AN EXTENDED INFORMATION SYSTEM SUCCESS MODEL FOR MOBILE LEARNING USAGE IN SAUDI ARABIA UNIVERSITIES

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Abstrak

Perkembangan rangkaian 4G membolehkan m-pembelajaran menjadi lebih menarik dalam sistem pendidikan. Peranti mudah alih mempunyai potensi untuk meningkatkan ketercapaian serta kecekapan pengedaran bahan dan maklumat pendidikan. Negara-negara membangun, terutamanya di Timur Tengah, jauh ketinggalan kerana telah menghadapi kesulitan dalam pengambilan dan penggunaan m-learning. Kajian lepas menyatakan bahawa penyelidikan dalam kejayaan m-learning masih tidak mencukupi di negara-negara membangun, terutamanya di Arab Saudi di mana jumlah pelajar yang terlibat dalam m-learning juga menunjukkan peratusan yang rendah. Sembilan faktor yang mempengaruhi kejayaan m-learning digabungkan dan dinilai ke dalam model penyelidikan. Pendekatan kuantitatif digunakan, di mana soal selidik dihantar ke tiga universiti di KSA. Faktor penyumbang dan hubungan di antara mereka telah dinilai menggunakan teknik Pemodelan Persamaan Struktur. Kajian ini mendapati bahawa kualiti maklumat, kepuasan pengguna (US), kepercayaan dalam teknologi, sikap, sokongan organisasi, kepercayaan dalam organisasi, dan net faedah m-pembelajaran mempengaruhi penggunaan m-pembelajaran secara positif. Di samping itu, keputusan yang diperolehi mengesahkan bahawa kepuasan pengguna secara positif dipengaruhi oleh kualiti sistem (SEQ), kualiti perkhidmatan (SQ), dan net faedah (NB) dalam menggunakan sistem (U). Hasilnya turut menunjukkan terdapat hubungan yang signifikan antara NB dan US untuk teknologi m-pembelajaran. Kajian ini memanjangkan penyelidikan sebelumnya dengan menyediakan model konseptual untuk pelaksanaan kejayaan perkhidmatan m-pembelajaran di universiti. Kesan mediasi US ini menerangkan kesan pembolehubah bebas (IQ, SEQ, SQ) pada U. Ia juga mengkaji kesan pengantara U dalam menjelaskan pengaruh US pada NB menggunakan perkhidmatan m-pembelajaran. Penemuan kajian ini adalah berguna sebagai input untuk Kementerian Pengajian Tinggi dan pengamal lain yang berkaitan. Kajian ini membina satu model baru untuk meningkatkan penggunaan pembelajaran jarak juah di kalangan pelajar di universiti.

Kata kunci: M-Pembelajaran, Model kejayaan sistem maklumat, Net faedah pembelajaran jarak juah, Universiti-Universiti KSA

Abstract

The emergence of 4G networks allows m-learning to be attractive for educational systems. Mobile devices have the potential to enhance accessibility and efficiency distribution of educational materials and information. Developing countries, especially in the Middle East, lag behind as they face difficulties in the adoption and use of m-learning. Previous researches stated that the studies in the success of m-learning are still insufficient in developing countries, particularly in Saudi Arabia where the number of students involved in m-learning also constitutes low percentages. Nine factors that influence the success of m-learning are incorporated and evaluated into a research model. A quantitative approach was used, where questionnaires were sent to three universities in KSA. The contributing factors and the relationships between them were evaluated using a Structural Equation Modelling technique. The research revealed that information quality, user satisfaction (US), trust in technology, attitude, organisation support, trust in organisation, and the net benefits of m-learning positively influence m-learning usage. In addition, the results confirmed that user satisfaction is positively affected by system quality (SEQ), service quality (SQ), and net benefits (NB) of using (U) the system. The results also showed that there is a significant relationship between NB and US for m-learning technology. This study extends the previous research by providing a conceptual model for the successful execution of m-learning services in universities. This mediating effect of US explains the impact of independent variables (IQ, SEQ, SQ) on U. It also examined the mediating effect of U in explaining the influence of US on the NB using m-learning services. The findings of this study are valuable as input for the Ministry of Higher Education and practitioners concerned with successful m-learning services. This study constructed a new model to enhance the mobile learning usage among students in universities.

Keywords: M-Learning, Information system success models, Net benefits of mobile learning, KSA Universities.

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List of Abbreviations

AJU	Al-Jouf University
ATT	Attitude
B2C	Business to Customer
BB	BlackBoard
BLMS	Blackboard Learning Management Systems
BU	Baha University
DL	Distance Learning
DM	DeLone and McLean
DOI	Diffusion of Innovation
eG	Electronic Government
E-HRM	Electronic-Human Resources Management
EL	Electronic Learning
GPS	Global positioning system
HR	Human Resource
HU	Hail University
IAU	Imam Abdulrahman bin Faisal University
ICT	Information and Communication Technology
IMAMU	Imam Mohammed bin Saudi University
IP	institutional policy
IQ	Information Quality
IS	Information System
ISP	Internet Service Providers
IT	Information Technology
ITU	International Telecommunication Union
IU	Intention to Use
IU	Islamic University of Madinah
JU	Jazan University

KAAU	King Abdul-Aziz University
KFPUM	King Fahad University of Petrol and Minerals
KFU	King Faisal University
KKU	King Khalid University
KMS	Knowledge Management Systems
KSA	Kingdom of Saudi Arabia
KSAU	Kingdom of Saudi Arabia Universities
KSU	King Saud University
KSUHS	King Saudi Bin Abdulaziz Health Sciences University
mG	Mobile Government
MIS	Management Information System
ML	Mobile Learning
MOHE	Ministry of Higher Education
MP3	MPEG Layer 3
MU	Majma University
NB	Net Benefits
NBU	Northern Border University
NU	Najran University
OECD	Organization of Economic Cooperation Development
OS	Organization Support
PBC	Perceived Behavioral Control
PC	Personal Computer
PDA	Personal Digital Assistant
PLS	Partial Least Square
PSAU	Prince Sattam bin Abdul-Aziz university
QU	Al-Qassim University
SEM	Structural Equation Modeling
SEQ	Service Quality

SERVQUAL	Service Quality
SMS	Short Message Services
SN	Subjective Norms
SPSS	Statistical Package for Social Science
SU	Shaqra University
SYQ	System Quality
TAM	Technology Acceptable Mode
TO	Trust of Organization
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
TT	Trust of Technology
TU	Taif University
U	Use of a system
UAU	Umm Al-Qura University
UB	University of Bisha
UJ	University of Jeddah
UN	United Nations
US	User Satisfaction
UT	University of Tabouk
UTAUT	Unified Theory of Acceptance and Use of Technology

CHAPTER ONE

INTRODUCTION

1.1 Background of Study

Information and communication technologies (ICTs), as instruments of socialisation and information, are playing an increasingly important role in the advancement of society, changing human interaction and communication in an unprecedented way. According to DeLone and McLean (1992), ICTs are considered important forces that can influence the success or effectiveness of Information Systems (IS) projects. Therefore, ICTs were exploited by institutions and learning environments to provide better interactional possibilities among their students and lecturers; hence, ICTs have become one of the fundamental building blocks of modern learning institutions. Therefore, the advancement of ICTs has an important role in the learning environment, such as higher education institutions (Livingstone, 2012).

According to Stead (2005), the use of ICTs has had an impact on all aspects of the education system. Adopting technology would be the key to improve services and promote better teaching and learning environment, which leads to fierce competition among universities in the developing countries and in the world (Fusilier & Munro, 2014; Sammalisto & Brorson, 2008). Therefore, universities are adjusting their strategies in line with students' needs, expectations, and welfare (Sánchez Prieto et al., 2014). When universities attempt to update technology to improve their students' skills and experiences, it will, in turn, reflect the stability of such institutions in the scene of the global competitive educational system, which enables them to move towards the trend of new knowledge (Barone, 2011; Szucs, Devin, Soltesz, Nobes & Gabriel, 2013; Seale, Georgeson, Mamas & Swain, 2015). Therefore, many education institutions (such as universities) are spending large amounts of money in an attempt to establish and maintain information systems with the exploitation of modern ICTs (Glood, 2017).

Since the early 1990s, e-learning initiatives across the world were supported by information communication technologies (ICTs) and its rapid growth. ICTs have provided different communication opportunities for students to connect to teachers and foster the growth of problem-solving and higher thinking (Nykvist, 2008). E-learning uses wired networks technology to enhance the delivery of information and services to benefit students and stakeholders with the minimum amount of cost and effort through a single informational website or a platform on the Internet (Odat, 2012).

Moreover, since the beginning of the century, wireless and mobile technologies have materialised as a mainstream venue of communication for both the private and public sectors. The International Telecommunication Union (ITU) reported continuous growth in the use of ICTs. This, in turn, resulted in an increase in the companies that offered their services or applications on mobile devices or on the internet (ITU, 2013a; 2013b). Today, many education institutions have adopted these sophisticated mobile technologies to enhance their performance and provide efficient services and information to their students and lecturers. This phenomenon, which is known as Mobile Learning, is not a direct replacement to the e-learning platform, but instead is meant to complement the service. Wireless and mobile technologies, which serve as channels for accessing learning services, were an area of critical concern for many education organisations. The transition of e-learning to m-learning was made possible due to the emergence of mobile technologies, such as better mobile devices, wireless capabilities, and high bandwidth (Triantafillou, Georgiadou, & Economides, 2006). In developing countries, exploiting mobile technology is considered as the optimal option to provide learning services and information to their students and lecturers (Fadhil, Osman, Nather, Al-Saadi & Al-Khafaji, 2014; Georgescu, 2010). Therefore, many universities have tried to exploit wireless and mobile technologies to interact with students, lecturers, and other stakeholders (Al-Hujran, 2012). Just like e-learning, which was formed for the universities and other institutions to provide students with information and services online, m-learning has emerged as another useful and effective resource (Al-Hujran, 2012). However, Abdelghaffar and Magdy (2012) and Napoleon and Bhuiyan (2010) asserted that, although several studies of e-learning were conducted in developed countries, little is written about m-learning in developing countries. Similarly, Hameed, Shukur, Al-khafaji, and Al-Farhan (2014) stated that m-learning studies remain insufficient in developing countries.

M-Learning is the latest technique to deliver services and information accessibility at the universal level for students, lecturers, and other institutions by wireless and mobile technologies (Al-Masaeed & Love, 2013). M-learning may be a more appropriate mode of learning in certain countries where mobile device usage may be more prevalent than Internet access (Fadhil et al., 2014; Georgescu, 2010; ITU, 2013a, 2013b). Technologies developed for mobile devices allow users to access information in areas or regions where Internet may not be possible. Therefore, M-learning enhances institution performance by delivering information and services to students, lecturers, and stakeholders efficiently and economically (Chatterjee et al., 2009; Mengistu, Zo, & Rho, 2009).

As M-learning continues to grow, several colleges and universities have gotten on board to support further development in m-leaning, such as the improvement of learning materials and administrative support (Georgieva, Smrikarov & Georgiev, 2005). In general, M-learning sought to improve flexibility by allowing students to study whenever and wherever they choose (Rekkedal and Dye, 2007). Previous studies found that m-learning functions should be available adequately (Sarrab & Alnaeli, 2016; El-Hussein & Cronje, 2010). Furthermore, Liu and Han (2010) stated that m-learning allows students and teachers to obtain different skills and knowledge. According to Mobil Learn Consortium (2006) and McLean (2003), the purpose of M-learning is to aid in the production, delivery, and tracing of materials and information that support learning.

Despite the fact that e-learning did not meet the projected figures of usage, many believe that m-learning has the potential to overcome the known limitations of its predecessor (Jiang, 2009; Williams, 2009; Ying-Feng & Ling-Show, 2004).

Based on the findings of Ntaliani et al. (2008), the many benefits of mobile-based learning include the ease of use, real-time delivery of information and knowledge, the flexibility to learn without restrictions to time and location, and the ease of management. In addition, m-learning can be improved rapidly without being restricted by bureaucracy (Ndou, 2004). However, m-learning services must be optimised to gain all the rewards of m-learning (Accenture, 2003). Improper usage of m-learning may lead to several disadvantages, such as dissatisfaction and low usage. Thus, for m-learning to be successful, it is critical that m-learning services are used at a maximum level.

However, regrettably, the use of m-learning services in school systems in developing countries has, in general, been far less successful than initially hoped (Abdelghaffar & Magdy, 2012; Al Thunibat, Zin, & Sahari, 2011; Alrazooqi & De Silva, 2010; Mahmood, 2013; Mengistu et al., 2009). There are several challenges and barriers that hinder the implementation of m-learning initiatives. Saudi Arabia, in particular, is one of the developing countries where many universities have invested large sums of money for the implementation of m-learning initiatives. According to the report published in 2014 by the Ministry of Economy and Planning, the government spending on higher education has increased during the last years (2008-2012), to reach 59.9 billion riyals in 2012, which represents an increase of 27.72 percent from 2012. However, it has experienced a lower rate of use/adoption of ICT services by students and lecturers (Al-Dabbagh, 2011; Faaeq, 2014; Faaeq et al., 2013; Younus, 2014; AlAlhareth, 2014; Alkhalaf, 2014; Bellaaj et al., 2015; Sarrab & Alnaeli, 2016). Therefore, although m-learning services provide numerous benefits to Saudi students, regrettably, the utilisation and adoption of m-learning services are still low.

According to Accenture (2003), and Andersen and Henriksen (2006), the realisation of the net benefits of using IS services is critical for IS success. The provision of IS services alone does not guarantee the usage if the net benefits are not recognised. Thus, if the net benefits of using m-learning services are not effectively communicated to students, it may result in low utilisation and, ultimately, lead to the failure of m-learning systems. Moreover, Vuolle (2011) emphasised that there is a considerable need to examine the benefits and impacts of the services that used mobile and wireless technologies as a platform.

In general, the adoption phase is where all the benefits of novel technologies are revealed. Realising the net benefits depends on the users' satisfaction and usage (Bhattacherjee, 2001; Delone & McLean, 2003). A technology or system is considered to be a success when a large quantity of consumers adopt and use the technology regularly (Accenture, 2003). Comparing the individual's expectations after actual use with the individual's initial expectations can lead to user satisfaction and realisation of the net benefits, which, in turn, leads to increasing the adoption rate for the new technology/system (Bhattacherjee, 2001). Continued usage of a technology is a good indication of customer satisfaction. Likewise, customers can be considered dissatisfied if they stop using the systems.

The obvious determinant of users adopting new technologies is the balance of costs and benefits of adoption. Therefore, for users to adopt an information system (IS), the user must receive net benefits for using the technology. Consequently, the successful implementation will depend largely on the amount of benefits that users obtain from using the system (Bhattacherjee, 2001; Delone & McLean, 2003; Seddon, Staples, Patnayakuni & Bowtell , 1999).

In relation to this, many researchers have attempted to quantify the level of IS success (Chatterjee et al., 2009; Teo, Srivastava, & Jiang, 2008). However, according to Abdelghaffar and Magdy (2012) many research has covered the adoption of e-learning but not m-learning services; therefore, research that evaluate m-learning success in developing countries is relatively limited.

The success of information systems was assessed with the introduction of a framework by Delone and McLean (2003). This comprehensive framework looked at a number of aspects, particularly system quality, service quality, and information quality. The researchers believed that the updated D&M IS success model was an appropriate tool to evaluate various factors and how it impacts the benefits of m-learning services. However, this model reflects only the technology aspect. Prior literature such as Algharibi et al. (2012) and Dadayan and Ferro (2005) stated that to explore reasons that lead to the failure of any electronic project, the researcher must understand the socio-technical dimensions.

1.2 Problem Statement

There are many possible uses and limitation for mobile technologies. As with most companies these days, educational settings, such as colleges and universities, provide wireless networks for students and teachers. This allows students and lecturers to interact, regardless of the time and place, as well as to access information. The popularity of mobile devices, including smart phones, have risen rapidly, as young adults take advantage of the ease of these devices for transactions or knowledge gathering.

However, students need to access information or communicate with others even when they are off-campus (Al-Zaza & Yaakub, 2011) where a wireless network may not be available. With traditional e-learning, students would need to access the Internet through desktop computers. The advantage of mobile technology is that access to the Internet is possible without a physical connection. This creates yet another way for students to access educational aids or documents (Al-Zaza & Yaakub, 2011). As a result, many have begun to look at mobile devices as extensions of the desktop computer with potential for use in the educational system (Anohah, Oyelere & Suhonen; 2017).

In most of the developing countries, the adopting process of new technologies is slow (Avgerou & Walsham, 2017; Ramdhani et al., 2017). The application of services in teaching environments via mobile devices is a challenge for all countries, especially developing countries, which face several barriers, such as insufficient infrastructure, political instability, corruption, technology issues (service or system quality), and lack of confidence in network security (Nguyen et al., 2017; Ramdhani et al., 2017). However, despite those barriers, most of the learners and lectures in developing countries are familiar with mobile devices (Al-Taie & Kadhim, 2013). Furthermore, Hameed et al. (2014) confirmed that the number of smartphone users in developing countries is among the highest worldwide. Therefore, most of education institutions have attempted to exploit mobile and wireless technologies to allow for m-learning (Alrasheedi & Capretz, 2018; Grenier, 2018). M-learning can be seen as a progression from electronic learning, except that information and services are accessible at a convenient time and place to the user.

Despite this positive trend, the utilisation of m-learning services in developing countries is low when compared to alternative forms of learning (Alkhalaf, 2014; Bellaaj et al., 2015; Rekkedal & Dye, 2007; Sarrab & Alnaeli, 2016; Wang, Wu, & Wang, 2009; Yordanova, 2007). M-learning services remain a challenge for developing countries and their school systems, and there are limited studies that have evaluated the influential factors of such use (Al-Hujran, 2012; Hameed et al., 2014; Hsin et al., 2016; Khudhair, 2016; Yfantis et al., 2013;). For m-learning to be successful, the factors that may lead students to be unmotivated to use the technology should be addressed. As such, it is critical to understand the factors that make m-learning adoption and implementation successful, especially in universities and colleges. According to Al-Zaza & Yaakub (2011), m-learning allows for the portability of learning so that activities can be both interactive and collaborative. M-learning is also an effective venue for group projects, and is able to enhance collaboration and communication, even outside of the classroom.

In line with the aforementioned above, Saudi Arabia, a developing country, is a strong proponent for adopting m-learning in the education system. Its successful adoption can be credited to the work of The Saudi Ministry of Higher Education, which accepted and pushed for universities to integrate ICT into the curriculum (Abu-Al-Aish & Love, 2013). The Ministry of Higher Education has invested large sums of money into implementing m-learning initiatives. According to a report published in 2014 by the Ministry of Economy and Planning, the government spending on higher education has increased during the last years (2008-2012), to reach 59.9 billion riyals in 2012, which represents an increase of 27.72 percent from 2012, which was 23.41 billion riyals in 2008. In addition, it is estimated that Saudi Arabia's e-learning market will increase to $670 million by 2014, a growth of approximately 33%. Despite this, the use of m-learning is still persisting (AlAlhareth, 2014; Alkhalaf, 2014; Alshwaier, Youssef & Emam, 2012; Bellaaj, Zekri, & Albugami, 2015). Alenezi et al. (2010) showed that the percentage of students involved in online courses in Saudi Arabia constitute low percentages. The low students' involvement in online courses in Saudi Arabia is unexpected (Hashem, 2014). Reasons behind these are yet to be understood.

Furthermore, an interview was conducted by the researcher with Dr. Hashem Al-Atas (Culture Attaché for Higher Studies and Academic in Saudi Embassy) on May 22, 2014. He asserted that, despite the high amount of money spend in the utilisation of m-learning in Saudi universities, the latest survey indicated that only 30% of the students use m-learning systems, which was unexpected (Abachi & Muhammad, 2014). Therefore, there is a need for more explanation for this issue as a lot of investments were made on the technology designed to improve learning. This observation is in support of other research findings (Abachiand Muhammad, 2014; Alfarani, 2015; Al-Shehri, 2014; Liu & Huang, 2015; Szücs et al., 2013; Sarrab, Alzahrani, Alwan, & Alfarraj, 2014; Sarrab & Bourdoucen, 2013), which stated that many educational organisations have sought to implement m-learning projects, only to suffer from low use and adoption of m-learning services in their institutions.

According to Lui and Han (2010), m-learning still has much potential to grow. As stated earlier, a success measure of m-learning is the net benefits. In addition, higher education school systems need to understand what students need to adopt m-learning as an educational tool (Williams, 2009). Currently, very little research exists in m-learning quality, and thus, there is a lack of data available (Al-Mushasha, 2008; Al-Mushasha & Hassan, 2009; Prajapati & Patel, 2014). Specifically, there is also limited research done on the factors that lead to the adoption of mobile learning in less developed countries, which could have an impact on utilisation (Al-Qahtani & Higgins, 2013; Bellaaj et al., 2015). Therefore, there is still a lot of investigation required for successful m-learning adoption, specifically in developing countries, such as Saudi Arabia (AlAlhareth, 2014; Alkhalaf, 2014; Bellaaj et al., 2015).

Several researchers have investigated the factors that impact utilisation and implementation of m-learning technology (Al-Qahtani & Higgins, 2013; Al-Mushasha, 2008; Al-Mushasha & Hassan, 2009; Bellaaj et al., 2015; Ismail, Idrus, Ziden, & Rosli, 2010; Liu & Han, 2010; Prajapati & Patel, 2014). However, these studies overlooked the importance of net benefits (Glood et al., 2016). In one study, a human resources information system was evaluated to determine if it was effective. It was concluded that low adoption rate of IS could indicate that the users did not receive the intended benefits of the system (Hosvani and Ramezan, 2010). Similarly, Alhareth (2014) and Bellaaj (2015) asserted that low usage of online services in institutions of KSA is caused by the lack of the full realisation of the benefits of such services. Perhaps the low use of the system lead to the low benefits of m-learning services, where the effects of net benefits appear in the post-adoption phase, which is considered the backbone of m-learning success (Hsin-Hui Lin, Yi-Shun Wang, and Ci-Rong Li, 2016; Khudhair, 2016). Additionally, the provision of m-learning services alone does not guarantee continuous usage (post-adoption usage); provision should be coupled with recognition of the benefits of using m-learning (Thomas, 2008). In other words, if the net benefits are not effectively communicated to users, they might become reluctant to continue their use of m-learning services. Moreover, Alshardan, Goodwin, and Rampersad (2015) emphasised that, despite several benefits of using IS, few studies have measured the effect of these benefits on IS usage. Therefore, the current research focuses on the net benefits of m-learning technology and how it relates to the usage level.

Prior studies on IS have concentrated on pre-adoption or first-time use, whereas the post-adoption phase of IS was given less focus, although the success of IS depends on the benefits obtained in post-adoption usage, which is synonymously referred to as continuous usage (Hong, Thong & Tam, 2006; Santhanamery & Ramayah, 2012). Therefore, Fang, Chan, Brzezinski, and Xu (2006), Lain and Yeh (2011), and Muraina (2015) asserted that IS success is synonymously referred to as continuous usage. Limayem and Cheung (2008) asserted that IS success is based on continuous use, which referred to the obtained benefits of the post-adoption phase. Santhanamery and Ramayah (2012, p. 398) asserted that a system cannot be considered a success if the intended users do not use it regularly. Therefore, IS success can be defined as a system which successfully provides the users with the goals and features that it is supposed to provide (Liu, Arnett, 2000, p.24). Some researchers (Barki et al., 2007; Delone & McLean, 1992; Lucas & Spitler, 1999) measured IS success based on 'Use', while others based it on the level of 'User Satisfaction' (e.g. Battacherjee, 2001; Raymond, 1985).

This study used the interrelationships between 'Use', 'User Satisfaction', and 'Net Benefits' constructs as indicators of the success of m-learning. The implication is that if m-learning system has positive benefits to users, it must be used and creates satisfaction among users, and therefore, it will be successful. Therefore, researchers have stressed that the benefits of IS are critical due to its ability to ensure IS success (Attaran, 2012; Bhattacherjee, 2001b; Delone & McLean, 2003; Karahanna et al., 1999; Reyes & Jaska, 2007). Therefore, these gaps illustrate the need to address the factors that influence the success of IS, which could encourage continuous usage among student's in different areas of developing countries (Zhang et al., 2006).

