely to be sucesssful.

Regarding service quality-user satisfaction nexus, the result of this study indicates that there is a positive relationship between service quality and user satisfaction. A number of empirical findings (Barton and Sinha, 1993). Barton and Sinha (1993) have shown that service quality has a significant relationship with user satisfaction. This implies that service quality (accessibility interface design reliability and response content quality personalization, privacy and security) affect the satisfaction gained by Jordanian student in M-learning implementation. However, the result of the study reveals that service quality does not significantly affect M-learning usage among Jordanian students. These finding is consistent with the view that high-quality service does not necessarily translate to decreasing negative quality (poor service and inconsistency) but it may lead to increasing positive qualities like luxury and fun and consequently give rise to the creation of value (Al-Mushasha and Hassan, 2009; Lee *et al*., 2000; Yoo Donthu, 2001).

As for information quality, it is found by this study that it affect users' satisfaction in the context of M-learning among Jordanian student. Consistent with this findings are the findings of Iivari (2005); Wu and Wang (2006). Information quality refers to the issues relating to personalization, completeness, eases of understanding and relevance of IS (DeLone and McLean, 2003). In this study information study refers to the quality of

M-learning system which leads to student satisfaction. However, the finding of this study suggest that information quality does not affect intention to use significantly. This is consistent with earlier studies like Iivari (2005) that found that information quality is not signifcantly related to intention to use. Using technology fit, Goodhue and Thompson (1995) reported that information quality was not signinifcantly related to utilization.

Regarding the effect of system quality and user satisfaction was examined, the finding indicates that there is a positive relationship between system quality and user stisfaction. and this is consistent with previous studies findings (Devaraj *et al*., 2002). Howver, the other finding indicates non significant relationship between system quality and intention to use. This result is in agreement with earlier studies (Agarwal and Prasad, 1997; Venkatesh *et al*., 2003; Kositanurit *et al*., 2006). These studies were in different IS contexts and found that system quality does not influence intention to use IS. Venkatesh *et al*. (2003) reported a non-significant relationship between system quality and intention to use when measured three and six months after the implementation of the system.

Futhermore, this study's finding confirm the extant findings that users intention to use a new IS affect user satisfaction (Fernandez and Rodriguez, 2009). Also, this study's finding confirm the extant findings that user satisfaction affects net benefit (Iivari, 2005) found a strong association between user satisfaction and net benefits. Yoon *et al*. (1995). In the same vein, in this study, intention to use was found to have link with net benefit and thus confirm the extant findings such as Jones and Straub (2006) and Petter *et al*. (2008). Lastly, the study's finding established the effect of user satisfaction on intention to use and thus confirm the extant findings such as Rai and coauthors; Kulkarni *et al*., (2006).

CONCLUSION

This study has presented a detailed analysis of factors affecting the success of M-learning implementation in the institution of higher learning in Jordan with emphasis on social influence as a significant predictor of IS success and thusexpanding the IS success literature consistent with the model developed by Delone and Maclean within the organisation context in a developing country. This study provide a framework for higher institution of learning in Jordan to assess the success of their M-learning apps. The current study investigated the success of M-learning apps from the dimensions: social influence, service quality, system quality, information quality, user satisfaction and intention to use. Social influence is proven to be fundamental to achieving high level of success: intention to use and net benefit. Successful M-learning can satisfy users and build the country's reputation of being technological growth. Intention to use the M-learning platform is the highest level of success because the continuous usage of the M-learning will lead to long-term benefits such as improved learning condition of the student. Among the system characteristics examined, Accessibility, interface design, privacy and security are important attribute of system quality for M-learning. These indicate that M learning developers should focus on enhancing this features when designing and upgrading the M-learning application.

However, the findings of this study could be influenced by changes over time of studies variable. For instance, a change in government policies towards M-learning implementation may likely have an impact on the research variables. It has been documented that there is possibility of variance in the data collected using the same method and the same point in time. Perception of users of M-learning could vary over time and depend on policies changes. Therefore, investigation over time can provide valuable insight, hence leading to better data quality. Meanwhile, during the survey, the questionnaire was not segmented; therefore, the empirical analysis could not be tested on gender, qualification and age and computer skill. Such a detail analysis could provide further insight that could enhance the understanding of the providers of M-learning.

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