Moreover, Srithar & Selvaraj (2015), Chounta, Manske, Hoppe, (2017) and Arambewela (2008) recommended that there is more need for further examination for the trust factor in future studies, because the trust variable is an important variable that influences student satisfaction towards M-learning. Therefore, this study incorporates the trust factor as often students and staffs do not trust the system (Maele & Houtte 2011). Thus, they prefer to meet face to face rather than trust the system. A study conducted by Abdelghaffar, Kamel & Duquenov (2014), which aimed to study citizens' engagement with their communities and with e-government in Egypt, recommended that further research focus on evaluating how trust plays a role in the adoption of new technology.

Other factors were identified as being crucial to the information system's success, including organisation support (Liu, Huang, & Lin, 2012). Organisation support underscores the strategic involvement and commitment from the senior management, while organisational culture refers to manner in which members of an organisation behave and the general understanding of the behaviour within the organisation. It may include important concepts, such as vision, values, norms, systems, beliefs and assumption. Besides that, Liu *et al.* (2012) discovered that top organisation support is positively correlated to system quality, which could give explanation for the student satisfaction towards M-Learning. Some researchers believe that offering m-learning courses may attract students to their schools (Park, Nam and Cha, 2012). Therefore, this study considers these variables as important variables that could determine the success M-learning in Saudi universities.

Better knowledge of the factors that lead to the success of m-learning may lead to more development in this field, particularly in a higher education environment. Based on Algharibi et al., (2012) and Dadayan and Ferro, (2005), the success of system implementation depends on system characteristics, user characteristics, and environment characteristics. The current research uses the DeLone and McLean updated model from 2003 as an underlying theory to evaluate m-learning success in higher education environment. Three categorical factors were tested. These factors were Technology factors, such as service quality, systems quality and information quality, Social factors, such as norms, Attitude, Perceived Behavioural Control, and trust, and institutional factors, such as organisation support, and institutional policy.

Therefore, this research uses the updated D&M as main theory, and added factors from the literature, such as Social factors (subjective norms, and trust), and institutional factors (organisation support, and institutional policy) to evaluate the influences of use of m-learning in the Saudi universities. Therefore, the purpose of this study is to primarily evaluate the success of m-learning systems based on the net benefits, and to identify the factors that influence utilisation, net benefits, and user satisfaction that can serve as determinants of m-learning services success amongst students in universities in developing countries.

The practical application of the D&M model is naturally dependent on the organizational context. The researcher intending to apply the D&M model must have an understanding of the information system and organization. This will determine the types of measures used for each success dimension. The selection of success dimensions and specific metrics depend on the nature and purpose of the system(s) being evaluated. For example, an e-commerce application would have some similar success measures and some different success measures compared to an enterprise system application. Both systems would measure information accuracy, while only the e-commerce system would measure personalization of information. An information system that is managed by a vendor will measure the service quality of the vendor, rather than of the IS department. The D&M model is applicable in a variety of contexts; however, the limits of the model are not well-known or understood. This research examines one of the potential boundary conditions for the model and identifies areas that warrant additional attention. This model content of additional factors that are expected to solve the problem related. The need to add institutional and social factors for the context of developing countries, particularly in KSA, where rules need to be followed.

Finally, this research anticipates that the model proposed in this research will further current research and knowledge by integrating factors that were not investigated previously, such as socio-technical dimensions (organisation support, institutional policy, subjective norms, perceived behavioural control, attitude, trust of technology, trust of organisation), that influence utilisation, user satisfaction, and the net benefits of m-learning services

1.3 Research Questions

In line with the problem statement, the current research focuses on the following questions:

- **i.** What factors influence m-learning usage among students in universities of KSA?
- **ii.** What factors influence students' satisfaction to use m-learning in universities of KSA?
- **iii.** How do the net benefits influence the use of m-learning among the students in universities of KSA?
- **iv.** To what extent does use of the m-learning mediate the relationship between user satisfaction and the net benefits of m-learning services in KSA?
- **v.** How to develop the model that explains the m-learning usage among students in universities in developing countries?

1.4 Research Objectives

Objective of this study is to create an appropriate model of use for mobile learning in higher education institutions in developing countries.

The sub objectives are as follow:

- **i.** Identify what factors influence m-learning usage among students in KSA.
- **ii.** To identify the factors that influence students' satisfaction to use m-learning in universities.
- **iii.** To evaluate the influence of net benefits towards the use of m-learning among students in universities.

iv. To analyse the role of use of system as a mediator in the relationship between student satisfaction and net benefits of m-learning services.

v. To develop the model that explains the m-learning usage among students in universities of developing countries.

1.5 Research Scope

Most of the existing research in the literature related to m-learning success falls into two main streams focusing on either the provider or the user side. The first stream addresses m-learning success from the perspective of the provider (university), focusing on interests and opinions at the management/organisational level, such as return on management, return on investment, system availability, cost savings and sales growth (Seddon, Graeser, & Willcocks, 2002). The second stream addresses m-learning success from the users' perspective (students), focusing on the final users and their opinions of m-learning usage and the benefits that can be derived from using m-learning services.

The main reason for selecting KSA is to fill the research gap as most studies concerning m-learning services were conducted in developed countries. Khan et al. (2010a, 2012) and Lee (2003) called for further research of IS in countries, including KSA. This research selected KSA as a setting to re-evaluate the IS success model proposed by D&M. Moreover, this research investigates the influencing factors behind the success of m-learning in universities, by evaluating students of KSA's universities that only used the platform BlackBoard of M-learning.

The current research proposes a model established by Delon and Mclean (2003), which encompasses the extent of mobile learning use and net impact in KSAU using the platform BlackBoard of M-learning. The study will be conducted in the Kingdom of Saudi Arabia. The students of the SA universities in the main campus will be selected as these are the locations where the implementation of the new technology will be started. However, not all of the SA universities are using the BlackBoard of M-learning. Therefore, this study selected the universities that use BlackBoard of M-learning in the different states of Kingdom of Saudi Arabia (KSA). However, several universities in KSA use the BlackBoard of M-learning. Due to the large-scale search, and geographical distances and high cost, 3 universities in SA were chosen that used BLMS in various regions to cover Saudi Arabia Universities that use BlackBoard of M-learning. The following universities were chosen: King Saud University, King Abdul-Aziz University, and King Faisal University (Ali Mohammad Al-Asmari, M Shamsur Rabb Khan, 2014; Abdulaziz Aljabre, 2012). These three universities have similar vision and mission statements, and have similar goals in providing m-learning courses to students. This research will distribute the questionnaire to their students in the generic programmes.

The reasons behind selecting these 3 universities are listed below:

1) These universities are considered as the first of the 3 universities that seek to implement Mobile technologies among their students. The mean purpose of the present study is post-implementation not pre-implementation.

2) Selecting these universities will reflect various viewpoints because the students come from different provinces in the Saudi Arabia.

3) Finally, the educational structural process in universities in Saudi Arabia, particularly in the public universities, is homogeneous. Thus, choosing these 3 universities is considered sufficient.

1.6 Significance of the Study

Currently, mobile devices and mobile technology seem to be a way of life. Mobile phones are used regularly to gather information or to communicate with one another. As mobile technology continues to grow, universities have recognised that this technology can be used as a learning alternative.

This study has the potential to provide essential information to universities that can help them in the successful implementation and execution of m-learning. In addition, this study attempts to elucidate the factors that impact m-learning success, particularly in Saudi Arabia universities. Understanding these factors may make implementation of m-learning easier and more successful. The knowledge obtained from this study will aim to answer the research questions posed earlier, which may ease the transition of universities from conventional methods of learning to m-learning.

This study also attempts to provide helpful suggestions that may encourage students to use m-learning systems. These findings will also be beneficial to the Ministry of Higher Education so that improvements to m-learning courses can be made that can better engage students by considering these factors for future system development.

This study also attempts to build on previous theoretical models by including other factors that may influence m-learning success. Improving the current model may be beneficial to universities in implementing m-learning services successfully in the future.

In the literature, the majority of the studies concerning m-learning services were based in developed countries. However, a distinct lack of research on m-learning services in developing countries, such as KSA, exists (AbuSneineh and Zairi 2010; Al-Nefaie 2015; Taha, 2014). Therefore, the current study adds new information to the existing literature by re-examining the Updated D&M model with the incorporation of organisational support, institutional policy, trust of technology, trust of the organisation, Norms, attitudes, and perceived behavioural control into a single conceptual model. It is anticipated that the present study will be considered among the pioneer studies that evaluates the success of m-learning among students in KSA.

Moreover, the current research is also expected to provide evidence that user satisfaction has a mediating effect between SQ, SEQ, IQ and the Use of m-learning. Unlike other studies, this research will directly evaluate the relationships between the organisational support, institutional policy, trust of technology, trust of organisation, norms, attitude, and perceived behavioural control factors and the Use of m-learning.

This research will endeavour to fill the gap in the existing knowledge as there is limited literature on the success of m-learning services in developing countries, such as KSA (Fadhil et al., 2014; Shareef et al., 2010). Therefore, this study is expected to help academics who are interested in investigating the status of m-learning services in developing countries and particularly in KSA. Moreover, although m-learning was already implemented in Saudi universities, it is still in the early stages and has not yet been evaluated (AlAlhareth, 2014; Alenezi et al., 2010; Alkhalaf, 2014; Hashem, 2014). Hence, there is a need to measure the effectiveness of m-learning services and evaluate m-learning success in Saudi universities. This is in line with Alhendawi and Baharudin (2014a) who argue that for any information system launch, evaluation of the IS is important to ensure future sustainability and success of any development project.

Moreover, this study extended the data analysis methodology by using HTMT (Heterotrait-monotrait ratio of correlations) technique to validate the model. According to Voorhees, Brady, Calantone and Ramirez (2016), HTMT is more comprehensive and less constrained test of discriminant validity for researchers doing PLS-SEM. As well as, Ab-Hamid, Sami and Sidek (2017) stated that, Fornell and Larcker criterion and the assessment of the cross-loadings are inadequately sensitive to detect discriminant validity when compared with Heterotrait-monotrait (HTMT) criterion. Ab-Hamid et al, also added that, HTMT criterion has high sensitivity and specificity in detecting discriminant validity problems and more empirical study is needed to use this approach.

1.7 Operationalization Definitions

The following definitions can help the readers to understand this study more clearly.

Blackboard learning management system: a comprehensive technology platform for teaching and learning, community building, content management and sharing. Instructors direct students through a learning path focusing on fundamentals and learning objectives

Higher education: education provided by developing government universities, vocational institutions, community colleges, and Teachers' colleges.

Mobile-Learning: the employment of various types of mobile or wireless technologies, e-learning with mobile device, apps, and devices that improve and enhance the delivery of services and educational information to all parties concerned, including students, lecturers, and all education institutions (Bassara, Wisniewski & Zebrowski, 2005; Nassuora, 2012).

Mobile Learning success*:* the extent to which the m-learning system achieves the net benefits that have an effect on usage and satisfaction of user (Liu, Arnett, 2000).

Mobile Devices: electronic devices that are used for making mobile telephone calls over a large geographic area and are served by various public cells, thereby allowing the user to be mobile (Rasul, 2011).

Mobile Technology: technology which is portable in the sense that it can be shifted from one place to another very conveniently, and cost effectively (Junior, Batista & Pereira, 2008).

Quantitative Research: an empirical research to study natural phenomena where the data are in the form of numbers to test the hypotheses that were developed based on theory and data collected (Al-Hadidi, 2010 & Creswell, 2009).

Structural Equation Model (SEM): a group of methods that integrate aspects of factor analysis and regression. SEM is an effective way for researchers to evaluate various relationships between latent variables and measured variables simultaneously (Hair, Hult, Ringle, and Sarstedt, 2014).

Partial least squares (PLS): a technique of latent variable modelling that incorporates several dependent constructs and clearly recognises the measurement error, and it can be utilised for confirmation or development theory (Chin, 1998; Karim, 2009).

Smart-PLS: a software application that can be used to created SEMs. Typically, partial least squares (PLS) are used to create and develop SEMs (Hansmann and Ringle, 2004).

Net Benefits: group all the "impact" measures into a single impact or benefit category (Delone and Mclean, 2003).

User Satisfaction: subjective assessment of the various consequences, evaluated on a pleasant and unpleasant continuum (Delone and Mclean, 2003).

Intention / Use: an attitude, whereas "use" is a behavior (Delone and Mclean, 2003).

Information Quality: refers to the quality of personalization, currency, relevance, reliability, completeness, easy to understand and secured for (to gain user's trust when conducting transactions via the internet) (Delone and Mclean, 2003).

System Quality: refers to the quality of (usability, availability, reliability, adaptability, and response time) (Delone and Mclean, 2003).

Service Quality: the overall support delivered by the service provider, applies regardless of whether this support is delivered by the IS department, a new organizational unit, or outsourced to an Internet service provider (ISP) (Delone and Mclean, 2003).

Attitude: a component of an individual's belief towards certain behaviour and the outcome assessment that results from the specific act (Ajzen, 1991).

Subjective Norms: refers to the perceived social pressure to perform or not to perform the behaviour (Ajzen, 1991).

Behavioural Control: refers to a specific behavioral context and not to a generalized predisposition (Ajzen, 1991).

Trust of internet (or Technology): an individual's trust in the technology through which electronic transactions and information exchange are executed, the internet (Lee and Turban, 2001).

Trust of organization: an individual's trust in the government agency providing an online service to protect privacy and ensure security (Lee and Turban, 2001).

Organizational support: refers to the degree to which an individual believes that an organizational infrastructure supports the use of PCs (Thompson, Higgins and Howell, 1991).

Institutional policy: any course of action (or inaction) relating to the selection of goals, the definition of values or the allocation of resources (Codd, 1988).

1.8 Organisation of the Thesis

The core aim of the research is to present a comprehensive summary of the appropriate information with regard to the evaluation of the success of m-learning services, and review the current and proposed models and theories of IS success. Therefore, this research includes six chapters, which will be laid out as follows:

- ***Chapter One:*** Chapter one introduces the topic and presents a summary of the literature. This section also provides the reasoning and explanation for choosing an education environment as the setting for m-learning success. Chapter one also provides background information, the research questions, potential study contributions, and an overview of how the study will be laid out.
- ***Chapter Two:*** Chapter two reviews the background and provides descriptions of m-learning, the potential benefits of m-earning services, m-learning services worldwide, m-learning services in KSA, previous studies on m-learning, assessing information systems, and the current models that researchers use to evaluate the success of IS. This section also provides a summary of previous research conducted in several countries. Moreover, this chapter details the theoretical framework that was used in the current study.
- ***Chapter Three:*** Chapter three provides a detailed review of how the study was conducted and the research methodology.
- ***Chapter Four:*** this chapter reviews the results obtained after analysis of the data. Chapter four provides a detailed description of the sample population and descriptive results.
- ***Chapter Five:*** Chapter five reviews the conclusions and their implications towards attaining the research objectives.
- ***Chapter Six:*** Chapter six highlights the research contribution, lists the research limitations, provides recommendations for the direction of future research, and presents the conclusion of the thesis.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Chapter One has specified the problem statement, research questions and objectives. This chapter contains a review of all previous research studies from the perspective of the net benefits, and elucidate the various factors that can impact m-learning usage, net benefits, and user satisfaction. This chapter is subdivided into several sections. Section 2.1 reviews m-learning in general, including several definitions of m-learning, and the benefits and challenges associated with m-learning. Section 2.2 discuss the status and the current situation of m-learning in KSA. Section 2.3 discuss m-learning services in developed and developing countries, with a particular focus on KSA. Section 2.4 contains the phases of IS usage. Section 2.5 present various IS success models, after which a discussion concerning the updated IS success model by Delone and Mclean follow in the next section. Section 2.7 reviews the factors that may have had an impact on the success of IS. A discussion of the limitations in previous literature follow in Section 2.8. Section 2.9 concludes with a chapter summary.

2.2 Mobile Learning (M-Learning)

The use of mobile and wireless technology has enabled the learning environments in universities to expand to locations that are off-campus (Ferreira et al., 2013). The rise of ICT has allowed both students and teachers to communicate and obtain knowledge at a place and time that is convenient for them. This ability to learn remotely has redefined the classroom space (Abachi & Muhammad, 2014).

Although many believe that m-learning began with the rise of mobile devices, the book is the first tool used by m-learning (Ferreira et al., 2013). Mobile devices and technology have made m-learning easier and more accessible, as it is now possible to get information from numerous resources at the tips of your fingers. It is estimated that the current limitations of mobile devices will be overcome, making m-learning more mainstream across the world.

Mobile learning allows students to learn without having to be present at a particular time and place. It may also be a mode of learning for students that do not perform well in traditional educational settings. In the next section of this chapter, studies on mobile learning will be detailed and discussed.

2.2.1 M-Learning vs. E-Learning

There are many studies on e-learning and m-learning, and many classifications of mobile learning. While some researchers define mobile learning based on the technology, some scholars focus on the method of learning or social factors (Rheingold, 2007; Castells et al., 2009). M-learning, however, includes aspects of all of these definitions, where the technology, social influences, and instructive factors are considered.

Theories on learning have varying opinions on the best method for students to learn. As distance learning is defined as learning that is physically distanced from the school, the modes of learning are typically through videos or compressed files. E-learning, in general, refers to learning that is obtained online (Garrison, 2011). E-learning and distance learning can be considered distinct based on the technology used to deliver the information and the specific content. In this case, distance learning is available for students who are off-campus. In contrast, mobile learning does not have to be limited to distance learning, but can be used for both off-campus and on-campus students (O'Neil & Perez, 2013).

Furthermore, Saudi Arabia is a country that has actively sought to implement e-learning initiatives, especially in education institutions. These initiatives of education institutions were faced with many challenges, such as physical limitations of desktop computers and restrictions on access of information or learning materials to a physical location (Nassuora, 2012). As a result, the performance and output level are less than satisfactory (Al-Shafi et al., 2010; Faaeq et al., 2013). Furthermore, the ratio of use and adoption of e-learning services in SA remains limited in comparison to other similar developed countries (Al-Dabbagh, 2011; Faaeq et al., 2013). Moreover, according the study conducted in Monash University in Malaysia by Chen and Yao (2016), it was shown that it was unlikely that e-learning is the most effective strategy for teaching and learning because e-learning face many challenges, such as a high financial investment required to create educational materials and maintenance of the system, low rates of e-learning courses. Users may also feel isolated and disengaged through e-learning.

Some authors often refer to m-learning in an e-learning context, so it is important to be able to differentiate between these learning methods. For example, some researchers refer to m-learning as e-learning, but with the use of mobile devices or technology (Korucu & Alkan, 2011). Table 2.1 provides several definitions, as taken from Traxler (2007); Laouris and Eteokleous (2005).

Table 2.1

E-Learning and M-Learning Definitions

E-Learning	**M-Learning**
Requires a fixed desktop computer	Can be accessed through a mobile device, allowing flexibility
Requires wired broadband	Requires wireless technology, such as Bluetooth, GPRS, and G3
Intelligent Multimedia	Intelligent Objects
Passive	Interactive - spontaneous
Allows for collaboration	Collaboration is more difficult. Instead, learning is more private and isolated.
Information is rich in media	Information is smaller and bite-sized
Distance learning	Situated learning
Follows a more formal structure and curriculum	Curriculum and structure is not formal
Situations are simulated	Situations are realistic and more contextual

Table 2.2

Modes of Communication between Students in both E-Learning and M-Learning

e-learning	m-learning
Interactions are in-person or through electronic mail	Interactions are more flexible and not tied to schedules
Communication and information delivery is typically through audio-teleconference	Communication and information delivery is typically through Video and Audio teleconference
Communication may be delayed	Allows for rapid communication with peers and lecturers
Curriculum is scheduled based on the course	Curriculum is flexible, interactive, and can be spontaneous, depending on the students' needs and feedback
Learning is restricted to a physical place and specific time	Learning is flexible and not restricted to a particular time or place

The advancement and investment in technology by higher education schools is an indication that universities want to enhance learning methods to benefit students. However, it should be noted that each type of learning paradigm all have their benefits and weaknesses. Although some believe that e-learning will decrease the need for traditional methods of learning (Garrison, 2011), we believe that e-learning and m-learning can augment the educational experience, by providing various delivery methods of information to a large number of students. M-learning, in particular, can be advantageous to students, as place and time is no longer a restriction for learning.

Another depiction of the relationships between the learning paradigms is shown in Figure 2.1. Instead of one form being a subset of another, each learning paradigm is distinct and intersections of different learning paradigms can be used to enhance the learning experience. The most flexibility in learning is seen with e-learning and m-learning. Some scholars believe that, as mobile devices become the primary mode of accessing the internet, e-learning may eventually become m-learning (Nyiri, 2002; Laouris & Eteokleous, 2005; Pachler, Bachmair & Cook, 2010).

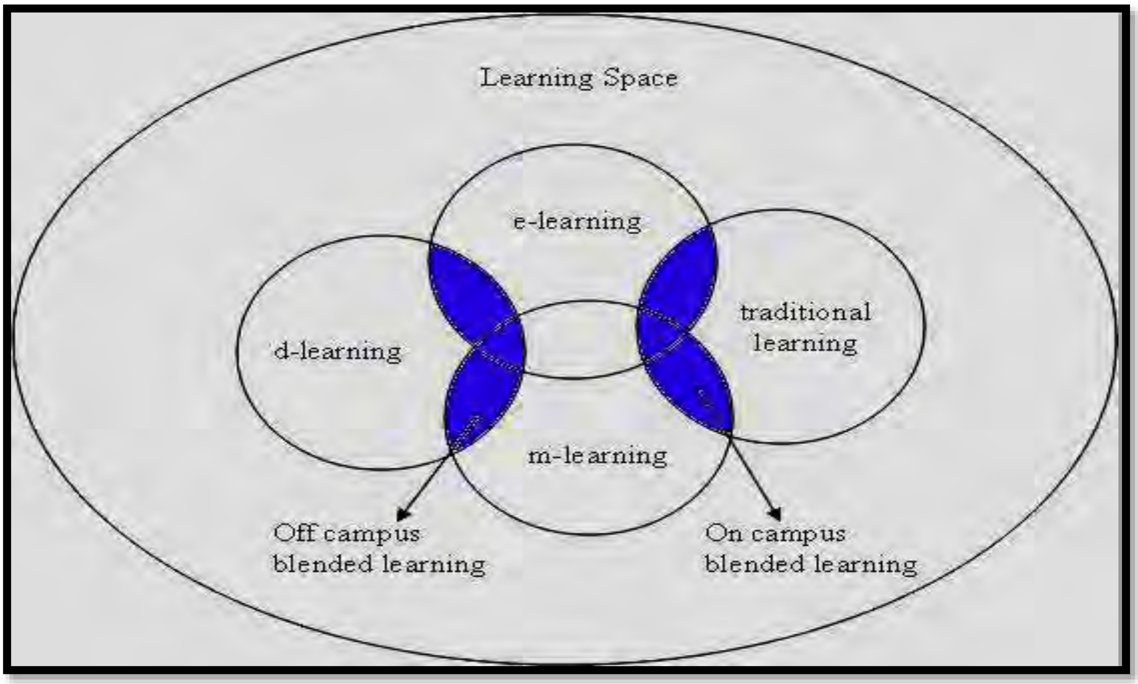

Figure 2.1. Interrelationships between Learning Paradigms (Pachler et al, 2010)

2.2.2 M-Learning in Developing Countries

M-learning implementation in developing countries has increased in the last a few years (Motlik, 2008). In Western countries, the students are increasingly taking advantage of m-learning services, and this phenomenon is regularly studied by researchers. The willingness of students to adopt m-learning usually depends on how m-learning enhances the learning experience and the benefits of using m-learning systems (Kim, Rueckert, Kim, & Seo, 2013). Hence, Jairak et al. (2009) assert that the adoption and the implementation of m-learning may not be similar in all countries.

Some developing countries in Asia have adopted m-learning to improve the effectiveness of the learning process. In relation, Malaysia is among those countries, in which the adoption m-learning can be seen in College University Islam Malaysia (KUIM), Open University Malaysia (OUM), Universiti Utara Malaysia (UUM), International Islamic University Malaysia (IIUM), University Technology Mara, Universiti of Malaya (UM), and Universiti Putra Malaysia (UPM), (UiTM) (Karim et al, 2006; Khan et al, 2015; Yeap et al, 2016). M-learning in those universities provide many services for their students, such as access to examination results. M-learning also allows students to register, check class schedules, and obtain information, such as account balances, with ease. Furthermore, in a study conducted by Chong et al. (2011), the factors that impacted the use and adoption of m-learning in Malaysia were examined. This study examined six factors, specifically cultural aspects, quality of services, cost effectiveness, technical feasibility, consumer's perception of the usefulness of the system, and the consumer's perception of how easy the system is to use. The study concluded that the factors that impacted the use of m-learning were cultural aspects, service quality, ease of use, and perceived usefulness.

According to Ramos, Trinona, and Lambert (2006), m-learning has risen significantly in the Philippines. The price drop and functionality increase resulted in cell phone usage to be the norm. At the same time, the Open University of Philippines has already offered a formal SMS-based mobile course. In relation to that, Ramos and colleagues reported that a large number of students accepted m-learning as a form of education.

Mongolia has also committed to adopting m learning in schools (Baggaley & Belawati, 2007). The local telecommunication liberalisation combined with partial privatisation has led to an increase in competition, resulting in a dramatic rise in mobile phone sales. As a result, the mobile phone market has boomed. As cost is an important factor for many countries, m-learning may be easier to adopt as SMS is inexpensive and more cost efficient than wired telephone lines.

M-learning utilisation has also gained popularity in Africa (Motlik, 2008). Visser and West (2005) found that in South Africa approximately 90% of its residents have cell phones. In another study, Brown (2004) investigated the use of mobile phone in support of and enhancing the learning process at University of Pretoria in South Africa. He found that m-learning has grown to more rural areas in Africa over the past few years.

In the Middle East, it is well known that organisations and individuals are late adopters of mobile technologies and its implementations in m-learning (Wagner, 2008). While the growth of mobile usage in the Middle East, particularly in KSA, was rapid, most of the initiatives are merely communication-based, especially SMS-related. However, since the last a few years, some Saudi universities have adopted m-learning to support their learning process. Among the universities that have adoption m-learning are King Faisal University, King Saud University, and King AbdulAziz University. However, their students are observed to be unwilling to use m-learning (Aljabre, A., 2012; Alasmari & Rabb, 2014; Ministry of Higher Education, 2014).

2.2.3 M-Learning in Higher Education

The learning environment of universities is being redefined by the emergence of mobile and wireless technologies (Wedge & Kearns, 2005; Long & Ehrmann, 2005; Johnson & Lomas, 2005). The use of mobile devices allows students and lecturers to interact with each other without having to be physically together. Nowadays, the concept of the classroom has changed from a physical location to a place that can be anywhere (Wentzel, Lammeren, Molendijk, Bruin, & Wagtendonk, 2005).

The adoption of m-learning in universities or colleges must be able to enhance or improve the current curriculum. For instance, Keegan (2002) argues that not all courses can be taught through m-learning and that m-learning was best suited for information-based classes instead of hands-on classes. Obviously, for universities to adopt m-learning, factors such as inter and intra personal factors, and organisational and socio-cultural factors should be considered (Elgort, 2005).

In general, m-learning can be deployed when information and learnings are obtained through a mobile device (Winters, 2006). Despite the apparent ease of m-learning, some universities have not adopted this technology. In the UK, some universities use m-learning to remind students of course information, conducting surveys, and distributing tests or quizzes (NMC & Educause, 2006). Other studies showed that school systems primary use personal digital assistants (PDAs) for easy storage and access to e-books, course information, and course schedules (Kim et al., 2006). Apple's iPod has also found a use in the education system by delivering recorded lectures to students (Belanger, 2005). IPods and similar handheld technology allow students to obtain course details repeatedly at a time and place that is convenient.

Patten et al. (2006) has provided a framework to classify the educational uses for mobile technologies. It suggests that the uses of m-learning are based primarily on administrative tasks, such as scheduling, and referencing, and gaining access to e-books, online information, and definitions in dictionaries. M-learning also can allow for quick response and feedback activities. Patten et al. (2006) asserted that the rise of m-learning is related to social behaviour. On top of that, Becta (2004) proposed that before m-learning can be adopted, universities need to assess if appropriate training and support can be provided. For successful adoption of m-learning, all key stakeholders need to be involved in the development phase (Wood, 2003).

Besides the works described in previous paragraphs, Tables 2.3 and 2.4 summarise various previous m-learning initiatives and projects available in literatures. This table presents studies conducted on a wide range of subjects, from university students to dropouts (Klopfer et al., 2002; Rogers et al., 2002; Colley & Stead, 2003; Traxler, 2003; Trifonova & Ronchetti, 2003; Attewell & Savill-Smith, 2003; Mitchell et al., 2003; Alexander, 2004; Belanger, 2005; Wentzel et al., 2005; Chinnery, 2006; Little, 2006; Cochrane, 2010; Farrow, 2011). Table 2.3 outlines a brief description of each study, the sponsor and area or country of the research, the study population, and primary results in m-learning.

Table 2.3

List of Previous Studies of Research Projects in M-Learning in Developed Countries

Research Project Name	Description	Country	Population	Key Outcomes
Moblogging (Cochrane, 2010)	Mobile Web 2.0 tools were used to improve teaching and learning. Mobile blogging was a focus. Success was indicated by integration of the technology into the course materials.	Centre for Teaching and Learning Innovation, Unitec, Auckland, New Zealand	Student and teaching staff	This study revealed several success factors for m-learning, such as: - The method of using the technology in course material - Choosing the appropriate type of mobile device to support the learning materials.
m-learning (Attewell, 2005)	This project enhanced learning to students that may not perform well in traditional settings. This study focused on the changes in attitude towards learning.	European Commission Information Society – UK, Italy, Sweden	Young Adults not in full time education or training	In general, students were encouraged with m-learning, with the majority preferring to use mobile devices. M-learning can be an effective way to keep students engaged and motivated.
MOBIlearn (Naismith et al., 2004)	This project created an m-learning architecture that included blended learning, location dependent learning and information interpretation learning.	European Commission Information Society - Europe, Switzerland, Israel, USA and Australia	General	Inclusion of the requirements of the end-user, mobile operators and manufacturers and market analysis to develop and m-learning architecture.

Table 2.3 Continued

GIPSY / Manolo projects (Wentzel et al., 2005)	This project created a location-based mode of learning that was more flexible for students. The aim was to evaluate a wireless mode of accessing information. Focus groups tailored the course material. Both individual and group learning was incorporated into the curriculum. This project combined e-learning and m-learning.	SURF (an ICT partnership organisation for all Dutch universities) - Netherlands	University students in Geographic Information Systems (GIS) departments	Students preferred the use of PDAs due to mobility. Challenges included bandwidth and battery size. Courses may be difficult to tailor to personal preferences. There are some logistic, resource and cost impacts for m-learning adoption.
Duke's Digital Initiative (Belanger, 2005)	This project looked at the potential use for iPods and encouraged teachers to integrate this technology into their curriculum.	Duke University and Apple Inc.	University students and faculty	The use of iPods increased from 2005 to 2006. Demand for iPods increased. Other objectives included the use of other multimedia, such as videos.
Wireless Instruction Initiative (WII) (Little, 2006)	This project used UT wireless networks as an educational tool.	University of Tennessee	University Students and faculty	Teachers and students were satisfied with this technology, but acknowledged that technical support is important. Independent learning was possible.
Stanford Learning Lab (Chinnery, 2006)	This project used mobile devices for the learning of language, including practice of vocabulary and taking of tests.	Stanford University	University Students	Quizzes can be distributed to students via mobile devices only if delivered in small bite-sized pieces. Learning voice vocabulary and taking tests has great potential for use in other courses. However, poor audio quality could be a challenge.

The findings from the majority of the projects show that m-learning can be applied in different teaching activities and by students with various backgrounds and ages. In fact, m-learning can add another facet to conventional learning methods by using a blended teaching approach (Naismith et al., 2004). The next section discusses the status of m-learning services in KSA.

2.3 M-Learning in Kingdom of Saudi Arabia

This section presents general information about KSA, including a summary of the Saudi Higher Education system, and m-learning services that are used in SA universities.

2.3.1 History of the Kingdom of Saudi Arabia

The Kingdom of Saudi Arabia (KSA) was officially declared in 1932. Its location is in the continent of Asia, between Africa, Asia, and Europe. KSA is composed of 80% of the Peninsula of Arabia. KSA is enclosed by the Red Sea on the west and Iraq and Jordan in the north. Oman and the Yemen Republic are located on the south border of KSA, with Qatar, the Arabian Gulf, Bahrain and the United Arab Emirates located to the east (Royal Embassy of Saudi Arabia, 2014). The population of the Kingdom of Saudi was 27 million in September 2014 compared to the previous population of 13 million in 1985 and 21 million in 1999 (Royal Embassy of Saudi Arabia, 2014). The percentage growth rate of population in KSA is 3.24. However, growth rates in the Saudi are greater than 2.37%, which is the general growth rate average. KSA, in general has a low death rate and a high birth rate, contributing to its high growth due to constant and intensive efforts towards health care issues (Royal Embassy of Saudi Arabia, 2014).

2.3.2 Utilisation of Mobile Learning in Saudi Arabia

Internet usage has increased dramatically in the past ten years, forming the building blocks for m-learning. Internet usage in December 2014 was 65.9%, while less than 1% of the total population in 2000 used the internet (Internet World State, 2014). In addition, mobile device usage has increased significantly, with penetration rates greater than 150%. As of 2010, over a million people were subscribed to mobile broadband through Mobily (Chanchary & Islam, 2011).

As reported by the Saudi Arabia Consumer Electronics Report Q4 2010 (Chanchary & Islam, 2011), approximately 22% of money in 2009 on consumer electronic goods was spent on mobile devices. It is estimated that mobile devices sales will continue to grow to 1.1 billion USD by 2014, as demand for smartphones, PDAs, and other mobile devices continue to rise. The new technology in mobile devices now offers longer battery life, faster speeds, and can support multiple types of files, making it a better tool for m-learning.

In the Kingdom of Saudi Arabia, implementation of M-learning is still in its infancy (Nassuora, 2012). The choice to adopt M-learning in Saudi schools is a fairly recent decision (Alebaikan, 2010; Abachi & Muhammad, 2014). Therefore, M-learning applications were spread (Ali & Ismail, 2013; Al-Wabil, 2015). Actually, the M-leaning Guild provides an appropriate definition for m-learning. (Alfarani, 2015). M-learning can be described as a method of obtaining understanding or information that permits students to consume, interact, and create information or knowledge via a mobile device that is relatively small, convenient, and portable. Although mobile devices among Saudi students has gained popularity (Al-Fahad, 2009; Alfarani, 2015), the use of m-learning applications by Saudi students have yet to be explored.

2.3.3 Higher Education in KSA

Today, Saudi Arabia is experiencing holistic advancement in a number of different sectors and industries, including the education system. According to the National Report on Education Development in the Kingdom of Saudi Arabia (2017;2018), there are 27 universities in Saudi Arabia that have received financial support to help with the development of construction and design of information systems.

2.3.3.1 Saudi Arabian Universities

In this dissertation, the researcher aims at evaluate government universities that use the Blackboard learning management system. There are, at present, twelve universities that have started using the Blackboard Learning Management Systems to enhance learning. As an outcome of the 2013 National Report on Education Development in the KSA, a short summary is provided regarding universities in Saudi Arabia. As stated earlier, there are 27 government run universities located in Saudi Arabia (National Report, 2013). To deal with the large number of students graduating from high school, e-learning was proposed (Albalawi, 2007; Zakaria et al., 2013). Table 2.4 illustrates the universities in Saudi Arabia.

Table 2.4

Public Universities in kingdom of Saudi Arabia (MOHE, 2017)

University	Year Established	Location
Umm Al-Qura University (UAU)	1967	Makkah
King Saud University (KSU)	1957	Riyadh
Imam Mohammed bin Saudi University (IMAMU)	1974	Riyadh
Islamic University of Madinah (IU)	1961	Madinah
King Fahad University of Petrol and Minerals (KFPUM)	1963	Dhahran
King Faisal University (KFU)	1975	Al-Hasa
King Khalid University (KKU)	1999	Abha
Taibah University (Taibah U)	2003	Madinah
Al-Qassim University (QU)	2004	Al-Qassim
Al-Jouf University (AJU)	2005	Sakakah
Taif University (TU)	2003	Taif
Hail University (HU)	2005	Hail
Tabouk University (UT)	2006	Tabuk
Jazan University (JU)	2005	Jazan
Northern Border University (NBU)	2007	Arar
Baha University (BU)	2006	Al-Baha
Najran University (NU)	2006	Najran
Imam Abdulrahman bin Faisal University	1975	Dammam
King Saudi Bin Abdulaziz Health Sciences University (KSUHS)	2005	Riyadh
King Abdul-Aziz University	1967	Jeddah

Table 2.4 Continued

Majma University (MU)	2010	AlMajma
Shaqra University (SU)	2010	Shaqra
Prince Sattam Bin Abdulaziz university	2009	Riyadh
Saudi Electronic University (SEU)	2011	Riyadh
Princess Nora Binti AbdulRahman University	2006	Riyadh
University of Jeddah	2014	Jeddah
University of Bisha	2013	Bisha

In this study, there was a focus on Saudi Arabia universities that used Blackboard Learning Management Systems (BLMS) to improve education and the dissemination of M-learning. There are at present 11 universities that have started using the Blackboard Learning Management Systems to enhance learning. Table 2.5 illustrates Saudi Arabia universities that used Blackboard Learning Management Systems (BLMS). Therefore, the next sub-section discusses some of universities that have started using the Blackboard Learning Management Systems to enhance learning in KSA.

Table 2.5
Saudi Arabia Universities which used Blackboard Learning Management Systems (BLMS)

University	**Year Established**	**Location**
King Saud University (KSU)	1957	Riyadh
King Fahad University of Petrol and Minerals (KFPUM)	1963	Dhahran
King Faisal University (KFU)	1975	Al-Hasa
King Khalid University (KKU)	1999	Abha
Najran University (NU)	2006	Najran

Table 2.5 Continued

Imam Abdulrahman bin Faisal University	1975	Dammam
King Abdelaziz University	1967	Jeddah
Prince Sattam Bin Abdulaziz university	2009	Riyadh
Saudi Electronic University (SEU)	2011	Riyadh
Princess Nora Binti AbdulRahman University	2006	Riyadh
University of Bisha	2013	Bisha

A. King Saud University

One of the oldest universities is King Saudi University, which consists of 41 colleges in total, the first being opened in 1957. In 2014, there were a total of 40,666 students registered at the university, with the support of 2937 administrators and 3,093 lecturers and staff members (Ministry of Higher Education, 2014).

B. King Abdul-Aziz University

The University of King Abdul-Aziz was created as a national university in 1967 in Jeddah. In 2014, there were a total of 22 colleges with 35,889 students in all levels. KAU consists of 1329 staff in the technical and administrative departments and 2,284 teachers (KAU-HR, 2014; Ministry of Higher Education, 2014).

C. King Faisal University

In 1975, the King Faisal University was created, containing a total of 31 colleges and 15659 registered students as of 2005. The staff totalled a number of 904 individuals, with 854 of these members from the administrative or technical departments.

2.4 The Phases of Information System Usage

There are two main phases of IS, known as pre-adoption or post-adoption (Teo et al., 2008; Zhou, 2013). In the first phase, individuals are surveyed to get their initial perceptions of the new system to gain a better understanding of the factors that lead to acceptance or rejection. This step is completed before implementation (Bhattacherjee, 2001). Several researchers have used information technology theories, including IDT, UTAUT, and TAM, to evaluate the acceptance and usage of various information systems, including m-health, m-commerce, m-banking, and m-government (Abdelghaffar & Magdy, 2012; Al-Hujran, 2012; Al-Khamayseh & Lawrence, 2006; Al Thunibat et al., 2011; Hung et al., 2013; C. Kim, Mirusmonov, & Lee, 2010; Oghuma et al., 2012; Venkatesh et al., 2011; Yaqoobi, Yazdani, & Kord, 2012). Based on the findings from the first phase, a new system or technology may be implemented to determine the user's first thoughts on their experience with the system (Chong, Ooi, Lin, & Bao, 2012; Rogers, 2003). The post-adoption phase follows next.

According to Zhou (2013), this phase occurs after the first experience to the new technology and is generally very important to the success of IS. In this phase, the net benefits of the technology are determined, rather than in the initial use (first-time), and the net benefits themselves can be seen as dependent upon the satisfaction of the user and their intent to use the technology (Bhattacherjee, 2001; DeLone and McLeane, 2003). Comparing the initial, first-phase expectations of the user, before they use the system, to their post-use, or second stage experiences of the user, after they have used the system, results in the users' satisfaction of the 'net benefits'. Overall, the net benefits that the user receives will determine if a new system or technology is successfully adopted (Bhattacherjee, 2001). Hence, post-adoption is synonymously referred to as continuous usage (Hong et al., 2006), which is synonymously referred to IS success (Liang & Yeh, 2011; Muraina, 2015; Santhanamery & Ramayah, 2012). Therefore, this study is focused on the post-usage (post-adoption) phase, because this study attempts to examine the factors that have an impact on the success of m-learning in developing countries.

The post-adoption phase was studied in several studies (Zhou, 2013; Wibexom & Watson, 2001; Wixom & Todd, 2005; Venkatesh et al., 2011; Thomas, 2008; Seddon & Kiew, 1996; Sanayei, Shaemi, & Jamshidi, 2011; Liu & Chen, 2009; Lin, 2013; Delone & McLean, 2003; Bento & Costa, 2013). In one study, the association between interface design quality, information quality, system quality, trust, and satisfaction within m-banking was evaluated (Sanayei et al., 2011) The results showed that trust and satisfaction were closely related to information quality and system quality, but interface design quality had no effect. Furthermore, trust had an influence on user satisfaction.

2.5 Previous Studies for M-Learning

Many studies have described the influencing factors on M-learning among the students in KSAU. Many M-learning studies are reviewed in this section. Table 2.6 shows previous studies on m-learning in many contexts.

Table 2.6

Prior Studies of M-learning

References	Country	N	Design	Focus	Findings
Mansour (2016).	Egypt	441	Quantitative	This study looked at how smart phones and applications are used at the South Valley University (SVU) in Egypt.	SVU students primarily used mobile devices for social applications, including email, YouTube, Facebook, and WhatsApp. For learning platforms, mobile devices were used to interact with other students and faculty members.
Şad & Göktaş (2013)	Turkey	1087	Questionnaire	The aim of this study was to understand how teachers perceived the use of mobile devices in a learning setting.	In general, teachers felt that laptops played a more influential part in learning compared to mobile devices; however, both laptops and mobile devices were not seen as overwhelmingly positive.
Hargis, Cavanaugh, Kamali, & Soto (2013)	Abu Dhabi	14,000	Questionnaire	This study looked at the implementation of iPads as a method to enhance teaching for a period 6 months.	Although there was no difference in focus on technology, the content focus was significantly altered. Substitution of teaching methods was found to increase.

Table 2.6 Continued

Al-Hunaiyyan, Alhajri & Al-Sharhan (2016)	Kuwait	132	Questionnaire	This research focused on the perceptions of students and teachers towards the implementation of m-learning.	Both teachers and students had a positive perception of m-learning; however, cultural and social factors may inhibit successful implementation.
Nassuora (2012)	Saudi Arabia	80	Questionnaire	This study focused on university students in Saudi Arabia and the factors that result in behavioural intent to use m-learning systems. The UTAUT model was used as a basis.	Attitude was significantly related to intent to use m-learning. This study proposes that m-learning programs should be designed to fit the expectations of students.
Al-Debei And Al-Lozi, (2013	Jordan	500	Questionnaire	This study looks at factors that lead to repurchase behaviour and aimed to develop a theoretical model to explain this behaviour.	Repurchase intent was influenced by satisfaction with the seller and the website, and the website quality. Trust in the website influenced the perception of the website quality and satisfaction and trust in the seller increased the perceived seller quality and satisfaction.

Table 2.6 Continued

Asiimwe & Grönlund (2015)	Uganda	30	Mixed	This study focused on the Makerer University in Uganda and the use of LCMS in mobile devices.	Despite content and technical issues, the use of LCMS on mobile devices was received positively.
Adedoja et al (2013).	Nigeria	201	Mixed	This study looked at the use of mobile devices as a learning tool in universities.	Tutorials or classes that were delivered through mobile devices helped to enhance the learning experience; however, some limitations to mobile devices were uncovered, including network connectivity or electricity supply.
Alharbi and Drew (2015)	KSA	105	Questionnaire	A framework was developed to comprehend behavioural intent to use m-learning by university students.	Three success measures, information quality, system quality, and user satisfaction were the result of this study. The acceptance measures included performance expectancy, social influence and effort expectancy. Attitude was also included as a factor that impacted the intent of students to use m-learning systems.
Schreiber & Aartun (2011).	South Africa	729	Mixed	This study looked at the influence of support services that were provided through mobile technology in universities in South Africa.	Students preferred support services that were provided online compared to face-to-face support.

Table 2.6 Continued

Mtega et al (2012	Tanzania	70	Mixed	The study investigated how mobile phones were used in higher learning institutions in Tanzania.	Mobile phones were primarily used in the teaching and learning process through SMS. However, the limitations for mobile phones was the high cost associated with large downloaded files.
Macharia & Pelser (2014).	Kenya	1800	Descriptive	This research looked at factors that influence university students to use ICT.	Adoption of ICT is influenced by individual, technological, organisational, and environmental factors.
Mtebe & Raisamo (2014).	East Africa (Kenya & Tanzania).	823	quantitative	This research focused on determining what influences students to use m-learning in East Africa.	The findings show that students have a greater probability of accepting m-learning based on pressure from social peers, the amount of effort required, facilitating conditions, and what the user expects the system to improve performance.

The results of previous studies that are outlined in Table 2.6 have raised notable evidence that Delone and McLean's (2003) model is a successful model to measure information system success, where it was referred to in over 5,000 studies in referred journals (based on Google Scholar). This suggests the importance of this model and the success of using it. Whereas, Alharbi and Drew (2015); Shin and Kang (2015); Mohammad (2015); Hsu, Chang, Chu, and Lee (2014) emphasised that the success of the Delone and McLean (2003) model needs to be combined with TAM and the Trust model. Therefore, it is a possibility of combining the model with other theories or models according to the study requirements.

The student's behaviour is an important factor for M-learning usage (Cheon et al., 2012). Previous studies confirmed that the self-efficacy and subjective norm in using M-learning were critical determinants of students' behaviour (Aldebei & Lozi, 2013; Cheon et al., 2012; George, 2004). Future research should focus on the effect that self-efficacy has on m-learning (Cheon et al., 2012). Furthermore, George (2004) emphasised that the overall trust to use online learning could enhance continued use of IS. Thus, students' confidence has a direct influence on M-learning usage and success.

In contrast, studies indicate that the institution has an effective role in enhancing the information system success (Cheng et al., 2012; Lwoga, 2012; Ndonje, 2013). However, Ndonje (2013) referred that the successful use of electronic learning depends on the institution's support and policies. Therefore, the organisational support factor (Cheng, et al., 2012; Ndonje, 2013) and the institutional policy factor (Lwoga, 2012; Ndonje, 2013) are the critical determinants of continued use of M-learning. Based on analysis above, the current study employed the D&M (2003) model to assess the M-learning system (technology factors), and combined it with the theory of planning behaviour to assess the student's behaviour (social factors), and the institutional theory to investigate the support of universities to M-learning (institutional factors). This will be explained in the next section.

2.6 Theories and Models of Information Systems Success

Numerous theories and models were proposed to measure IS success in a number of various contexts. Some of these models include the original D&M IS Success model (DeLone & McLean, 1992), a revised version of the D&M IS Success model (DeLone and McLean, 2003), the Wixom and Todd model (Wixom & Todd, 2005), the theory of planning behaviour (Ajzen, 1991), and the institutional theory (Scott, 2005). These will be reviewed in the next sub-section.

2.6.1 The Original DeLone and McLean Model

Considered to be the most popular model, the DeLone and McLean's IS Success Model is an appropriate model to measure the success of IS. One of the main advantages is that it integrates the findings of other IS studies to provide a comprehensive framework for further research on IS success. The D&M model integrates aspects of a communication study conducted by Shannon and Weaver in 1949 and Mason's 1978 study. Based on this integration, factors, including information quality and system quality and user satisfaction can be measured.

System quality is an evaluation of technical aspects of the system. Information quality, on the other hand, relates to the output quality of the IS. "Use" is the utilisation of the system's outputs. "User satisfaction" is defined as the positive or negative feelings the user has towards IS. "Individual impact" is described as the system output effects on the behaviour of individual users. "Organisational impact", similarly, is the system output effects on the organisation as a whole. In this model, IS success is dependent on the satisfaction of the users, the impact on the individual, and the impact on the organisation. One of the underlying foundations of this model is that once satisfaction or dissatisfaction is established, evaluation of features can be done by looking at the information quality and system quality. In this context, user satisfaction can directly impact the work performance of an individual, thereby, improving or reducing the performance of the organisation. The original model from DeLone and McLean from 1992 is illustrated in Figure 2.4.

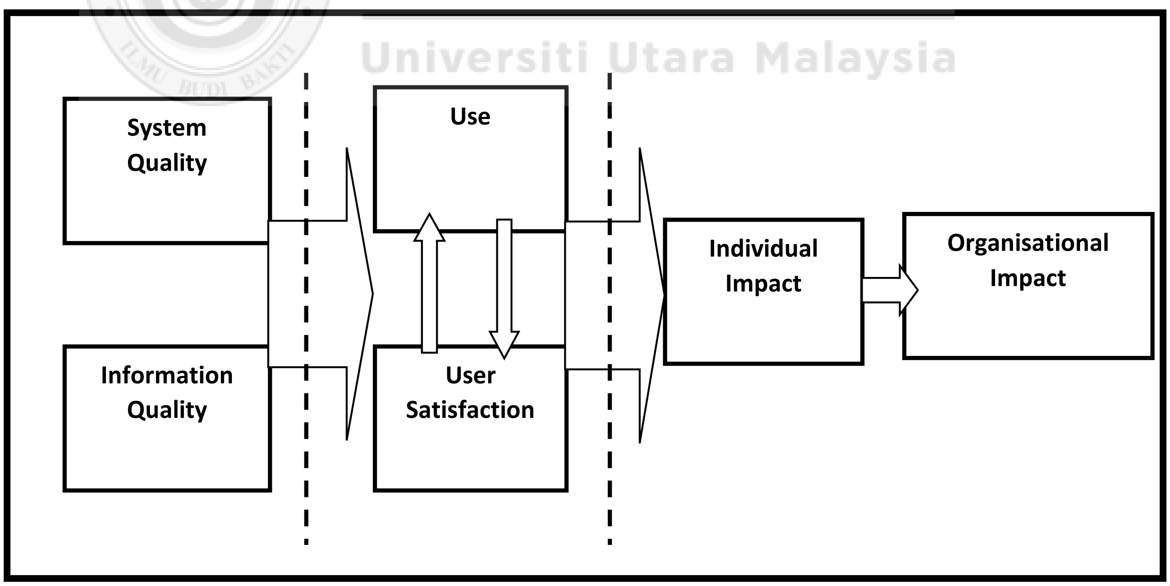

Figure 2.4. DeLone and McLean Model, 1992

Several researchers have examined and employed this model, while some (Alshibly, 2014; Rai et al., 2002; Wang & Liao, 2008) confirmed the original dimensions outlined by D&M's model. Some scholars (Seddon & Kiew, 1996; Guimaraes & Igbaria, 1997; Molla & Licker, 2001; Nelson et al., 2005) have proposed updates or revisions to the D&M model. For example, Seddon and Kiew (1996) proposed that the term "use" be revised to "usefulness" as this is what was being measured (Seddon and Kiew, 1996, p. 93). According to Seddon and Kiew, the term "use" can be measured in systems that are voluntary, whereas modern systems should employ the term "usefulness", as it is a better determinant of IS success.

However, despite this argument, DeLone and McLean (2003) assert that the term "use" should remain intact. In general, there was inconsistency in the term "usefulness" between studies, where Lee and Lee (2012) considered usefulness as a subset of system quality, and other researchers disagreed (Floropoulos et al., 2010; Seddon, 1997). Further adjustments were recommended to the D&M model by including service quality (Pitt et al., 1995). Some researchers opposed this update (Seddon, 1997), while others approved and utilised the modification. Regardless, in 2003, DeLone and McLean revised the IS success model by adding service quality. Seddon (1997) proposed other revisions to the model, as he felt it was limited, and proposed that the term "use" be better defined. Due to the ambiguous nature of the term "use", Seddon defined "use" in three distinct ways; however, despite his good intentions, his revisions made the model more complex and less effective.

2.6.2 Wixom and Todd Model

Wixom and Todd (2003) presented the third model for evaluation of information system success. In their proposed model, they sought to identify literature related to user satisfaction and technology acceptance as two corresponding domains of research, through which IS success could be effectively measured. They propose that incorporation of these two research streams would provide a comprehensive analytical approach for the assessment of system usage. In this regard they depended on the Ajzen and Fishbein's (1980) conceptualisation of attitudes, predominantly the object-based versus behavioural attitudes. Having incorporated these two domains of research they have established a novel model for the evaluation of IS success. Their model is shown in Figure 2.5.

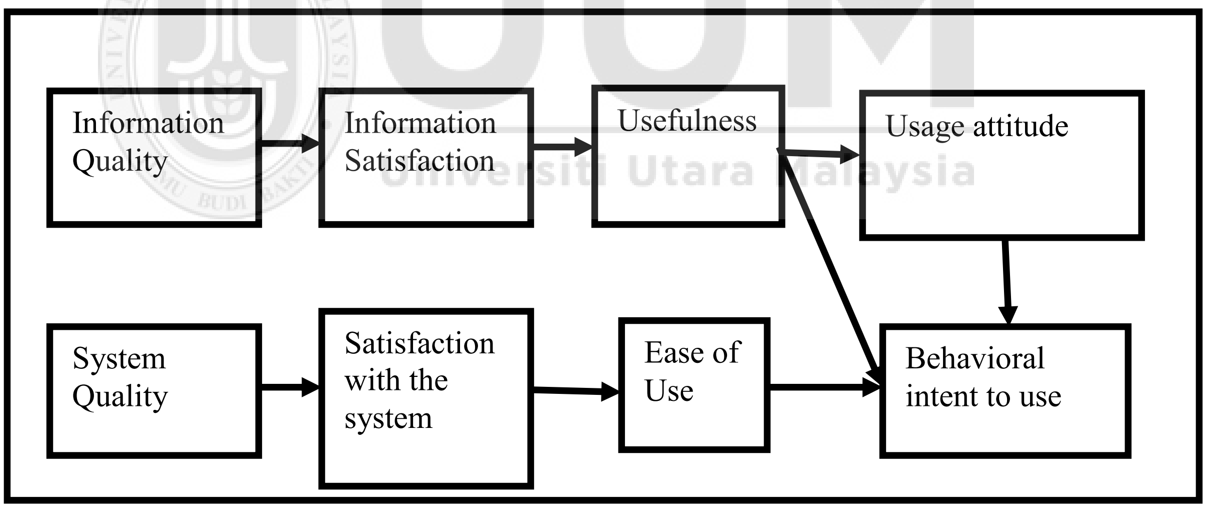

Figure 2.5. Wixom and Todd's Model, 2003

A survey was conducted by Wixom & Todd's (2003) of 456 users from seven different companies. According to final results, information satisfaction was greatly influenced by the quality of the information, while users were satisfied with the system if the system quality met their expectations. Findings also revealed the presence of a significant association between satisfaction with the system and ease of use, and also between information system and usefulness. Simultaneously, the usefulness of the system and the easiness of use were isolated as important factors for attitude, while attitude and usefulness were held to be significant determinants of intention.

This model also carries certain shortcomings. For example, certain variables tend to affect the success of information system, such as system quality. This study has also ignored the social and institutional factors that may be influenced by information system users.

2.6.3 The Theory of Planned Behaviour (TPB)

In 1980, the Theory of Reasoned Action was proposed, then was revised to The Theory of Planned Behaviour (TPB). Researchers used this theory to predict the intent of an individual to act under specific circumstances at a particular time and location. At the time, the theory was created to model how individuals behave when the activity required self-control. Behavioural intent is the main facet of this theory and is influenced by an individual's attitude and perceptions about the advantages and disadvantages of engaging in an activity (Fishbein & Ajzen, 2010).

The Theory of Planned Behaviour was used by a number of researchers to explain why individuals engage in negative behaviours, such as drinking and smoking, as well as other types of behaviours, such as health care usage. According to this theory, motivation and ability are key determinants of behaviour. There are six factors that are described in this theory that are related to an individual's behavioural control. These will be described below.

The first factor is behavioural intention. Individuals are more likely to engage in a particular behaviour if strong motivational factors exist.

The second factor is subjective norms, which are based on an individual's belief that others will think positively or negatively about the behaviour. An individual's feelings and opinions can greatly influence whether an individual will engage in the behaviour.

The third factor is social norms, which are codes of conduct that are set by society. Social norms can differ depending on the area, region, or group of people.

The intent to engage in a particular behaviour is an indication of how much individuals will try or exert effort to participate in the behaviour. Performance of behaviour is more likely if an individual's intent is strong. However, a particular behaviour can only be performed if the individual has a choice or control over this decision.

Some behaviours, however, are not under the control of the individual. Other factors, such as opportunity and resources, can influence whether a behaviour is performed. According to this theory, if an individual has the intent, resources, and opportunity, the behaviour should be successfully performed. This combination of factors forms the basis for much animal behaviour (Hull, 1943). Researchers have proposed that behavioural control is involved in human behaviours, including resources (Liska, 1984), opportunity (Sarver, 1983), or action control (Kuhl, 1985). It makes sense that behavioural performance is more likely to occur if the individual has control over the action and is motivated. However, there is little data to support this model (Locke, Mento, & Katcher, 1978).

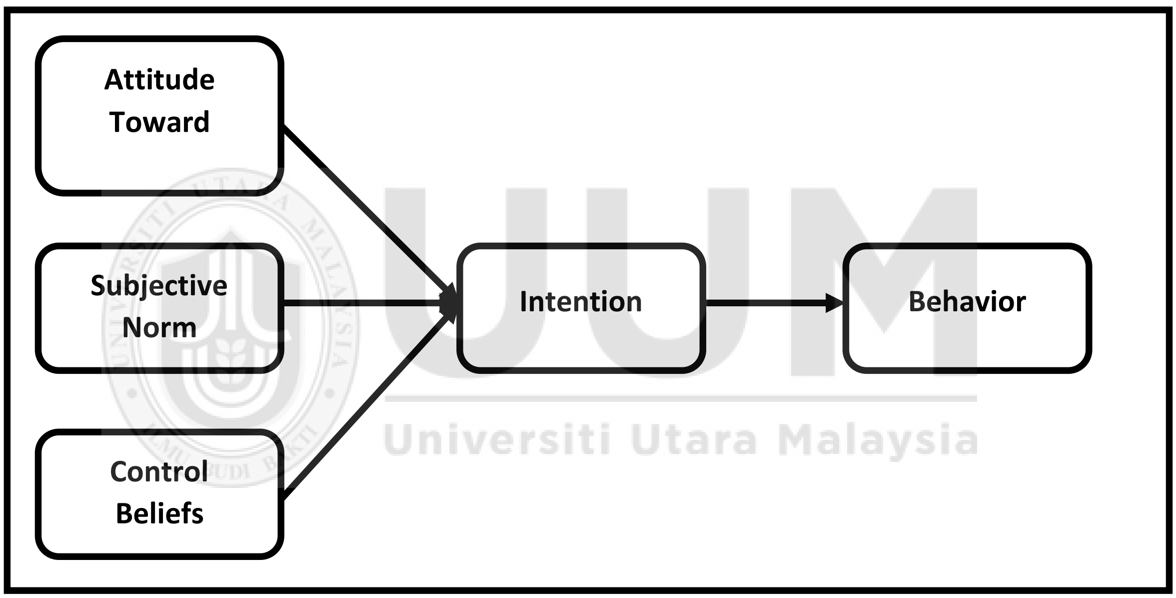

Figure 2.6. The Theory of Planned Behaviour by Ajzen (1991)

2.6.4 Institutional Theory

According to the Institutional theory, social context aids in shaping the organisation, as social context plays a key role in developing the organisational structure, policies, and procedures (Meyer & Rowan, 1977; Eisenhardt, 1988; Scott, 2005). In order to be socially acceptable, organisations need to include social context into their business practices (Scott, 2014; Deephouse, 1996; DiMaggio & Powell, 1983). This means that organisations are willing to change or adapt to social contexts in order to gain acceptance and legitimacy. In this way, organisations can remain competitive and relevant by remaining legitimate to their key stakeholders (Scott, 2014). In the context of an educational setting, online education is an outlier to the traditional way of learning. However, for an organisation to successfully implement online learning, factors, such as support from the organisation and institutional policy, will be important.

2.6.5 Updated Delone and McLean Model

Based on the strengths and limitations of the original success model by DeLone and McLean, the model was revised. Studies that modified, validated, or refuted the original model were used to modify the model. Due to the changing environment and the rising role of IT, Wu (2007) proposed that the model needed revisions. Similarly, Pitt et al. (1995) suggested that IS's function should be taken into consideration. Other studies have recommended that the model should also include a service quality variable (Kettinger & Lee, 1994; Li & Kishore, 2006; Wilkin & Hewitt, 1999). Based on this criticism, this variable was added to the model.

Another revision was made in 2003 by removing "individual impacts" and "organisational impacts" and creating "net benefits" (Delone and Mclean, 2003). "Net benefits" was used to integrate all aspects that were impacted by use and user satisfaction, including the impact on society and industry. The inclusion of net benefits instead of each individual construct was done to keep the model simple and reduce complexity.

DeLone and McLean (2003), regarding the third addition, suggested the term ‘intention to use’ to replace ‘use’. Herein, ‘use’ can occur in a voluntary system, whereas ‘intention to use’ can occur when the usage is mandatory (Delone and McLean, 2003). The definitions of constructs provided by the updated D&M’s model are shown in Table 2.9.

Table 2.9

Definitions of Constructs of the Updated D & M Model in 2003

Construct	**Definition**
System quality	Includes constructs like reliability, response time, availability, and usability, which are desired in an e-commerce system.
Information quality	“Information quality” includes the personalisation of web information, relevancy, understand ability, and security of online transactions. If information quality is acceptable to the user, the user is more likely to return to the site.
Service quality	Describes the level of help that the service provider can provide to users. Good service quality is likely to retain customers.
Usage	“Usage” is the level that a customer uses the internet site, whether it be visiting, navigating, retrieving information, or conducting a transaction.
User satisfaction	“User satisfaction” describes the level to which a customer believes that the e-commerce system is beneficial to them.
Net benefits	“Net benefits” measure the advantages and disadvantages of an e-commerce system and is the most important measurement of success.

IS success can better be measured using the revised version of the DeLone and McLean IS Success model, which is depicted in Figure 2.7.

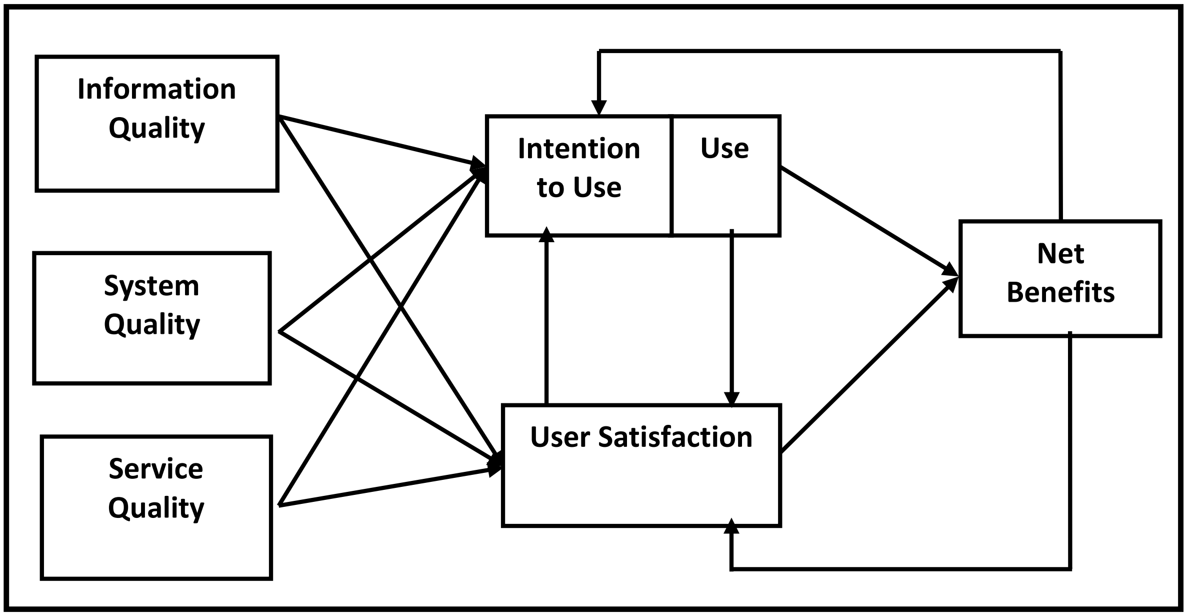

Figure 2.7. Updated model of IS success by Delone and McLean, 2003

2.7 Previous Research of the Updated D&M IS Success Model

Several studies have attempted to research IS success involving various factors. Success measures have included user satisfaction (Ginzberg, 1981; King & Epstein, 1983; Raymond, 1985) or 'usage' (Hamilton & Chervany, 1981; Lucas & Spitler, 1999). DeLone and McLean (1992) detailed that several IS studies tried to evaluate IS in various ways, making the comparison of results a challenge (DeLone & McLean, 1992). Consequently, Delone and McLean (1992) proposed a comprehensive framework containing six key categories. These categories were organisational impacts, individual impacts, user satisfaction, use, system quality, and information quality. As stated in the previous section, 'service quality' was later added and 'net benefits' was added by combining "organisational impact" and 'individual impact'. Today, this revised model remains the most popular model for the success of IS to be evaluated.

Delone and McLean (1992, 2003) recommended on several occasions the importance of validating their model. As a result, the IS Success Model was validated in m-Commerce (Gebauer & Shaw, 2004; Lee & Chung, 2009; Vuolle, 2011), e-Government (Alawneh et al., 2013; Teo et al., 2008), m-Healthcare (Chatterjee et al., 2009), and m-Payment (Lin, 2013; Zhou, 2013). Furthermore, a number of studies have assessed the entirety of the model, including Alshibly (2014), and Wang and Liao (2008). These research studies successfully validated the model and the relationships between the various variables. Despite these validation studies, there is little research that can suggest further improvements to the model (Guimaraes & Igbaria, 1997; Molla & Licker, 2001; Nelson et al., 2005; Seddon, 1997; Seddon & Kiew, 1996).

To assess the validity of the updated IS Success Model, Wang and Liao (2008) tested all the relationships in the model using the eG system (G2C). "Intention to use" replaced "Use" as the G2C system was not mandatory. In addition, the relationship between user satisfaction and net benefits was removed. A questionnaire was sent in Taiwan and SEM was used to analyse the data. Data analysis showed that the associations between the variables were validated, except the correlation between "system quality" and "use". Other studies have tested the validity of this model in other contexts, such as the e-Human Resource Management in Jordan (Alshibly, 2014). Similar to Wang and Liao, Alshibly confirmed that a relationship existed between the six constructs. Further validation of the model was shown in a Business to Customer (B2C) context, but excluded the relationship between 'net benefits', 'satisfaction' and 'use' (Chong et al., 2010). In this study, SEM was run two times, and the results show that use and satisfaction were related bidirectionally.

In addition, they discovered that net benefit was more influenced by satisfaction than by 'use'. In contrast to other studies, system quality had no influence on 'use' or 'satisfaction'.

Some researchers have proposed revisions to the 2003 D&M model when tested in different contexts. For example, in e-commerce systems, Wu (2007) found that other quality constructs should be included as a determinant of user satisfaction. In another study, knowledge quality and success replaced information quality and net benefits for Knowledge Management Systems (KMS) (Halawi et al., 2008).

In the context of mobile healthcare, the 'content quality' factor replaced 'information quality' and it was found that time and complexity of the task had an influence on success (Chatterjee et al., 2009). In m- banking, system quality, interface design quality, and information quality lead to 'trust' and 'user satisfaction' (Lee and Chung, 2009). The 'intention to continue using' was added as a success measure by Teo et al. (2009) to replace 'net benefits' and 'use' in an eG context. In a mobile payment context, it was revealed that quality of service significantly influences user trust and satisfaction, leading to return behaviour (Zhou, 2013). Visser et al. (2013) proposed the MIZ evaluation model and found that information quality and user satisfaction were the primary constructs. In the ERP system, Bento and Costa (2013) focused on the key stakeholders throughout each phase of implementation and used a variety of models to determine the net benefits of IS. Table 2.10 summarises the previous research that used DeLone and McLean's (2003) as a basis.

Net benefits was also a focus of study. In one study, Lin (2008) claimed that 'member loyalty' was a net benefit and was a strong indicator of success and effectiveness. In this study, information and system quality resulted in satisfaction, which had an effect on loyalty. In another study of net benefits, 'intention to continue using' and 'perceived value' were used (Wang, 2008).

Table 2.10

Summary of Previous Research using D & M Model

No	AUTHORS	FIELD	SAMPLE SIZE	FINDINGS
1	Nelson and Todd and Wixom (2005)	Data warehouse	Data was obtained from 7 organisations with a total of 465 respondents in the warehouse.	Nine determinants were proposed in the IT sector that were predictors of system and information quality.
2	Teo et al. (2009)	e-governmen t	Data was obtained from 214 users of eG sites in Singapore.	Trust was closely related to information quality, system quality and service quality. Good service quality positively impacted user satisfaction and the intent to continuously use the service.
3	Chatterjee et al. (2009)	m-health	Qualitative study	Portability, mobility and flexibility, structure of tasks, and service quality can influence user satisfaction and the intent to use.

Table 2.10 Continued

4	Vuolle (2011)	m-business	Interviews and questionnaires were the main source of data. Data was also obtained through workshops and observation.	There are three main phases for measurement performance. These were identified as contextual factors, performance impacts, and defining measures.
5	Lu, Zhang and Wang (2009)	M-commerce	Chinese m-service providers were chosen and 338 respondents were included in the study.	This study showed that the quality of interaction, environment, and the outcome are important.
6	Zhou (2013)	Mobile payment	Questionnaires were distributed to the two largest Chinese telecommunication operators. There were 200 respondents.	Trust and satisfaction is greatly influenced by service quality. In contrast, flow is impacted by information and service quality.

Despite widespread usage of DeLone and McLean's (2003) updated IS Success Model's in a number of industries and contexts, there is limited data on m-learning services. As m-learning is rapidly increasing, the use of DeLone and McLean IS's Success Model for m-learning in SA Universities is increasing in importance.

Past work reveals that only specific models can consistently measure the factors of IS success in a number of different contexts. However, there is no current model that can be used for all contexts. While the DOI model looks at the technology, other models, like TAM, focuses on the perception of the user. Thus, no model can be considered to be a comprehensive model that can be used across all contexts and situations (Liu & Chen, 2009).

In this study, the updated IS success model was used because the variables in this model provide a better picture in regards to the research questions. Specifically, we believe that this model can address the impact that net benefits have on the adoption and usage of m-learning services in KSA.

2.8 Theoretical Framework

A theoretical framework can be defined as a group of concepts that are related in some way and that lead to research; it determines the variables/dimensions that should be measured and determines the possible relationships based on the data (Borgatti, 1999). A theoretical framework also explains in detail the variables of the true world that are considered highly relevant to the issues or problems under investigation and interprets relationships between these variables (Frankfort-Nachmias & Nachmias, 2000).

A number of theories, including the technology acceptance model (TAM) and diffusion of innovation (DOI) model, were evaluated among consumers using technology for the first time (Ajzen, 1991; Davis, 1989; Rogers, 2003). However, the success of IS is more dependent on the post-adoption phase (Bhattacherjee, 2001; Bischoff et al., 2014). This simply means that IS success cannot be measured by users using the system for the first time. Previous studies also showed that the existing research in IS was given lesser focus on the post-adoption usage (Hong et al., 2006; Santhanamery & Ramayah, 2012).

In addition, most of the theories that were discussed previously were used by many researchers (e.g., Abdelghaffar & Magdy, 2012; Al-Hujran, 2012; Al Thunibat et al., 2011; Duraipandian & Rakesh, 2011; Hung et al., 2013; Karjaluoto, Koenig-Lewis, et al., 2010; Oghuma et al., 2016; Weerakkody et al., 2009) to evaluate the causes of users adopting and using IS. One major limitation of these theories, however, are that NB was excluded, as it is thought that NB may influence IS success and usage (Gunasekaran et al., 2006; Irani, 2002), thereby calling for the net benefit (NB) of using m-learning to be the focus for future research.

The net benefits of IS will determine whether IS will be successful (Zhou, 2013; Bhattacherjee, 2001). Delone and McLean (2003) and Seddon (1997) stated that net benefits can only be obtained after using IS. Thus, the current research focuses on the net benefits of the m-learning system as a way to evaluate success.

The literature review revealed that the main problem associated with the lack of use of m-learning services is associated with the shortage of awareness on the possible reasons that aid individuals to use e-services, which leads to the success of IS (Rehman & Esichaikul, 2011). This implies that there is a lack of attempts to investigate the effect of potential factors on an IS success. Therefore, this study uses external factors, such as subjective norms, trust in technology, trust in organization, organisation support, and institutional policy, using DeLone and McLean's (2003) updated IS Success Model as an underlying theory in order to understand and evaluate the existence of net benefits and the factors that lead to utilisation and user satisfaction of m-learning services in Saudi higher education contexts.

Meanwhile, previous studies on the updated D&M model showed that some constructs are fit to measure IS success in different contexts (Alawneh et al., 2013; Chatterjee et al., 2009; Chen & Cheng, 2009; Lin, 2013; Gebauer & Shaw, 2004; Lee & Chung, 2009; Vuolle, 2011; Zhou, 2013). On the contrary, Delone and McLean (2003) reported that the updated D&M model needs to conduct numerous empirical studies in different contexts. Chiu and Wang (2008), Kim, Shin, and Lee (2006), and Straub et al. (2004) stated that additional factors must be identified to validate the updated model so that it can be utilised in another context.

The DeLone and McLean IS success model, after the updates were implemented, is generally seen as a good model for IS success measurement. Many researchers have supported this model stating that it is the most adequate model (Petter et al., 2008; Rai et al., 2002; DeLone and McLean, 2008; Visser et al., 2013), and is superior to the model developed by Seddon. Rai et al. (2002), however, showed that the D&M model is more flexible. The IS Success Model was also shown to be relevant in various other context (Chatterjee et al., 2009; Gebauer and Shaw, 2004; Lee and Chung, 2009).

Indeed, no individual study has focused on m-learning services in developing countries, such as KSA, which integrates in its model, variables such as social factors (subjective norms, and trust), and institutional factors (organisation support, and institutional policy) within DeLone and McLean's (2003) IS Success Model.

2.9 Development of Conceptual Framework

This study uses the updated D&M model as the base model, with the inclusion of subjective norms, attitude, perceived behavioural control, trust, organisation support, and institutional policy factors, to determine the contributing factors in evaluating m-learning success in KSA universities. In the next sub-sections, more details about development conceptual model for this study will be discussed.

2.9.1 Updated D&M model

As reviewed in previous sections, there were some updates to the original D&M model to make it a more comprehensive model in measuring the success of IS. Many researchers stressed that some constructs in the updated D&M model can be used to evaluate IS success in different contexts (Chatterjee et al., 2009; Liu & Chen, 2009; Sedera et al., 2004; Visser et al., 2013). The updated D&M model (2003) is considered by many researchers to be the best model.

DeLone and McLean (2003) reported that the updated D&M model needs to conduct numerous empirical studies in different contexts. Therefore, various modifications and refinements were made on the model, though it remains the basis model of IS success domain. Many studies have stressed that most of the constructs of the updated D&M model can be used to assess IS success in different contexts (Alshibly, 2014; Chen et al., 2015; Lin, 2013; Teo et al., 2009; Wixom & Todd, 2005). This observation showed that each construct is useful in modelling m-learning success in SA universities, except for the 'intention to use' construct. The 'intention to use' construct is an acceptable variable in mandatory usage context. On the contrary, the 'use of a system' construct is an acceptable variable in voluntary usage context, and it has a close meaning to success. However, the student's use of m-learning system is entirely voluntary (Delone & Mclean, 2003; Wang & Liao, 2008). Moreover, Petter et al. (2008) stated that including the analysis of both sub-constructs of use (i.e. use and intention to use) makes a complex model. Thus, an m-learning success measure in the current study is 'use' rather than 'intention to use'. Furthermore, Seddon & Kiew (1996) found that 'user satisfaction' and 'use were not strongly associated. Specifically, Petter et al. (2008) asserted that the level of usage (e.g. how often the system is used) was not related to the satisfaction of the user. Therefore, this study excludes the relationship from use to user satisfaction.

In this respect, m-learning success is dependent on the net benefits that the user receives after using the system. Thus, ensuring that there are positive net benefits is essential for m-learning success (Zhou, 2013). From the NB of using m-learning, the present study evaluates the individual benefits of m-learning. The literature review shows that numerous outcomes occur in accordance with the needs of students in the perspective of usage of m-learning services. These NB have crucial importance for students. Nevertheless, the literature review cannot identify a model that may link the updated D&M model as an underlying theory of social factors, institutional factors, and NB in the same framework.

As mentioned in the previous study, several researchers (e.g., Chatterjee et al., 2009; Delone & McLean, 2003, 2004; Lin, 2013; Teo et al., 2009; Vuolle, 2011) focused on the significant role of quality characteristics as determinants of the U and US within various contextual backgrounds, such as m-banking, m-business, m-health, e-government, and e-commerce. Therefore, the researcher of the present study anticipates that SQ, IQ, and SEQ have a strong influence on the use of m-learning and on the level of satisfaction derived by the users of m-learning services. Consequently, the use and user satisfaction of m-learning eventually achieves a strong influence on NB. The examination of this argument from the perspective of m-learning services reveals that user perception toward quality characteristics (IQ, SQ, and SEQ), whether positive or negative, may have an influence on the US and U of m-learning services, thereby achieving the NB of m-learning. Therefore, the constructs, such as IQ, SQ, SEQ, US, U, and NB, in the updated D&M model are useful for the purposes of this research.

Chatterjee et al. (2009) noted that the updated D&M model of IS success was also considered a strong theoretical framework for measuring IS success. This was supported by other researchers (Petter, 2011; Rai et al., 2002; Visser et al., 2013). In a model comparison study, Sedera et al. (2004) also found the updated D&M model to be the best model for evaluating IS success. Therefore, the updated D&M model is used as the base model for the current study. From the aforementioned discussion, constructs IQ, SQ, SEQ, US, U, and NB were adapted to complete this study.

2.9.2 Needs for Inclusion of Perceived Behavioural control, Subjective norm and Attitude Constructs as Social Factors

The social influence on IS usage/adoption was comprehensively studied in the last two decades (Al-Eneze, 2011; Al-Khasawneh, 2012; Aversano, 2005; Daneshgar et al., 2007; Park, Nam, & Cha, 2011; Taylor & Todd, 1995). In line with previous studies, this study includes social factors (perceived behavioural control, subjective norm and attitude) as external factors with the DeLone and McLean's updated model.

Perceived Behavioral Control (PBC)

The first introduction of Perceived Behavioral Control (PBC) as a construct was in the Theory of Planned Behaviour (TPB). It was suggested that PBC has a strong impact on actual usage levels. PBC can be defined as an individual's awareness of their control over performing certain behaviours (Ajzen, 1991; Mathieson, 1991). Doll and Ajzen (1992) further expanded on this definition by stating that PBC also considers an individual's past experiences and his or her judgement on obstacles and challenges to perform the behaviour.

In the past, PBC was considered to be an important factor for IS usage. In 1991, one study found that PBC has an influence on the behavioural impact to use IS (Mathieson, 1991; Taylor and Todd, 1995a). In m-learning, Daneshgar et al. (2007) found a positive correlation between PBC and behaviour intent, where a high PBC was related to a higher usage of m-learning technology. Based on previous theoretical and empirical studies, PBC and usage level are strongly related.

According to Ajzen (2002), PBC and self-efficacy are similar. An individual with high self-efficacy believes that they are able and are motivated to perform a specific behaviour (Bandura, 1986, 1997). Thus, an individual who has confidence in their skill is more likely to engage in the activity. This was shown in a number of studies where high usage of IS is a result of higher self-efficacy and behavioural intent (Compeau & Higgins, 1995; Gist, Schwoerer, & Rosen, 1989).

Taylor and Todd (1995) stated that self-efficacy is based on the belief that an individual has control over adopting a service. Furthermore, Kaseniemi and Rautiainen (2002) mentioned that young people consider m-learning services as more interesting than PCs. So, we can expect that PBC will be higher among student users than among users in the general public. Daneshgar et al. (2007) found that people with a low PBC prefer to use less m-learning services. Therefore, it is necessary to involve perceived behavioural control as an independent factor to measure M-learning success into the model.

Subjective norm (SN)

The Theory of Reasoned Action (TRA) first brought the term 'subjective norm' to light. Subjective norm can be defined as how an individual feels his or her actions will be perceived by others (Fishbein and Ajzen, 1975), and can be influenced by expectations and social pressure from peers and the community (Aversano, 2005). The intention to use a technology or system is believed to be influenced by both subjective norms and behavioural intent (Ajzen, 1980). In the context of the learning environment, some students may be influenced to use m-learning systems based on other people's opinions.

Schepers and Wetzels (2007) confirmed that there is a strong effect for subjective norm on use of a system. Yang (2007) conducted a study and showed that subjective norms had an influence on whether students used a new technology called WebCT. Negative attitudes towards a POLNET system in Turkey can also lead to negative subjective norms, making it a challenge to adopt this system (Yalcinkaya, 2007). In a study focused on online learning, it was found that subjective norms had an effect on perceived usefulness, but did not impact perceived ease of use (Shen et al., 2006). More studies are required to evaluate whether student usage is positively or negatively impacted by subjective norms, specifically in different cultures.

Based on the previous arguments, the current study supports the notion that behaviours are greatly influenced by expectations and subjective norms. Therefore, it is necessary to involve subjective norm as an independent factor to measure M-learning success into the model. Moreover, this study examines subjective norms as a social dimension.

Attitude Toward using M-Learning (AT)

The Theory of Reasoned Action (TRA) first introduced the construct of Attitude. Rogers (2003) described attitude as an individual's feelings or thoughts towards novel or innovative ideas. An individual's attitude can be negative or positive and can influence whether a particular behaviour is performed (Fishbein & Ajzen, 1975). Melone (1990) proposed that the definition of attitude be adjusted to reflect a predisposition of an individual to react positively or negatively towards a technology, system, or application.

Regarding technology usage, many studies have proven that attitude has a positive relationship with use of m-learning services in a mandatory setting (Akour, 2009; Jacob & Issac, 2007; Park et al., 2011). However, Lu and Viehland (2008) argued that the attitude and use of a system are not related. Davis et al. (1989), on the other hand, revealed that an individual's attitude has a greater impact in an environment where behaviour is voluntary, but does not play a huge role in a mandatory environment. Brown (2002) showed that the students' attitude towards web-based learning contributed to the usage level of the technology. In another study conducted by Lee, Cheung, and Chen (2005) in Hong Kong with 544 universities, it was found that attitude was significantly related to perceived usefulness, ease of use, and enjoyment. Ngai et al. (2005), similarly, found that the use of a WebCT system greatly affected the students' attitudes towards the system, and that it was directly associated to PU.

In conclusion, previous studies show that usage of a system is influenced by an individual's attitude. This could predict in some extent the students' usage of m-learning in universities and colleges. Therefore, there is a need to investigate the effect of attitude towards using m-learning in different cultural, such as higher education in KSA. Thus, the researcher sees that it is necessary to involve attitude as an independent factor into the model.

2.9.3 Needs for Inclusion of Trust in Technology and Trust in Organisation Constructs

The use of wireless technology in the 21st century was explosive. It is believed that as individuals trust more in technology, the more likely these individuals will also accept and use the technology. Trust in technology can be increased if the system has sufficient security and privacy setting that can protect confidential information (Lippert, 2002). Although security and privacy are a focus for internet based technology, other factors, such as reliability and predictability, could also improve trust, especially in an education context.

Trust in providers is an important factor, according to Bandyo-padhyay (2002). One of the biggest challengers for providers is the lack of trust people have in mobile networks, especially when making transactions (Unyolo, 2013). Also, trust was a main theme in the adoption of mobile services and trustworthiness has significant and positive impacts on the learners‟ perceived adoption and satisfaction (Kaasinen, 2005, 2007; Zeithaml, Parasuraman, & Malhorta, 2000).

Research has evaluated aspects of trust specifically in mobile technology (Almushasha & Hassan, 2009; Ghosh & Xu, 2010; Mahatanankoon et al., 2006; Siau & Nah, 2006; Siau et al., 2003; Termsnguanwong, 2010; Wang et al., 2006; Wickramasinghe & Misra, 2004). A central theme in these studies is that individuals must have trust in the organisation and the products they offer before they can have confidence in performing mobile transactions. In this way, trust may be a more important factor in m-learning than in the more conventional form of learning, since classroom learning involves face to face interaction where personal relationships and trust can develop. Trust, therefore, can be considered an important factor for m-learning and e-learning success (Ibrahim & Walid, 2014; Lawless & Allan, 2004; Robertson, 2005). Also, trust is a main facilitator of mobile wireless transactions because human beings need to understand the social surroundings of the virtual environment (Jaradat, 2011).

In detail, trust in the institutions, such as universities, requires trust from both the managerial staff and the organisations support of IT (Filstad & Gottschalk, 2010; Lewicki & Bunker, 1996; Tyler & Degoey, 1996). This dimension gives positive views for users who might be using and interacting with IT (Lewicki & Bunker, 1996; Powell, 1996; Tyler & Degoey, 1996). In fact, trust in IS is becoming more important to academicians and practitioners (Lippert, 2001). It is worth it to note that trust in the electronic channel, such as mobile channels, is the major determinant of the adoption of new technology (Malaysian Administrative Modernisation and Management Planning Unit, 2003). In fact, Alsukkar (2005) also agreed that trust in the mobile channel influenced the adoption and use of technology, in the context of Jordan. Therefore, it is important to study trust in the mobile channel variable that fosters and impede the adoption of new technologies, particularly m-learning. This study proposes that trust in technology acceptance requires an environment with two key ingredients: (i) Trust in the university as an institution (ii) Trust in the mobile channels as electronic channels.

2.9.4 Needs for Inclusion of Institution Policy Construct

Institutional policy refers to the policies that can restrict the usage of m-learning technology to become more widespread in higher learning institution (Ndonje, 2013). Generally, the literature shows that the level that developed countries adopt and implement m-Learning can be influenced by the lack of institutional policy and strategies. In these cases, m-learning technologies are supported by individuals instead of the entire organisation, making it difficult to gain traction within higher learning institutions (Lwoga 2012). Thus, for a technology to be successful, the system needs to be supported and backed by the institution through strategic plans and policies that help in motivating students to use the technology (Rosenberg, 2006). Therefore, it is necessary to involve Institutional policy into the research model.

2.9.5 Needs for Inclusion of Organisation Support Construct

Organisation support can be regarded as the level that the organisation's management team believes in and understands IS function and its activities (Nathan et al., 2004). From an employee's perspective, organisation support can be described as how an employee perceives the organisation's support for a particular technology (Seymour et al., 2007; Venkatesh et al., 2003).

Technology adoption is often impacted positively or negatively by organisation support. Several previous studies have emphasised the pivotal role of organisation support in ensuring technology usage. Specifically, it was shown that technology usage would be decreased unless senior management was involved in managing and supporting the technology in the business (Kwan & Wang, 2009; Nathan et al., 2004). Furthermore, lack of organisation support and IT training facilities could limit the number of users from using the technology (Wang & Chen, 2006). Wang and Chen (2006) gave this assertion from a study carried out in a Taiwanese hospital that examined the quality recognition of medical information systems and evaluated the factors contributing to low usage of the medical information system by physicians.

Again, the work of Vonk, Geertman and Schot (2007) identified several negative factors that affect system failure, such as the negative feelings of the managers, social disorganisation of the employees, and low recognition of the benefits of a system, as well as inadequate implementation support by the organisation. On the other hand, usage of IS would be achieved if organisation support is existing in the organisation. For instance, a study by Wu, Shen, Lin, Greenes, and Bates (2008), which introduced new variables that influence trust and management support in the model, investigated factors responsible for the adoption of a health information system, specifically, adverse event reporting systems by healthcare professional users. It was shown that organisation support significantly affects perceived ease of use.

Further studies, such as Hamdy and Al-Enezi (2009) and Nathan, Apigian, Nathan, and Tu, (2004), confirmed that organisation support is positively correlated to the adoption of a system, and this support could be direct or indirect support. Direct support entails the direct involvement of IT staff in the information development stages, especially planning, design, and development stages. On the other hand, indirect support is often seen in the situation where vendors and consultants are hired to ensure adopting the system.

Management support may also be seen in the form of designing appropriate strategies in the adoption and usage of the technology, especially regarding making information easier to find as well as understand in order to ensure successful adoption of the IS. This is corroborated in the study by Brown (2002) that found that focused organisation support may increase system usage among the users, as well as reducing anxiety arising from using the system, which, in turn, improves the adoption/acceptance of technology significantly.

It should be noted that organisation support involves all efforts directly or indirectly taken by the organisation to ensure the success of a system. This may also include overcoming obstacles in the process of learning to use the IS or other forms of assistance made available to ensure IS success (Lewis, Agarwal, and Sambamurthy, 2003). The study by Lewis et al. (2003) examined the factors that inform users' perception regarding IS usage, where it was shown that organisation support is significantly related to ease of use. It is known that organisation commitment greatly impacts individual beliefs to use IS.

Conclusively, it is believed generally that organisation support directly impacts IS usage. Inadequate or ineffective organisation support may cause the IS usage to be impacted. Therefore, it is necessary to evaluate the effects of organisation support on the usage of ML service among students in universities of KSA as new culture. Therefore, it is necessary to involve organisation support into the model.

2.10 Conceptual Research Model

A conceptual research can identify the relationships that exist between different variables as it pertains to the research objective (Sekaran, 2003). Thus, Sekaran (2003) asserted that a research model is an essential foundation on which other research structures extend the frontier of knowledge. Considering the discussions in the literature review together with those in this chapter, the researcher came up with a conceptual research model for the contributing factors of m-learning success among students in the SA universities. Figure 2.8 shows the conceptual model in this research.

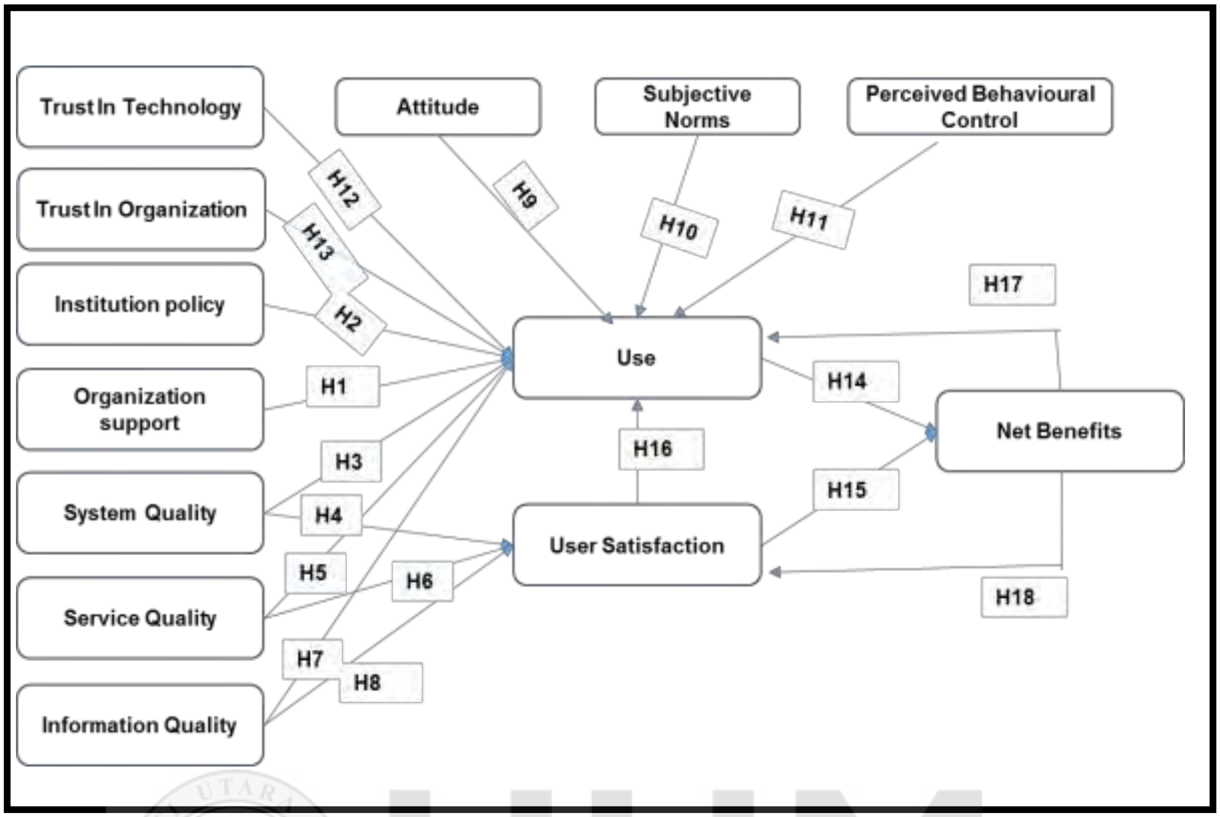

Figure 2.8. Conceptual Model

The conceptual research model in this study was formulated for NB, U, and US, which serve as dependent variables. The determinants of NB include US and U. The determinants of U comprise IP, OS, IQ, SEQ, SQ, AT, SN, PBC, TT, TO, US, and NB. US is determined by IQ, SEQ, SQ, and NB. Figure 2.8 illustrates the potential relationships between the dependent and independent variables.

2.11 Operationalization of Constructs and Hypothesis

The operational definition of constructs provides useful terms to describe the relationship between the constructs used in this study. This study uses thirteen constructs to model the contributing factors of m-learning success among students in the SA universities. The variables are service quality (SEQ), system quality (SQ), information quality (IQ), organisation support (OS), institutional policy (IP), subjective norms (SN), Perceived Behavioural Control (PBC), Attitude (AT), Trust of Technology (TT), Trust of Organisation (TO), Use of a system (U), User Satisfaction (US), and Net benefits (NB). The operational definitions of the constructs are shown in Appendix F.

2.11.1 Independent Variables

2.11.1.1 Institutional factors

Previous studies, such as the study conducted by Agarwal (2003), established that technology acceptance is not only influenced by individual characteristics, institutional characteristics, and social characteristics, but other factors also contribute and intertwine, thereby influencing technology acceptance. One of the factors is technology (or system) characteristics, as can be seen in Park et al. (2006), where it was observed that individual characteristics interacted with technology characteristics, which, in turn, influenced technology acceptance.

<u>Organisation support (OS)</u>

Organisation support can be regarded as the level that top management believes in the IS function and is willing to support it during development and activities (Nathan et al., 2004). Technology adoption and utilisation is often impacted positively or negatively by organisation support. Several previous studies have emphasised the pivotal role of organisation support in ensuring technology usage. Specifically, it was shown that the organisation must manage and support the usage of technology, otherwise technology usage would be impacted (Kwan & Wang, 2009; Nathan et al., 2004). Furthermore, lack of support from the entire organisation and IT training facilities could demotivate users from using an information system (Wang & Chen, 2006). Wang and Chen (2006) gave this assertion from a study carried out in a Taiwanese hospital that examined the quality recognition of medical information systems and evaluated the factors contributing to low usage of the medical information system by physicians.

It should be noted that organisation support involves all efforts directly or indirectly taken by the organisation to ensure the success of a system. This may also include overcoming obstacles in the process of learning to use the information system or other forms of assistance made available to ensure IS success (Lewis et al., 2003). The study by Lewis et al. (2003) examined the factors that inform users' perception regarding IS usage, where it was shown that organisational support is significantly related to ease of use. It is known that organisation commitment greatly impacts individual beliefs to use IS.

Conclusively, it is generally believed that organisational support directly impact IS usage. Inadequate or ineffective organisation support may cause the IS usage to be impacted. Therefore, it is necessary to evaluate the effects of organisation support on the usage of ML service among students in universities of KSA as a new culture.

H1: Organisational support has a significant influence on Use of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.

Institutional policy (IP)

Institutional policy refers to the policies that restrict the widespread use of m-Learning in higher learning institutions (Ndonje, 2013; Lwoga, 2012). Generally, the literature shows that m-Learning implementation in developed countries is also negatively influenced when institutional policies and strategies do not exist. Thus, in order to motivate students to utilise m-learning, it is important that the program is supported by institutional and national policies (Rosenberg, 2006).

Several experimental studies examined the impact of institutional policy on IS success in several contexts of different countries (Lwoga, 2012; Ndonje, 2013). In this study, Institutional Policy refers to the policies that limit the wide usage of m-learning to support learning and teaching in a higher learning institution (Ndonje, 2013).

The use of these technologies is mainly driven by individual efforts rather that institutional policies and strategies, which limits the wide usage of these technologies to support learning and teaching in higher learning institutions (Lwoga, 2012). Therefore, supportive institutional and national policies, based on individual values, are necessary to encourage and motivate individuals towards the desired directions and motivate students creatively (Asiimwe et al., 2017).

As most ICT in education policies were articulated in a ‘pre-mobile’ era, they do not seek to maximize the learning potentials of mobile technology (Karch, 2014). The rare policies that do reference mobile devices tend to treat them tangentially or ban their use in schools

(Athanasopoulos, 2017). Newly developed policy directives related to mobile learning should be embedded within existing ICT in education policies, which many governments already have in place (Khaddage et al., 2016). In order to leverage the opportunities afforded by mobile technology and other new ICTs, education officials may need to review existing policies. The examples of institutional policy related to the usage of mobile learning as following :

- Examine the unique educational potentials and challenges offered by mobile technology and, when appropriate, incorporate these understandings into broader ICT in education policies (Sife et al., 2007).
- Avoid blanket prohibitions of mobile devices. Universal bans, unless implemented for well-considered reasons, are blunt instruments that usually obstruct educational opportunities and inhibit innovation in teaching and learning (Kraut, 2013).
- Provide guidance on how new investments in technology can work in conjunction with existing educational investments and initiatives (Kraut, 2013).
- Prioritize the professional development of teachers. The success of mobile learning hinges on the ability of teachers to maximize the educational advantages of mobile devices (Levy, 2009).
- Provide necessary technical and well as pedagogical training to teachers when introducing mobile learning solutions and opportunities. While many teachers know how to use mobile devices, many do not, and as devices grow more versatile and complex they tend to become more difficult to use (FernáNdez et al., 2013).
- Encourage teacher training institutes to incorporate mobile learning into their programmes and curricula (Simonson et al., 2014).

- Provide opportunities for educators to share strategies for effectively integrating technology in institutions with similar resources and needs (Afshari et al., 2014).

As such, to overcome limitations of m-learning utilisation, one must understand the deployment level of these technologies in different countries, such as Saudi Arabia (Badwelan et al., 2016). For this reason, Institutional policy is included into the model.

H2: Institution policy has a significant influence on Use of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.

2.11.1.2 Technology Factors

The major factors that can be linked to successful M-learning implementation relates to the characteristics of system itself. Several keys aspects of M-Learning system involve the quality of the system, services, and information, as described below.

Systems quality (SQ)

Information systems can be assessed based on the quality of information it is able to store, produce, and deliver to users. The quality of the information directly impacts the satisfaction of users and usage level of the system. As a result, it can also affect the net benefits that users can get from using the system (DeLone and McLean, 2003). Several system characteristics such as relative advantage, result demonstrability, trial ability, visibility, image, compatibility, voluntariness were shown to affect technology acceptance and information quality. This postulation can be supported by Venkatesh, Morris, Davis, & Davis (2003).

Recent mobile devices are capable of providing information instantaneously (Cohen, 2010; Eteokleous and Ktoridou, 2009; Cavus and Ibrahim, 2009). Many learning needs require learners to obtain timely information promptly. Examples include updates and announcements from educators, or finding immediate solution to some specific questions or problems encountered during study or an assignment, such as looking up definitions, formulas, and equations. With mobile devices, learners can quickly search to obtain or clarify such information. Another useful aspect of m-learning is Continuity, since the learning model offers ubiquitous access to information by having access to vast resources that allow the learners to obtain learning materials at any given place, as well as at any given time. It was even shown from a study conducted by Lan and Sie (2010) that the ability to sustain learning without the constraints of location or time enhances the learner's motivation to utilise their mobile devices or applications for learning. Learners have the liberty to access information and learning material at various places, times, and in a variety of ways. This notion, thus, implies that learners are similar to consumers. Considering M-learning users as consumers brings perceived quality into focus. How a customer perceives the quality of services or products that are provided by an IT system will impact their intention to use it.

By definition, perceived quality is described as the customer or user's feelings or beliefs about the product or service (Zeithaml, 1988). Researchers have sought to classify perceived quality perspectives into diverse dimensions subject to the focus intended (Parasuraman et al., 1985, 1988). This is primarily because perceived quality can be said to be product-related (Chu and Lu, 2007). The perceived quality of IT products can be considered in two dimensions; technology infrastructure and service delivered. These two combined perspectives have effects on the perceived overall quality. The perceived quality, in turn, affects users' acceptance and users' intention to use. Information quality is central to building successful IS (Delone and McLean, 1992). Furthermore, later researchers have shown that perceived system qualities, as well as perceived content quality, are directly related to how users perceive the usefulness of the mobile internet (Cheong & Park, 2005; Jiang, 2009). Others such as Lin and Lu (2000) considered information quality as a component of Information System quality, and that it is significantly and positively related to perceived usefulness.

Other works have also emphasised the significance of content quality to perceived usefulness, especially in online social information services (Dai et al., 2007). Moreover, Yang et al. (2005) outlined six dimensions of quality and showed that perceived overall service quality and user satisfaction are significantly and positively related. Other studies showed that perceived satisfaction in a system is predicted by perceived quality (Liaw, 2008; Chiu et al, 2008) Viewing m-learning as a kind of advanced information, it can be reasoned that perceived quality constitutes an integral element of the model.

Hu & Zhang (2016) conducted a study in China that aimed to examine behavior intention of university students towards mobile library (m-library) applications (apps) and to explore the determinants of their perceptions of m-library apps. The study found that perceived qualities of system quality, information quality, and service quality significantly affects university students' perceptions of use of m-library apps. In this empirical research, the effect of service quality is strong. Moreover, system quality was shown to have an important effect on the intention to continue using m-library. These studies corroborated the findings of Lu et al. (2011) and Yang et al. (2012) which found that system quality is important in use of mobile application. Also, system compatibility, system reliability has positive effects on the perceived ease of use and this result goes in the direction of the studies conducted by DeLone & McLean (2003) and Petter and McLean (2009). This was also shown in many studies, such as Shin (2009), Chandra et al. (2010), and Schierz et al. (2010). Additionaly Hu and Zhang (2016) found that poor system quality causes a decrease in user satisfaction from using m-library.

The study that was conducted by Balasubramanian (2014) indicated that system quality was an essential component of the information system itself, as mentioned by Delone and McLean (1992). Furthermore, ease of use and learning, system flexibility, system integration, drawing response, response time, and reliability were considered to be important measurements for the influence of system quality towards the use and the adoption for E-learning. In a study that was conducted by Ying-Feng & Ling-Show, (2004) with the purpose of measuring the features of an electronic commerce system, it was found that usability, availability, adaptability, response time, and reliability are important measurements for the system quality towards the usage and adoption for Web sites as an information processing system. This was in the same direction as Lin & Lu (2000); Ghandour, Deans, Benwell, & Pillai, P. (2008) and DeLone & Mclean, (2003).

In the marketing and advertising sector, IS service quality, which is composed of service quality, system quality and information quality is becoming increasingly important. Without strong IS service quality, competitor websites may be able to take potential customers away. According to Hung, Chen and Huang (2014), customer satisfaction with a website is influenced by the quality of service, system and information. In addition, website features, such as privacy, security, easy navigation, and customisation can also improve system quality (DeLone and McLean, 2003; Balasubramanian, 2014).

H3: System Quality has a significant influence on Use of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.

H4: System Quality has a significant influence on User Satisfaction of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.

Service Quality (SEQ)

The quality of service is also assessed by the service quality. The intent to use the system and user satisfaction are directly influenced by service quality. As a result of this impact, the net benefits are also impacted (DeLone and McLean, 2003).

A study was conducted by ALSMADI & Hilles, (2017) with the purpose of evaluating the important of service quality on students on Higher Education. The study found that service quality motivates the participants to employ Mlearning. For educational plan, organization and policy maker must really pay attention to technology element. Taking into account the element of technology might provide assurance of a higher percentage, which would assure effective implementation. Also, the study found that trust and service quality among the educational technology students may ease the integration of m-learning and social media in the context of education. In order to get students to feel motivated to use m-learning, m-learning has to have suitable content and appear attractive to the user. Moreover, the service quality and trust was shown to have an important effect on the intention to continue using M-Learning.

Bitner and Hubbert (1994) described service quality as how a customer perceives and feels about the service performance, whether it be positive or negative. However, others have described service quality as the user's perceptions on the performance of the service (Ying-Feng, & Ling-Show, 2004). Also, they referred the important influences of the service quality on the intention to use a Web site. Service quality remains a valid tool for measuring the adapted model for a wide range of services and Web sites quality (Ying-Feng, & Ling-Show, 2004 & Maditinos, Mitsinis, & Sotiriadou, 2008). However, Ying-Feng, & Ling-Show, (2004) in their study that aimed to develop new measurements for service quality, identified that there are several dimensions to evaluate service quality, such as reliability, tangibles, responsiveness, empathy, and assurance. These dimensions of post service quality lend high influences on the intention to use (Ying-Feng, & Ling-Show, 2004; Parasuraman, Zeithaml, & Malhotra, 2005). We argued that system quality and information quality have an impact on the use of IS in organisations, which ultimately has an influence on the performance of the job. In a mandatory IS-use context, system quality is shown to affect use (DeLone and McLean, 2003; Livari, 2005; Yim & Shin, 2014)

IS success can also be measured by service quality, which consists of three classes. These classes include the use frequency, whether the system is used, and the users' dependence on the system. In general, if the customer's expectations are met or exceeded, the service quality is considered to be high. Factors, such as security, access, communication, responsiveness, and reliability, play a role in service quality. Researchers have noted that customers are more satisfied with the system if the IS service quality is high (Conrath & Mignen, 1990). To improve service quality, a number of measures can be implemented, including increasing system reliability, making privacy setting easier, a friendly and easy to navigate website design, improvements to security, and improved customer service. Improvement in these areas can help to increase customer satisfaction (Hung & Chen & Huang, 2014).

There are two main revisions to the updated D&M model. The IS Success Model has added service quality as a dimension of quality (DeLone & McLean, 2003). Without the addition of service quality, researchers may not estimate IS effectiveness accurately (Pitt, Watson & Kavan, 1995). Also, "net benefits" was added to the model as it integrates both "individual" and "organisational impacts".

Intentions to use the system and user satisfaction are both positively affected by service, system and information quality, which in turn, influence the net benefits. There are five dimensions that are used to measure ICT service quality. These include: (1) Physical attributes. Which can include the equipment, the appearance of the personnel, and the state of the facility; (2) Reliability; (3) Customer service and responsiveness to questions and issues; (4) the ability of representatives from the organisation to create trust and confidence with the customers; and (5) Empathy that the service provider has towards the users (Jiang, Klein & Crampton, 2000).

H5: Service Quality has a significant influence on Use of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia

H6: Service Quality has a significant influence on User Satisfaction of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia

<u>Information Quality (IQ)</u>

Information quality is also an essential part to measure the overall quality of the system. A system with high information quality can be described as a system that delivers good and varied information that are relevant to the user. Information quality is typically defined at the beginning phases of design and development. Features, such as reliability, accuracy, and timelines, are identified during the system operations. It could be further regarded as comprising these characteristics: reliable, relevant, timely, complete, varied, and detailed (Ahn, Ryu, & Han, 2007). Information quality may also influence the report content, which is regarded as a measurement of perceived effectiveness by the user for the information quality (Ahn et al., 2007; Srinivasan, 1985). Several variables, such as adequacy, relevance, accuracy, and comprehension constitute the component of information content, while form, on the other hand, comprises format quality, information results, manner of presentation, and timeliness of reports (Srinivasan, 1985). Information quality or output quality is regarded as a vital benchmark of technology or system characteristics Information quality may give an indication of the extent of technology acceptance (Ahn et al., 2007).

The backdrop that information quality is an essential component of technology acceptance is established by the majority of the studies conducted with respect to technology acceptance. However, the studies differ with respect to the perspectives. While some studies such as Mohd, Syed Mohamad, and Zaini (2005) considered the importance of information quality from the vendor's perspective, others, such as Chismar and Patton (2002), held that information quality is important from the user's perspective. The work by Mohd et al. (2005) examined the association between information quality and the recognition and acceptance of doctors focusing on the health information system, specifically the Electronic Medical Record System (EMR). The research was carried out in a hospital in Malaysia. It was found from the study that information quality significantly impacts perceived usefulness and perceived ease of use. Among the important recommendations from the research is that the findings underscore the critical need for system designers to have effective communication with the end users about the information quality factors.

To understand the association between information quality, perceived ease of use, and usefulness, Ahn et al. (2007) conducted a research that was intended to test how the quality of the website is related to the acceptance behaviour of the users. The results of the study revealed that perceived ease of use and website usefulness was positively influenced by information quality. Another variable that was also considered is the impact that playfulness has on user acceptance of information system, utilizing an online retailing system as the case study. This study is in agreement with several previous studies, such as Chismar & Patton (2002) and Mohd, Syed Mohamad, & Zaini (2005), and showed that service quality, information quality and system quality strongly affected usefulness, ease of use, and playfulness. This effect was increased when ease of use and intention of behaviour was the mediator. The study also confirms further that greater website quality increased the intention of usage of the system by the mediators of ease of use, attitude, usefulness, and playfulness.

Other related work that also supported this finding includes Ali & Money (2005), where the results showed that the level of usage of a system is dependent on system characteristics. Information quality, system functionality, and ease of use are strongly and positively related to the new system software usage. Information quality also serves as sufficient explanatory rationale for the new system usage. These findings are also supported in other studies, such as Staples, Wong, and Seddon (2002). Staples et al. (2002) studied users' perception regarding the implementation of a new system. Specifically, it focused on the relationship between the expectations that consumers have prior to implementation and the perceived post-implementation benefits. It was revealed in this study that user satisfaction and the success of IS are strongly related to information quality, ease of use, and the usefulness of the system. Other corroborative work, such as Saeed and Helm (2008), also established that system integration and information quality can significantly predict user perceptions regarding information system usefulness. Also, the quality of the information on a continuous basis and the integration of the system had an influence on the IS system for exploratory purposes. This was only supported partially.

From the foregoing, it can be said that information system characteristics, such as information quality, can influence the perceptions of users regarding the value of the information system, as well as its importance. Consequently, usage is often encouraged for users to understand how to apply IS. Once there is conviction that the IS positively impacts their work, especially when it is at the post adoption stage, the greater the usage may be (Saeed & Helm, 2008). Previous studies are in agreement concerning the significance of the impact of information quality with respect to the usage of the technology. Consequently, based on the obtainable empirical evidence, it is pertinent to consider information quality as an integral component which determines if the IS is accepted and used by the user. Therefore, it is convenient to suggest that their information quality impacts perceived usefulness and ease of use on the intention to use technology in various environments and organisational settings.

With increasing pressure on marketing operations, IS features, such as service quality, system quality, and information quality are required to make businesses more competitive.

Research shows that better features of competitor websites can attract users away and decrease user satisfaction from the target website (Hung, Chen & Huang, 2014). Balasubramanian (2014) defines Information quality as the quality of the output of the information that is produced by the system. Information quality, such as currency, timeliness, conciseness, reliability, accuracy, precision, format, relevance, and completeness, are the mean determinants of the information quality.

Under the socio-technical approach, users of IS as social actors and an EMS as a technical subsystem, mutually influence each other. An EMS facilitates users to access and use the information they need. Employees can use an EMS without time and place limits. They can interact with other users or use information other users have already inputted. This means those vigorous interactions between users and an EMS or among users themselves can enhance the quality of information that flows through the EMS. In addition, researchers revealed that system quality enhances information quality in similar information-processing systems, such as web based knowledge services (Lin et al., 2007), ERP systems (Ram & Wu, 2013), and IS in organisations (Gorla et al., 2010), and project information systems (Raymond & Bergerson, 2008). Specifically, Gorla et al. (2010) argued that poor system quality causes lower information quality in an IS in organisations (Yim & Shin, 2014).

Information and output quality can affect the characteristics of the system and whether users will accept the technology (Ahn, Ryu and Han, 2007). During the initial design and development phase of the system, characteristics, such as type and detail of information, are determined. During system operations, on the other hand, characteristics, such as reliability, accuracy, and timeliness, are determined (Ahn et al., 2007). Report content is another feature of information quality that can be used to measure how users perceive the usefulness of the system (Ahn et al., 2007; Srinivasan, 1985).

Many findings have shown that the level of information quality has a large influence on the user's acceptance of the technology. However, some studies have stated that information quality is only important from the user's side, while other studies contradict this finding by stating that it is only important from the vendor's perspective (Malaysia by Mohd, Syed Mohamad, and Zaini, 2005). From the vendor's perspective, it was shown that perceived usefulness and ease of use of the IS system was impacted by the quality of the information provided. The study concluded that it is essential for system designers in the development phase to communicate with the end users about the information quality factors.

From the user's perspective, a study was conducted by Chismar and Patton (2002) among doctors in Hawaii. In this study, TAM2, a health application, was evaluated to determine the factors that influence the physician's intent to use. In this particular case, the most important factors included the usefulness of the system and the quality of output that the system provides as it relates to daily work. These results were corroborated by Algahtani (2004), where features, such as compatibility, relative advantage, and information quality, have a positive influence on user acceptance. On the other hand, the more complex the technology, consumer acceptance was decreased.

A similar result was reported by Ali & Money (2005), who examined the relationships between experience level, training, user education, project size, organisation size, performance impact, information quality, system functionality, complexity of the project, ease of use, and computer self-efficacy. In general, the results showed that the characteristics of the system, specifically information quality, greatly influenced the usage of the new technology or system. This finding was confirmed by Staples, Wong, and Seddon (2002), who examined the effects of the implementation of a new system on users. This research assessed the expectations of the users prior to implementation and how it related to the users' perceived benefits following system implementation. Similar to other studies, information quality, ease of use, and usefulness are significantly related to the success of IS and satisfaction of users.

In sum, user's perceptions and motivations are influenced by information quality of the system. In general, a high level of information quality increased users' perceptions regarding the importance and value of the technology. Saeed and Helm (2008) proposed that users are more likely to adopt a system if the information system is capable of making their work more effective and efficient. Due to the fact that there was agreement in the previous studies concerning the importance of the impact of information quality on the usage of the technology, this study considers information quality as an important influencer on the user's acceptance of the IT. Therefore, there is a need to investigate the impact of information quality on perceived usefulness and perceived ease of use towards the intention to use technology in different environments and organisational settings, especially in the public sector.

H7: Information Quality has a significant influence on Use of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.

H8: Information Quality has a significant influence on User Satisfaction of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.

2.11.1.3 Social Factors

Social Factors (SF) comprises the feeling or perception of users regarding how others close to them view their usage of an information system. That is, users were influenced by their close associates' perceptions about them regarding whether they should use a particular information system (Ravenscroft, 2000; Sharples, 2003).

Social Influence in M-learning will include lecturers, instructors, peers, family members, and other members of the community. It was established that peer influences for students is paramount where the students possess inadequate experience to use information systems effectively (Wang and Shih, 2009). Positive experience is important to ensure that users are fortified since they are influenced by their peers. Furthermore, Delon and McLean (2003), in their model, focused on technology factors and the model does not reflect wider societal context. The social influence on IS success or adoption has a significant effect on

IS success. Hence, in this research, proposed social factors as external factors are included in the DeLone and McLean updated model.

Attitude toward Using M-Learning (AT)

This study includes Attitude as an independent factor into the proposed model. Attitude can be described as the feelings that an individual has about engaging in a particular behaviour (Fishbein and Ajzen, 1975). Regarding technology usage, several studies have proven that attitude is positively related to the use of m-learning services in an obligatory setting (Akour, 2009; Jacob & Issac, 2007; Park, Nam, & Cha, 2011). However, Lu and Viehland (2008) argue that the relationship between attitude and use of a system does not exist. Other studies show that attitude only has an influence in a voluntary environment (Davis et al., 1989). Brown (2002) directed his study at a university located in South Africa to assess the contributing factors to use web-based learning technologies. These results suggest that the enhancement of online learning usage can be improved by increasing attitude.

In conclusion, Attitude is a crucial factor in the adoption of a system, which links the major keys that determine the adoption. This could predict, to some extent, the students' adoption of m-learning in a university or college setting. Therefore, there is a need to investigate the effect of attitude toward using m-learning in different cultural, such as higher education in KSA.

H9: Attitude has a significant influence on Use of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.

Subjective Norms (SN)

Subjective norm (SN) can be described as the influence that peers and family members have on an individual's behaviour (Park et al., 2006). People who are close and important to the individual are like family members, friends, and colleagues (Agarwal, 2000: Merchant, 2007). Moreover, according to Chiasson and Lovato (2001), social pressure can influence subjective norms. This dynamic plays a strong role on IS adoption and usage.

Several studies have demonstrated that Subjective norm has a strong influence on IS usage. For example, Chung, Skibniewski, and Kwak (2008) examined the construction sector to determine the main factors required for successful ERP system implementation. It was found that a user's intent to use the system was influenced by subjective norms. Additionally, there is a strong effect for subjective norm on intention to use and perceived usefulness, which was confirmed by Schepers and Wetzels (2007). In a separate study, using a high school environment where IS usage is mandatory, it was shown that social norms and image are positively related (Singletary, Akbulut, and Houston, 2002). Chang (2004) found that usage can be predicted based on social factors and user attitudes.

Additionally, subjective norms are proposed to have an influence on technology usage by students. In Yang's (2007) study, students were more likely to accept TAM and WebCT based on their subjective norms. In a different study, Yalcinkaya, (2007) found that subjective norm has a negative direct effect on the acceptance of police officers to use the POLNET system in Turkey. This is because the system implemented in the police force facilitates their job better in dealing with the public.

However, Seymour, Makanya, and Berrange (2007) also did not find any effect of social influences on acceptance of ERP systems using UTAUT. They further found that social influence reduces until it becomes insignificant on the implementation of the system. Venkatesh and Davis (2000) further showed that social constructs (subjective norm, social factors, and image) are not significant when the systems usage is optional. Although, if system usage is obligatory, intention is directly influenced by social influences.

Usage of IS can be influenced by a combination of the user's experience and subjective norms (Chiasson and Lovato, 2001). In a government context, subjective norm was a key factor in the usage of the e-government system (Lin, Hu, and Chen, 2003). An individual's opinions could also influence the evaluation of the system. Based on past literature, we propose that subjective norms could have an influence on the usage of e-learning in universities and colleges.

Based on the previous arguments, the current study supports the notion that social factors, such as subjective norm, could be a predictor for the usage behaviour of IS. Moreover, Subjective norms were found to be an important factor of IT usage.

The attitudes and feelings that a group has about a technology can shape how that technology is received and used. There are various sources of social influence that could determine one's usage and, hence, behaviour, such as peers, friends, managers, and co-workers. Pressure from an individual's social network can influence new users to adopt a particular behaviour, such as using and adopting IS.

In summary, subjective norm is a social factor that could potentially influence the students' usage of M-learning system among students in universities of KSA as a different culture. Therefore, this study will evaluate the effect that subjective norms have on students' usage of M-learning system.

H10: Subjective Norm has a significant influence on Use of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.

Perceived Behavioral Control (PBC)

Many studies have suggested that Perceived Behavioral Control (PBC) is an important factor for actual use. PBC can be described as an individual's awareness about how easy or challenging a particular behaviour will be to engage in (Ajzen, 1991). An extension of this definition includes an individual's past experience and their perceptions of the challenges or obstacles that may prevent an individual from performing a particular behaviour (Doll and Ajzen, 1992).

A number of studies have based IS usage on PBC. PBC and behavioural intent to use IS was found to be significantly related (Mathieson, 1991; Taylor and Todd, 1995a). Also, Daneshgar et al. (2007) found that people with a low PBC prefer to use less m-learning services. In the past empirical and theoretical research, usage and PBC are strongly related.

On the other hand, the concept of PBC and self-efficacy are compatible. An individual is more likely to engage in behaviours that they have confidence in performing (Ajzen, 2002). Taylor and Todd (1995) stated that self-efficacy is based on how confident an individual feels about a service leading to a desired behaviour. Furthermore, Kaseniemi and Rautiainen (2002) mentioned that young people consider m-learning services as more interesting than PCs. So, we can expect that PBC will be higher among student users than among users in general. Daneshgar et al. (2007) found that people with a low PBC prefer to use less m-learning services. Therefore, it is necessary to involve Perceived Behavioural control as an independent factor to measure M-learning success into the model.

H11: Behavioural Control Beliefs have a significant influence on Use of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.

2.11.1.4 Trust

The use of wireless technology in the 21st century was explosive. It is believed that acceptance and usage of wireless technology is increasing rapidly due to increased trust. Increased trust in technology is made possible with improved security and privacy settings that restrict access to personal information (Lippert, 2002). In the university setting, reliability and predictability also influence the trust that students have in using the technology.

Bandyo-padhyay (2002) asserted that users must have trust in providers in order for system usage to be prominent. Unyolo, (2013) proposes that the absence of trust is a key obstacle for mobile service providers, especially in regards to online transactions. Also, trust is considered to be a critical factor in the adoption of mobile services and trustworthiness has significant and positive impacts on the learners' perceived adoption and satisfaction (Kaasinen, 2005, 2007; Zeithaml, Parasuraman, & Malhorta, 2000).

Many researchers have evaluated the impact trust has on mobile technology (Al- Mushasha & Hassan, 2009; Ghosh & Xu, 2010; Mahatanankoon, Wen, & Lim, 2006; Siau & Nah, 2006; Siau, Sheng, & Nah, 2003; Termsnguanwong, 2010; Wang, Lin, & Luarn, 2006; Wickramasinghe & Misra, 2004). In general, these studies are similar in which they found that individuals must have trust in the organisations, as well as in website transactions, for the system to be successful. This explains why trust is more critical in web-based learning, and not as important a factor in the conventional learning setting. While conventional learning requires in-person interactions, web-based learning requires an individual to trust in a product or service that they cannot see or touch. For this reason, trust is important for m-learning and e-learning success (Ibrahim & Walid, 2014; Lawless & Allan, 2004; Robertson, 2005). Also, trust is a main facilitator of mobile wireless transactions because human beings need to understand the social surroundings of the virtual environment (Jaradat, 2011).

In detail, trust in the institutions, such as universities, appears to consist of trust in the competence of the management team and in the organisation's support of IT (Filstad & Gottschalk, 2010; Lewicki & Bunker, 1996; Tyler & Degoey, 1996). This dimension gives positive views for users who might be using and interacting with IT (Lewicki & Bunker, 1996; Powell, 1996; Tyler & Degoey, 1996). In fact, trust in IS is gaining in importance in the school environment (Lippert, 2001c) and in the health care system (Lippert, 2001b, 2001d). It is worth it to note that trust in the electronic channel, such as the mobile channel, is the major determinant of the adoption of new technology (Malaysian Administrative Modernisation and Management Planning Unit, 2003). In fact, Al-Sukkar (2005) also agreed that trust in the mobile channel influenced the adoption and use of technology, in the context of Jordan. Therefore, it is important to study trust in the mobile channel variable that fosters and impedes the adoption of new technologies, particularly m-learning. This study proposes that trust in technology acceptance requires an environment with two key ingredients: (i) Trust in the university as institution (ii) Trust in the mobile channels as electronic channels.

Based on the literatures above, the present study proposes that trust in technology and organisation has important influencing factors in using m-learning services. Thus, the current research considers trust in technology and trust in organisation as two of the independent variables to be tested in the research model.

H12: Trust in technology has a significant influence on Use of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.

H13: Trust in Organisation has a significant influence on Use of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.

2.11.2 Dependent Variables

2.11.2.1 Use of a System (U)

In previous research, the actual system use was a key factor for IS success. The usage of a system is impacted by the quality of the system, information, and service. The level that an individual uses a system can influence the user's satisfaction and intention to use the system. As follows, increased system use can allow users to understand the net benefits of the system (DeLone & McLean, 2003).

A system that is accepted is one that is used by its users. In the past, usage of a system was measured based on frequency of use, number of times the system is accessed, dependency on the system, and the pattern of usage. However, the amount of time that a system is used is a poor measure of system usage. Instead an appropriate measurement would be to evaluate if the system is being used for its intended purpose. Usage of a system, such as VC, is influenced by the loyalty the consumer has towards the system (Lin, 2008).

A user's opinions and attitudes of the system is typically measured by user satisfaction. Satisfaction can be enhanced based on the user's initial expectations and how they are met (Flavian et al., 2006). Satisfaction is granted when the needs of the system are met. In turn, user satisfaction can lead to customer loyalty (Anderson & Sullivan, 1993; Flavian et al., 2006; Yoon & Kim, 2000). Customers that are satisfied with the system can also become ambassadors by recommending it to their peers. A positive experience while using the system will also lead to higher satisfaction. Thus, system usage is an important predecessor to impacts and benefits.

In a study conducted by Zhao & Kurnia, (2014), which studied the continuing usage of mobile payment (M-payment), it was found that the service of M-payment can be measured by accessing availability and the processing integrity, privacy and stability, which had significant influences on consumers' intention to use the system. However, the consumers' attitudes, especially in regards to the stability and security of paying bills online, consumers may not choose to use it anymore. The same result was found by Meharia (2012), Amoroso & Magnier-Watanabe (2012), and Delone and McLean (1992). In many empirical studies and conceptual models, system use is an IS success measure (DeLone & McLean, 1992). Reported use (Fuerst & Cheney, 1982; Maish, 1979) was less important than actual use (King & Rodrigues, 1978; Lucas, 1973; Seddon, & Kiew, 1996; Swanson, 1974). Other studies have focused on the motivation to use the system (DeSanctis, 1982), the rate of use (Culnan, 1983), and the frequency of use for a specific function (Fuerst & Cheney, 1982). In D&M's updated model, use is also measured by navigation patterns, the number of transactions, and the number of times that users visit the site (Balasubramanian, 2014; DeLone, 2004).

Important factors include internet efficacy and personal information needs. Their information needs are normally IT innovativeness, attitude towards DL, and information that is relevant to the educational courses that students are enrolled in. Apart from that, the users also have their personal reasons, such as self-interest, for using the information provided by a digital library (Samadi et al., 2014). Therefore, it is necessary to involve use of m-learning into the model.

H14: Use has a significant influence on Net benefit of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.

2.11.2.2 User Satisfaction (US)

User satisfaction can be described as how happy the user is with using the information system. User satisfaction is based on system use, and the quality of service, system, and information delivered by the IS. Net benefits are directly influenced by user satisfaction (DeLone & McLean, 2003).

Loyalty in m-payment systems is related to user satisfaction (Sanayei, 2011). There are three main areas that are related to user satisfaction as it relates to m-payment. First, consumers must be satisfied with the process and the system that is used for the transaction. Second, users have to be satisfied with either the product or the service. Third, there must be satisfaction in the type and detail of information provided by the m-payment system (Molla & Licker 2001; Wang & Liao 2007). Continued use of the m-payment is greater based on user satisfaction (Lin & Wang 2006; Zhao & Kurnia, 2014).

Chan (2014), in his study that aimed to study user satisfaction and system use for measuring the measure of IS success, found that system use was an important criteria for IS success (DeLone & McLean, 2003). Furthermore, users' satisfaction is dependent on the difference between the initial expectations of the system and the actual results (Flavian et al., 2006). Also, user satisfaction and System usage are strongly related where positive experience of the use leads to increases user satisfaction. Thus, system usage must precede impacts and benefits (DeLone & McLean, 2003).

Literatures on D&M model prove that information quality and system quality jointly or separately affect user satisfaction—the user's response to the IS (Seddon & Kiew, 1996; Rivard et al., 1997). Consequently, user satisfaction also affect the usage of IS (DeLone & McLean, 2003; Abasi et al., 2015).

However, use of hardware and advanced equipment, such as portable computers and smart sensors, must be present and have useful applications for the system in order to reduce errors. Optimal support services will lead users to be fully satisfied with service quality (Safdari et al., 2014). Therefore, it is necessary to involve user satisfaction into the model.

H15: User Satisfaction has a significant influence on Net benefit of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.

H16: User satisfaction has a significant influence on the use of the m-learning context.

2.11.2.3 Net Benefit (NB)

Net Benefits (NB) is defined as the assessment of the expected and actual benefits regarding the totality of net benefits received from the use of IS. The realisation of IS benefits is considered a backbone for IS success (Zhou, 2013). Seddon (1997) and Delone and Mclean (1992, 2003) assert that the construct of net benefits is one of the primary constructs in IS success. Several researchers also stressed that NB have an important effect on IS success in different contexts (Attaran, 2012; Bento & Costa, 2014; Zhu et al., 2012; Chatterjee et al., 2009; Vuolle, 2011), as shown previously.

Net benefits are the most important success measures as they capture the balance of positive and negative impacts of the m-learning on students (Cidral et al., 2017). The usage of m-learning saves individual students' time and money as well as countries' investments in m-learning infrastructure which can be yield a net positive growth in the gross national product. "Net benefits" measures must be determined by context and objectives for each m-learning investment (Alrasheedi & Capretz, 2018). Thus, there will be a variety of m-learning net benefits measures, but many will be the same ones that have been developed and tested for IS investments in general.

Net benefits success measures are most important, but they cannot be analysed and understood without "system quality" and "information quality" measurements. For example, within the m-learning environment, the impact of an m-learning design on students usage cannot be fully understood without an evaluation of the usability and the relevance for the information, services, and system quality of the mobile applications that is provided to the students (Parsazadeh et al., 2018)..

NB were tested and confirmed in many domains as the determinant of US (Bharati & Chaudhury, 2006; Hsieh & Wang, 2007; Kulkarni et al., 2006; Leclercq, 2007; Wu & Wang, 2006). The relationship between NB and the U of a system was also tested and confirmed by some researchers (Bento & Costa, 2013; Chatterjee et al., 2009; DeLone & NcLean, 2003; Hsieh & Wang, 2007; Seddon, 1997; Venkatesh & Morris, 2000; Wixom & Watson, 2001; Wang, 2006; Wixom & Todd, 2005). Agarwal and Prasad (1997) determined a significant relationship between the respective advantages of a system and intention to use.

In the m-learning service context, numerous benefits were provided for the users of m-learning services. These benefits have different effects (negative or positive effects) on the individual level through usage behaviour and user satisfaction of m-learning services. For instance, receiving anticipated benefits repetitively and frequently from using m-learning services may lead to a positive effect toward the usage of these services (and vice versa). This repeated usage may serve as a feedback relationship. As a result, the usage/adoption of m-learning services may be ultimately enhanced. Additionally, users have many needs and anticipated desires that can be fulfilled through m-learning services. If m-learning services fulfil their needs, users will feel satisfied and pleasured in using these services (a positive effect), thereby increasing usage/adoption of m-learning services. User satisfaction also serves as another feedback relationship of NB influence. Lastly, the literature review of IS success domain indicates that studies assessing m-learning success in developing countries are lacking (El-kiki & Lawrence, 2006; Vuolle, 2011). Therefore, this study focuses on the NB influence toward m-learning success to fill this gap.

Based on literature review and discussion above, NB was added to the study as a dependent variable that potentially has an influence on the User Satisfaction and Usage of m-learning. Therefore, the hypotheses are proposed, as follows.

H17: Net benefit has a significant influence on Use of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.

H18: Net benefit has a significant influence on User Satisfaction of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.

Table 2.11

Research Main Hypotheses between Independent and Dependent Variables

Codes	Description of Hypotheses	Independent Variables	Dependent Variables
H_1	Organisation support has a significant influence on Use of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.	OS	U
H_2	Institution policy has a significant Influence on Use of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.	IP	U
H_3	System Quality has a significant influence on Use of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.	SQ	U
H_4	System Quality has a significant influence on User Satisfaction of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.	SQ	US
H_5	Service Quality has a significant influence on Use of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia	SEQ	U
H_6	Service Quality has a significant influence on User Satisfaction of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia	SEQ	US

Table 2.11 Continued

H_7	Information Quality has a significant influence on Use of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.	IQ	U
H_8	Information Quality has a significant influence on User Satisfaction of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.	IQ	US
H_9	Attitude has a significant influence on Use of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.	AT	U
H_{10}	Subjective Norm has a significant influence on Use of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.	NS	U
H_{11}	Behavioral Control Beliefs have a significant influence on Use of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.	PBC	U
H_{12}	Trust in technology has a significant influence on Use of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.	TT	U
H_{13}	Trust in Organisation has a significant influence on Use of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.	TO	U
H_{14}	Use has a significant influence on Net benefit of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.	U	NB
H_{15}	User Satisfaction has a significant influence on Net benefit of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.	US	NB
H_{16}	User satisfaction has a significant influence on the use of the m-learning context.	US	U

Table 2.11 Continued

H_{17}	Net benefit has a significant influence on Use of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.	NB	U
H_{18}	Net benefit has a significant influence on User Satisfaction of Mobile Learning in the Public Universities in Kingdom of Saudi Arabia.	NB	US

2.11.3 Mediating Effects

Preacher and Hayes (2008) argued that mediation acts as a process by which some variables exert their influences on another variable by intervening with another variable called a mediator. Thus, a mediator exhibits and explains the relationship between the predictor and criterion variables (Hair, Hult, Ringle, & Sarstedt, 2014; Preacher & Hayes, 2004, 2008). The mediating variables are often used to explain or describe psychological phenomenon (MacKinnon & Fairchild, 2009). The mediating variable helps to explain the influence that an independent variable has on a dependent variable (MacKinnon & Fairchild, 2009).

The developments in extant and potential mediation analysis assist in obtaining authentic answers to the question with regard to the manner and the reason behind the relationship between two variables (MacKinnon & Fairchild, 2009). Moreover, in a public education environment, the researcher intends to establish the mediating relationships among IQ, SQ, SEQ, and U through the US, and the U mediates the relationship between the US and NB of m-learning services. More explanation on these mediating relationships are discussed in the next sub-sections.

2.11.3.1 Mediating Effect of User Satisfaction

Moreover, user satisfaction was also researched in the context of various theories of information system adoption and dispersion, specifically TAM, TPB, TRA, and DOI. There is a lot of research in the e-commerce, m-banking, e-health services, and e-government services that focus on the construct of user satisfaction as a factor of IS success (Fen Lin, 2013; Flavia'n & Guinaly, 2006; Kim et al., 2009; Suki & Ramayah, 2010; Wang & Liao, 2008; Zhou, 2013). User satisfaction is an important factor for users to adopt and use ML services and can greatly influence the project's outcome. Alawneh, Al-Refai and Batiha (2013) conducted a study in Jordan and highlighted the five major determinants of User Satisfaction. Those five determinants include awareness of public services, public services quality, trust, privacy and security, and accessibility. In a study that involved 400 university employees in Jordan, the main motivator for Jordanian students and staff to use e-services was user satisfaction.

By adapting the DeLone and McLean's IS success model, Wang and Liao (2008) proposed that user satisfaction, perceived net benefits, use, information quality, system quality and service quality should be the primary dimensions of the model. Questionnaires were distributed and structural equation modelling (SEM) was employed for data analysis. The respondents comprised of 119 users in Taiwan. The findings suggested use and user satisfaction are significantly impacted by the information quality. Service quality, use, and user satisfaction were shown to be insignificantly related. A significant relationship between user satisfaction and system quality was shown to exist, but system quality and use were not associated.

User satisfaction was found to be influenced strongly by the perceived net benefits. In a study conducted on e-government services in Malaysia, it was found that user acceptance was influenced by ease of use, perceived usefulness, social influences and pressure, compatibility, influences from external sources, self-efficacy, attitude, PBC, subjective norms, intention to use, and facilitating conditions (Suki and Ramayah, 2010). Therefore, IS success is largely dependent on user satisfaction.

Furthermore, past researchers have evaluated the linkage between satisfaction of users and system usage. For instance, DeLone and McLean (1992) opined that user satisfaction will determine the usage levels of the information system (p. 83). Several studies have supported this assertion by showing that user satisfaction is related to the amount of use of the IS system (Rai et al., 2002; Guimaraes and Igbaria, 1997; Yuthas and Young, 1998).

However, there are few studies that revealed contrasting results (Ang & Soh, 1997; Collopy, 1996; Vlahos et al., 2004). For instance, usage frequency was found to have an insignificant relationship with user satisfaction in some organisations across Asia (Ang & Soh, 1997). Collopy (1996) explored there was a significant linkage between actual usage of an information system and user satisfaction. However, when users self-reported their usage of the system, it was not found to be related to satisfaction.

In addition, Seddon and Kiew (1994) posited that for consumers to use and accept an information system, it must provide benefits to the user. Thus, user satisfaction is enhanced when the information system meets or exceeds the expectations of the user. Many of the previous researchers have explored that user satisfaction is directly related with benefits associated with the system. For instance, user satisfaction is higher when the system has a positive influence on a user's job (Guimaraes and Igbaria, 1997; Torkzadeh and Doll, 1999; Yoon and Guimaraes, 1995), or if it enhanced job performance (McGill et al., 2003). In contrast to aforementioned findings, Yuthas and Young (1998) explored a non-significant association between user satisfaction and the effectiveness of decision making.

2.11.3.2 Inconsistent Findings

It can be inferred from the aforementioned discussion that there are inconsistent findings about the effect of user satisfaction, as well as there is scarcity of empirical studies that have examined users' satisfaction in the context of ML and applications in a developing country. Moreover, there is general lack of empirical studies on user Satisfaction and its influence on the success or failure of ML services (Alawneh & Hattab, 2009a, and 2009b). User satisfaction in ML can contribute to increasing user acceptance and creating a positive user experience after system implementation (Alawneh, Al-Refai & Batiha, 2013).

Therefore, in a public education environment, the researcher intends to establish the mediating relationships between IQ, SQ, SEQ, and U through the US of m-learning services. The researcher proposes the following hypotheses to explain its mediating effect:

H19: User Satisfaction mediates the relationship between IQ and use of m-learning services in the Public Universities in Kingdom of Saudi Arabia.

H20: User Satisfaction mediates the relationship between SQ and use of m-learning services in the Public Universities in Kingdom of Saudi Arabia.

H21: User Satisfaction mediates the relationship between SEQ and Use of m-learning services in the Public Universities in Kingdom of Saudi Arabia.

2.11.3.3 Mediating Effect of Use of a System (U)

The researcher hypothesises that the U mediates the relationship between the US and NB of m-learning services based on (McGill et al., 2003; Igbaria & Tan, 1997). The researcher proposes the following hypothesis to explain its mediating effect:

H22: The students Usage of m-learning mediate the relationship between User Satisfaction and Net Benefits of m-learning services in the Public Universities in Kingdom of Saudi Arabia.

2.12 Justification of Model Development

The D&M model has been applied and validated in a number of IS studies. For instance, it has been tested and validated in studies assessing the success of e-commerce systems (Wang, 2008; Brown & Jayakody, 2008), knowledge management systems (Wu & Wang, 2006), e-government systems (Wang & Liao, 2008). It is evident that the D&M model can be used to assess the success of information systems such as m-learning. It is pertinent to mention that most of the studies assessing success based on the D&M model have been carried out in developed countries, with few explicitly validating the model in the context of m-learning information systems in a developing country such as Saudi Arabia. The major objective of this study is therefore to validate the updated D&M model for assessing the success of m-learning information systems in a developing country. D&M model focus on technology aspects but in developing countries such as Saudi Arabia inistitutional and social factors are needed to ensure procedures. Furthermore, many researchers stated that additional factors must be identified to validate the updated D&M model so that it can be utilised in another context (Chiu & Wang, 2008; Kim et al.,2006; Straub et al., 2004). DeLone and McLean (2003) support other researchers to devlop and validare his model further.

2.13 Summary

In Chapter 2, the rationale for basing the study on the updated D&M model was discussed. A detailed review of the inclusion of the IP, OS, AT, SN, PBC, TT, and TO constructs are outlined. This chapter also explained the relationships among independent variables, dependent variables, and mediating variables. Moreover, this chapter presented the research hypotheses, which were proposed for the current study. In the next chapter, the research methodology that was adapted to answering the research questions posed in this chapter will be discussed.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Chapter three presents the outline of the steps used to conduct the research. Research methodology is the environment for researchers to apply the suitable methods and techniques for collecting and analysing the data for their research. The research methodology can be described as an outline of the scientific method used to meet the objectives of the study and to attempt to answer the research questions (Kothari, 2004). This chapter will outline the research process and design and sampling methods. The questionnaire, pilot test, method of data collection and analysis are also detailed.

3.2 Research Process

Vaishnavi and Kuechler (2015) stated that designing science research in information system is necessary to identify the framework of the research process design. Three distinct phases were employed in this research, as illustrated in Figure 3.1.

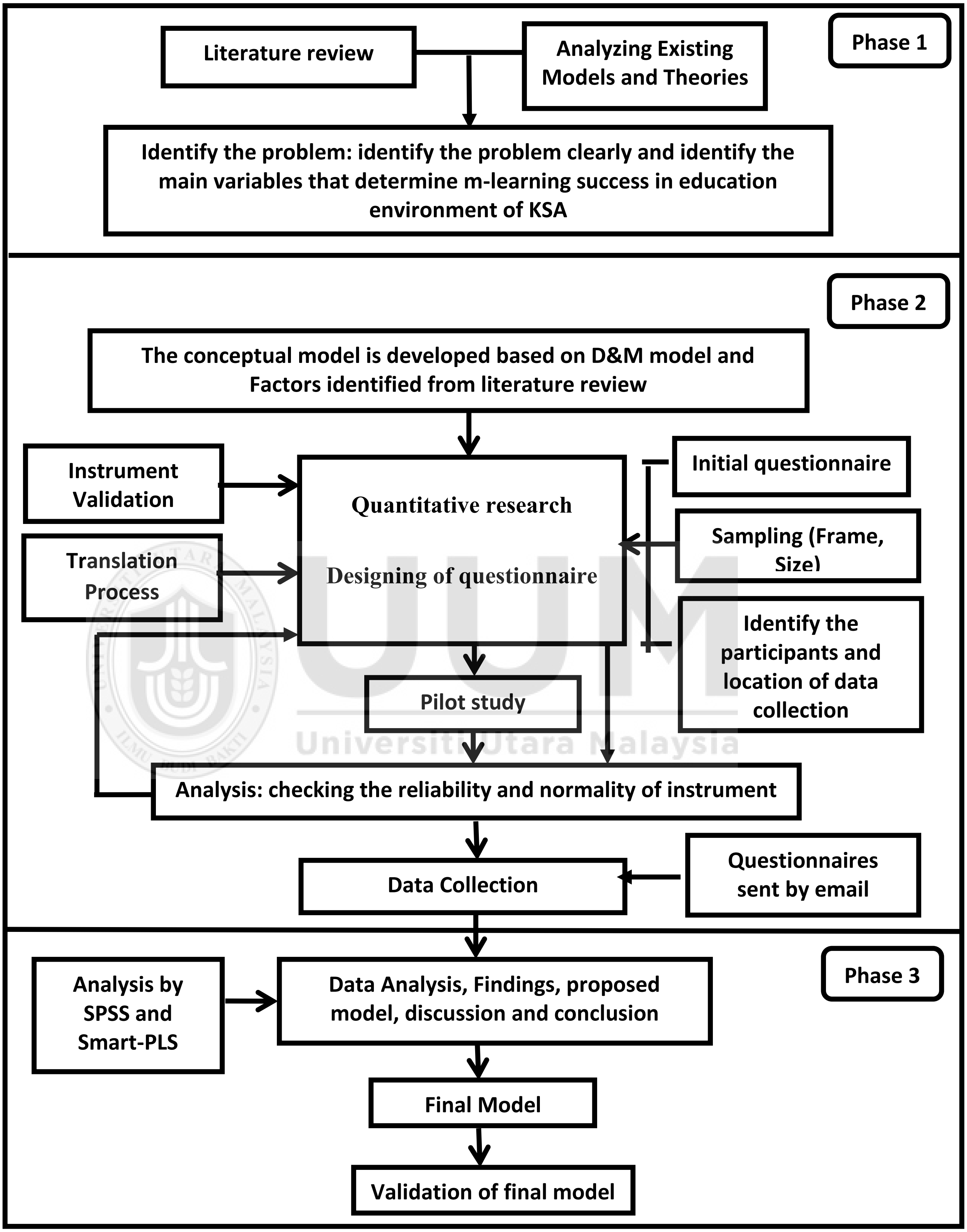

Figure 3.1. Research Framework

The first phase of the research process design is a detailed review of previous studies and literature. Literature that was included involved similar research areas. Analysis of the literature and existing models were used as a basis for the research questions used in this study.

In the second phase of the study, a conceptual model was devloped. The variables included were IP, OS, AT, SN, PBC, TT, and TO constructs based on the findings from previous research. This stage of the study also includes quantitative research, which determined the factors of m-learning success. Quantitative research activities were also included in this phase of the research that determined the factors influencing m-learning success among students in SA universities that used BlackBoard system. This step included instrument design, followed by a validation step, and a review of the instrument by experts in the field. These experts included University Utara Malaysia faculty members. After validating the instrument, the questionnaire was translated from English to Arabic, then tested in a pilot study to assess the questionnaire reliability. The questionnaire was revised and updated based on the pilot study results. In the final phase, Phase Three, data was collected from respondents, then analysed and interpreted to produce the final research model. A final validation step was conducted where the final model was sent to experts in the field.

3.3 Research Approach

A quantitative approach involves identifying the important variables, generating the hypothesis, and testing various models to accept or reject the hypothesis based on analysing the date (Creswell, 2013). In a quantitative research, error and bias is reduced by selecting participants randomly that is representative of the population (Newman & Benz, 1998). A qualitative research focuses on an interpretive or natural approach where the researchers look at events, case studies, questionnaires, or observations as a means of collecting data (Creswell, 2013). Qualitative research is typically used to study behaviour (Malhotra, 2010). Table 3.1 outlines the differences between these two research approaches.

Table 3.1

Comparison between Qualitative and Quantitative Approaches (Sekaran, 2003)

Quantitative approach	**Qualitative approach**
Data collection is objective and structured.	Data collection is subjective and unstructured.
Subjects are chosen to represent the population.	The subjects do not have to be representative of the population.
Reliability and validity of the constructs is important.	Trustworthiness and honesty of the subjects is important.
Interviews are short, lasting less than 20 minutes.	Interviews are long, approximately half an hour.
Questions to the respondents are direct and not typically followed by follow-up questions.	The respondents are asked follow up questions to get more detail.
Sample size is over 50 subjects.	Sample size is less than 50 subjects.
Objective results	Subjective results

The primary purpose of this study is to create a model of IS success and test it in a m-learning context. To achieve this, a quantitative approach was used as this approach is appropriate for theory testing (Hair et al., 2007). The quantitative approach also allows for a better representation of the results to the larger population, and to improve validity and reliability of the results.

3.4 Research Design

The design of the research is the methodology or study plan that will be followed to obtain and analyse the data (Bryman & Bell, 2007; Sekaran & Bougie, 2011). The research design should also include the questionnaires, surveys, or interviews that will be used to collect data.

Exploratory, descriptive, and explanatory research are the most popular research methods (Chisnall, 1997). An exploratory method is used to look at phenomena in a different way and to gain new insights (Gitte, 1994). Exploratory research is used to better understand a specific question. This type is research is more flexible because strict procedures are not used; instead, the researcher is permitted to re-focus their attention based on the developments and insights that are gained throughout the study. Exploratory research can take the form of literature searches and reviews, consultation with subject matter experts, and through group interviews.

Descriptive research methods are used when the researcher clearly understands the research question and objectives of the study. This type of method is employed when cause-effect relationships are not important to the study (Yin, 2009). In this way, descriptive research methods focus on testing existing theories (Patten, 2009) to describe an object, behaviour, or an event.

Explanatory research methods are used to identify causal relationships among variables (Saunders et al., 2011). In this type of study, cause and effect relationships are investigated and better understandings of the factors that lead to specific results are obtained (Patten, 2017). The primary researcher must have good knowledge of the subject matter and be able to relate the results of their study with previous findings. In the current research, an explanatory research method was used as the objective was to identify the cause and effect relationships between the various variables.

3.5 Population and Sample Size

This section describes the target population of the current study, determining sampling frame, and the sample size that was required for collection data.

3.5.1 Target Study Population and Sampling Frame

According Sekaran (2006), the population is the target group that the researcher is evaluating. In general, a population shares a certain set of characteristics (Kleinbaum, 2013). Data is only collected from subjects that are contained within the target group. Defining the target population is an important step during the design phase of a study (Fowler, 2009).

The target population in this research will be the students in three universities of Saudi Arabia which are used BlackBoard system. These universities are King Faisal University, King Saud University, and King Abdul-Aziz University. Collectively, they had around 408789 students in 2015-2016, according to statistics of planning information department in 2017. The reasons behind selecting these three universities are listed below:

1) These universities are considered as the first of the three universities that sought to implement Mobile technologies among their students. The main purpose of the present study is post-implementation not pre-implementation.

2) Selecting these universities will reflect various viewpoints because the students come from different provinces in the Saudi Arabia.

3) Finally, the structure of the educational process in higher education in Saudi Arabia, particularly in public universities, is homogeneous. Thus, chosen these three universities will be sufficient.

A sampling frame is complete population from which a sample is selected. These elements could be individuals, institutions, geographic areas, or other units (Babbie, 2008; Churchill, Brown, & Suter, 2010; Earl, 2011). A sampling frame might result in research bias if it is not up-to-date and does not contain foreign elements, which are not common to all population members (Carl-Erik, Bengt, & Jan, 2003; Herman et al., 2008; St-Pierre, 2007). Hence, an element list that is unique to each population member must be included in the sampling frame. The sample frame was obtained from the Planning Information Department of Statistics and Informatics, as shown in Table 3.2.

Table 3.2

The Number of Students for the study population

NO.	University	No. of Students	Percentage of Students
1	King Saud University.	57,143	14%
2	King Abdul-Aziz University	165,509	40%
3	King Faisal University	186,137	46%
Total	**3**	**408,789**	**100%**

(Source: Planning Information Department of Statistics and Informatics, 2017)

3.5.2 Sample Size

A smaller subpart of the target population is known as the sample size (Sekaran & Bougie, 2010). A smaller sample size is selected due to practicality (Zikmund, 2003), but should be large enough to ensure accuracy (Fink, 2002).

The sample size based on the guidelines reported by Sekaran and Bougie (2011) who reported that sample size of 384 would be enough if the study population is more than 1,000,000 elements. Sekaran (2006) stated that a sample size between 30 and 500 units is usually adequate for most studies and should ensure validity of the data. As mentioned earlier, this study had 408,789 students as the population (see Table 3.2). The sample size for this study was 384 students that attended 3 Universities of Kingdom of Saudi Arabia (Sekaran & Bougie, 2011).

Researchers have specifically highlighted the need obtain a minimum of 300 sample size when rigorous analyses, such as multivariate and factor analysis, are required (Dwivedi et al., 2010; Fowler, 2002). This means that the minimum required sample size for the multivariate data analysis should be ten times that of the structural path's largest number directed to a specific latent construct (Dwivedi et al., 2010; Fowler, 2002; Hair et al., 2014). Creswell (2012), Creswell, Pacilio, Lindsay, and Brown (2014), Kothari (2011), and Sekaran and Bougie (2013) asserted that the base of the sample size should be increased to consider drop-outs or unresponsiveness and to reduce the margin of error. Added to this, the results obtained from a significant number of sample can be generalized to the entire population (Hair, Black, Anderson & Tatham, 2006). In other words, the larger the sample size, the more flexibility is offered to the researcher in the determination of suitable data (Sekaran, 2003). Therefore, a total of 700 questionnaires were sent to the students at Kingdom of Saudi Arabia Universities (KSAU) to meet the suggestions in the literature. Before distributing the 700 questionnaires to students in the universities located in the KSA, probability sampling of students for each university in the three universities was conducted. Probability sampling was calculated by using formula (3-1).

$$Probability\ Sampling\ of\ student's = NP * {}^{NS}/_{T} \qquad (3-1)$$

Where

NP= Number of students attending each university;

NS= Number of samples that were distributed;

T= total number of students attending all three universities

Table 3.3

The Probability Sampling of Students for Each University

Name of University	Number of Students	% of Sampling	Probability Sampling of Students	Systematic Random Sampling
King Saud University	57,143	14%	98	583
King Abdul-Aziz University	165,509	40%	283	583
King Faisal University	186,137	46%	319	583
The Total	**408,789**	**100%**	**700**	

Table 3.3 displays the number of questionnaires distributed in the selected universities. There were 319 questionnaires were distributed in the King Faisal University because it had the largest number of students (i.e. 186,137), and 283 questionnaires were distributed to the King Abdul-Aziz University. Finally, 98 questionnaires were distributed in the King Saud University.

3.6 Sampling Method

Sampling involves selecting a few subjects from the target population that will be used to represent the bigger population (Ranjit, 2011; Lynn & Ronald, 2010).

In addition, Marlow (2010) states that the method for sampling can be allocated into two methods: probability and non-probability sampling. With the probability sampling method, all members of the target population are equally able to be selected. With the non-probability sampling method, subjects are chosen based on specific characteristics in the target population that are of interest to the researcher. The current research uses the probability sampling method to reduce the bias in sample selection.

3.6.1 Sampling Technique

Sampling techniques in quantitative studies are classified into random and non-random sampling (Creswel, 2009; Ranjit, 2011). Random sampling is a probability sampling method, wherein each individual of the population has an equal and independent likelihood of being chosen for the study (Sekaran & Bougie, 2011; Ranjit 2011). Several studies argue that random sampling is useful in the investigation of the theory (Whitacre, Hartman, Boggs, & Schott, 2009; Wicander, Hatakka, & Kromidha, 2010; Wilson, 2010). This observation means that rejection or selection of an element of a population does not affect other elements in the same population. By contrast, non-random sampling is utilised in the population when the exact number of the population is unknown and the choice of one element relies on the consideration of others (Ranjit, 2011; Zoltan & Tatsuya, 2010). Thus, the random sampling technique is suitable for this study, as the total number of the population is known.

3.6.2 Systematic Random Sampling

According to Sekaran (2003), a sample size can be obtained by selecting the *n*th individual from the target population, beginning with an individual selected at random (Sekaran, 2003). This type of sampling is referred to as a systematic sampling design. In the current research, a total of 700 students from three universities of KSA were randomly and systematically selected, as shown in Table 3.3.

3.7 Questionnaire Design

A sound knowledge of the research objective is required to formulate an appropriate questionnaire for the respondents (Colton & Covert, 2007; Muller, 2012). At times, it may be appropriate to redesign or revise the research instruments based on the objectives or the scope of the research (Leiyu, 2008). Zikmund (2003) describes a questionnaire as a means of collecting data, and involves a set of questions that respondents answer. Sharma (2007) suggests that the questions should be pre-set and organised in such a way that provides value and reliability to the study. The questionnaires used in the current study were revised and adapted from previously used questionnaires. The questions used focused on the research objectives and the formulated hypotheses. There are three parts in the survey questionnaire. The first part prompted respondents to provide demographic information. The second part includes questions regarding the measurement of the factors that influence m-learning success among students in KSA.

Table 3.4 shows all the constructs, items, and sources. A total of thirteen constructs were included: **(1)** IQ, **(2)** SEQ, **(3)** SQ, **(4)** OS, **(5)** IP, **(6)** SN, **(7)** PBC, **(8)** AT, **(9)** TT, **(10)** TO, **(11)** U, **(12)** US, and **(13)** NB. The designed questionnaire was used to measure the constructs in the conceptual research model. Moreover, Part C includes two questions (comments), which are related to reasons for not using this facility, and suggestions related to the service. A short statement or description was included for each construct to give the respondents a better understanding. These statements were reviewed by a group of academic experts prior to the start of the pilot study.

Each construct was measured using a Likert Scale, based on a five-point system. A score of '1' represented 'strongly disagree', while a score of '5' represented 'strongly agree' (Muraina, Wan & Azizah, 2013). The questionnaire used in this study also used a five-point Likert scale to making answering the questions easier for the respondents (Dwivedi et al., 2010; Woodcock, Middleton, and Nortcliffe, 2012).

3.7.1 Constructs Measurement

As mentioned previously, thirteen constructs were measured: IQ, SEQ, SQ, OS, IP, SN, PBC, AT, TT, TO, U, US, and NB. These constructs were based on the literature, and adapted to this study. A summary of the constructs used in the instrument are shown in Table 3.4.

Table 3.4

Sources and Measurement of Constructs

Constructs	Items	Sources
Information Quality	1. The information in mobile learning system is accurate 2. Mobile learning provides sufficient information. 3. The information in mobile learning system is up-to-date 4. The information in mobile learning system is presented in a clear way. 5. Mobile learning provides me with the information that I need to do my job.	Al-adaileh (2009), Bharati and Chaudhury (2004), Bailey and Pearson (1983), Delone and Mclean (2003); Doll and Torkzadeh (1988), Rai et al. (2002).
System Quality	1. It is easy to navigate within M-learning system. 2. It only takes a few clicks to locate information on M-learning system. 3. This M-learning system is available all the time. 4. M-learning system website loads all the text and graphics quickly.	AlKhatib (2013); Delone and Mclean (2003); Wangpipatwong, Chutimaskul and Papasratorn (2005), Wixom and Todd (2005).
Service Quality	1. I have sufficient understanding about M-learning system. 2. I have gained enough training on how to operate M-learning system. 3. If the Service Support promises to do something by a certain time they will. 4. The Service Support provide prompt service. 5. The Service Support has adequate knowledge to help me if I experience any problems with M-learning system. 6. The Service Support understands my needs.	Pitt, Watson and Kavan (1995).
Use of a system	1. I use M-learning system to help me make decisions. 2. I use M-learning system to help me record my knowledge. 3. I use M-learning system to communicate knowledge and information with colleagues. 4. I use M-learning system to share my general knowledge. 5. I use M-learning system to share my specific knowledge.	Delone and Mclean (2003); Wu and Wang (2006).

Table 3.4 Continued

User Satisfaction	1. I am satisfied that M-learning system meet my knowledge or information processing needs. 2. I am satisfied with M-learning system efficiency. 3. I am satisfied with M-learning system effectiveness. 4. Overall, I am satisfied with M-learning system.	Delone and Mclean (2003); Wu and Wang (2006).
Net Benefits	1. M-learning helps me acquire new knowledge and innovative ideas. 2. M-learning helps me effectively manage and store knowledge that I need. 3. M-learning enable me to accomplish tasks more efficiently. 4. My performance on the study is enhanced by M-learning. 5. M-learning improves the quality of my study.	Delone and Mclean (2003); Wu and Wang (2006).
Attitude	1. Using M-learning would be a wise idea. 2. Using M-learning is a good idea. 3. Using Mobile technology in education is unpleasant. 4. I like to use M-learning. 5. Using M-learning would be a wise idea	Cheon, Lee, Crooks and Song (2012); Taylor and Todd (1995).
Subjective Norm	1. People who are important to me would think that using M-learning would be a wise idea. 2. People who are important to me would think that using M-learning is a good idea. 3. Most people who are important to me would think that I should use M-learning. 4. My family who is important to me would think that using M-learning would be a wise idea. 5. My family who is important to me would think that using M-learning is a good idea. 6. My family who is important to me would think that I should use M-learning.	Khac (2012); Park et al. (2006); and Taylor and Todd (1995).
Perceived Behavioural Control	1. I would be able to operate M-learning 2. I have the resource to use M-learning 3. I have the knowledge to use M-learning	Ajzen (1991); Taylor and Todd (1995).
Trust in Technology	1. The Internet has enough safeguards to make me feel comfortable using it to interact with the university online. 2. I feel assured that legal and technological structures adequately protect me from problems on the internet. 3. In general, the Internet is now a robust and safe environment in which to transact with the university.	Carter & Bélanger (2005); Lee and Turban (2001).

Table 3.4 Continued

Trust in Organisation	1. I think I can trust the University 2. The University can be trusted to carry out online works faithfully. 3. In my opinion, University is trustworthy. 4. I trust University to keep my best interests in mind.	Carter & Bélanger (2005); Lee and Turban (2001).
Institutional Policy	1. I am aware of the current ICT policy. 2. The ICT policy, addresses the issues regarding m-Learning. 3. My University provides incentives to Teachers who use m-Learning. 4. My University provides incentives to students who use m-Learning. 5. My University promotes the adoption of m-learning through proper ICT policy implementation.	Ndonje (2013); Umrani-Khan & Iyer (2009).
Organisational Support	1. I have heard of my university Mobile Learning System. 2. I have used my m-Learning System. 3. My head of department is supportive to me on the use of m-Learning for my work. 4. There is technical help available if required while using m-Learning. 5. When I encounter issues during my work, I am always given technological and pedagogical support.	Ndonje (2013)

3.7.2 Translating the Questionnaire

Expert translators from one of the Language Centre's in The Kingdom of Saudi Arabia translated the study questionnaire from English to Arabic. After the initial translations, the questionnaire was translated back to English, checked, and corrected, if necessary. The final copy of the questionnaire was compared to the original questionnaire to ensure reliability of the translation before validating the instrument.

3.7.3 Validation of the Questionnaire

Validation of the questionnaire prior to distribution is an important part of the research. Validation ensures that high quality data is collected and that the data answers the research question. Three types of validity tests are commonly used, including construct validity, content validity, and face validity.

Content validity is a measure of how closely the items actually measure the targeted constructs (Hair, Black, Babin, & Anderson, 2010). Content validity can be ensured by having subject matter experts review the research instrument (Sekaran, 2000). The questionnaire used in this study was reviewed by Prof. Dr. Zulkhairi Md. Dahalin, and Assoc. Prof. Dr. Shafiz Affendi Bin Mohd Yusof, who have extensive experience in developing and validating quantitative research instruments. Appendix L, include their feedback and comments that were considered in designing the research instrument.

3.8 Pilot Study

Prior to the start of the full study, a pilot study can be conducted. The sample size for the pilot size is typically small and should have similar characteristics to the target sample in the full study (Jan 2012; Sekaran 2003). The questionnaire is usually tested during the pilot study (Ranjit, 2011) to determine if the items are appropriate, and to ensure reliability of the questions (Jan, 2012; Pallant, 2011). The pilot study also allows for standardisation of the questionnaire before use in the final study (Sekaran, 2003; Jan, 2012; Hair et al., 2011). The current study executed a pilot study using a smaller sample size of students from the target location prior to the final study.

Hunt, Sparkman Jr and Wilcox (1982) recommend that at least 30 subjects be included for the pilot study sample. Therefore, 100 questionnaires were sent to students, who were selected by a computer program randomly by the college's staff of the college of Sciences in King Faisal University in Al-Ahsa City of KSA, on Jan 30, 2017. Afterwards, all 100 respondents in the pilot study were excluded in the main data collection. Peat, Mellis, Williams, and Xuan, (2002) recommends that the subjects included in the pilot study should not be included in the data for the actual study to reduce bias.

Furthermore, 60 questionnaires were returned out of 100 questionnaires that were distributed to the participants. The questionnaires have a filter question to classify the respondents as users of the BlackBoard system and non-users of the BlackBoard system. The numbers of non-users were 5 respondents and 55 of the respondents were users of the BlackBoard system at the King Faisal University. Moreover, the final data includes 55 questionnaires that were used in pilot test analysis. Table 3.5 shows the demographic information for participants included in the pilot study.

Table 3.5

Demographic Information for Participants in Pilot Study

Demographic Variable	**Category**	**(*N* = 55) Frequency**	**Percentage %**
Gender	Male	23	41.8
	Female	32	58.2
Age	18-22	37	67.3
	23 -35	18	32.7
Marital status	Single	42	76.4
	Married	12	21.8
	Divorced	1	1.8
Education level	First Year	12	21.8
	Second Year	13	23.6
	Third	16	29.1
	Last year	14	25.5
Mobile-Device	Hand phone	21	38.2
	Laptop	5	9.1
	Smart phone	24	43.6
	others	5	9.1
Experience	Advance	36	65.5
	Normal	19	34.5
Time-of-Using	Daily	10	18.2
	Weekly	19	34.5
	Monthly	10	18.2
	Others	16	29.1

3.8.1 Checking Reliability of the Instrument

Instrument reliability describes the level of consistency and stability of the instrument (Sekaran & Bougie, 2011). A scale is considered to be reliable if there are no random errors that could incorrectly correlate two variables (Pallant, 2011). Internal consistency refers to the level that all the items of the scale measure the same underlying attributes. Internal consistently is typically evaluated using Cronbach's Alpha (Pallan, 2011; Zoltan & Tatsuya, 2010) and can be used at the pilot study stage (Cronbach, 1957). Cronbach's Alpha ranges from 0 to 1 to indicate the level of correlation (Pallant, 2011). A value close to 1 indicates a high level of correlation. A Cronbach's Alpha of 0.6 is considered to be highly correlated (Hair et al., 2006).

A total of 60 items were used as a measurement of the thirteen constructs of the conceptual research model. Table 3.6 shows the distributions of the items for each construct. The Cronbach Alpha values were high (i.e. greater than 0.6) in the pilot study. This indicates that there is a high level of consistency in the scale, which makes it acceptable for further analysis (Hair et al., 2006).

Table 3.6

Number of Measurement Items with Their Construct

Construct	Number of Items used
Information quality	5
System quality	4
Service quality	6
Organisational Support	5

Table 3.6 Continued

Institutional Policy	5
Trust in Technology	3
Trust in Organisation	4
Attitude	5
Subjective Norm	6
Perceived Behavioral Control	3
User Satisfaction	4
Use of m-learning services	5
Net Benefits	5
Total	**60 items**

Table 3.7

Pilot Study Reliability test

Constructs	**No. of items originally included**	**Cronbach's Alpha**	**Items Deleted**	**Cronbach's Alpha if item deleted**
Information quality	5	0.898	Nil	0.898
System quality	4	0.875	Nil	0.875
Service quality	6	0.921	Nil	0.921
Organisational Support	5	0.871	Nil	0.871
Institutional Policy	5	0.824	Nil	0.824
Trust in Technology	3	0.865	Nil	0.865
Trust in Organisation	4	0.947	Nil	0.947
Attitude	5	0.647	AT3	0.912

Table 3.7 Continued

Subjective Norm	6	0.934	Nil	0.934
Perceived Behavioral Control	3	0.892	Nil	0.892
User Satisfaction	4	0.928	Nil	0.928
Use of m-learning services	5	0.927	Nil	0.927
Net Benefits	5	0.916	Nil	0.916

3.8.2 Factor Analysis for Pilot Study

A method that is employed in a study to identify and define the causal factors in a set of variables is called Factor Analysis (FA) (Loehlin & Beaujean, 2017). Factor Analysis is used to test relationships between different variables (Yong & Pearce, 2013). According to Brown (2006), FA is a good analytical method for creating and revising research instruments, determining the construct validity of the instrument, elucidating the causal relationships, and evaluating the invariance of the factors. Geldhof, Preacher & Zyphur (2014) asserted that FA is a useful tool for research in this field. Therefore, the researcher used FA to identify the correlations between and among Items to bind them into one underlying factor driving their values, as shown in Table 3.8.

Table 3.8

Factor Analysis and Reliability of the Final Instrument (Pilot Study)

Constructs	No of items	Factor loadings		AVE	KMO	Eigen-value	% of Variance
IQ	5	IQ1	0.7866	0.7123	0.885	3.562	71.249
		IQ2	0.8763				
		IQ3	0.8795				
		IQ4	0.8551				
		IQ5	0.8186				
SQ	4	SQ1	0.8653	0.7257	0.801	2.914	72.841
		SQ2	0.8728				
		SQ3	0.8347				
		SQ4	0.8341				
SEQ	6	SEQ1	0.7333	0.7384	0.880	4.438	73.971
		SEQ2	0.7166				
		SEQ3	0.9298				
		SEQ4	0.9479				
		SEQ5	0.9201				
		SEQ6	0.8772				
U	5	U1	0.7943	0.7744	0.851	3.976	77.525
		U2	0.9112				
		U3	0.9305				
		U4	0.884				
		U5	0.8737				
US	4	US1	0.8123	0.8237	0.841	3.297	82.434
		US2	0.9379				
		US3	0.9267				
		US4	0.9468				

Table 3.8 Continued

		NB1	0.8641				
		NB2	0.8358				
NB	5	NB3	0.8932	0.748	0.814	3.742	74.835
		NB4	0.8888				
		NB5	0.8407				
		AT1	0.8702				
		AT2	0.9151				
AT	5	AT3	-0.3519	0.6561	0.840	3.382	67.641
		AT4	0.837				
		AT5	0.9282				
		SN1	0.907				
		SN2	0.8832				
		SN3	0.8189				
SN	6	SN4	0.8955	0.7523	0.856	4.518	75.297
		SN5	0.8949				
		SN6	0.7985				
		PBC1	0.8763				
PBC	3	PBC2	0.94	0.8217	0.723	2.470	82.340
		PBC3	0.9021				
		TT1	0.8757				
TT	3	TT2	0.9126	0.7857	0.676	2.368	78.931
		TT3	0.8704				
		TO1	0.9649				
		TO2	0.9296				
TO	4	TO3	0.9499	0.863	0.838	3.454	86.358
		TO4	0.8685				

Table 3.8 Continued

		IP1	0.829				
		IP2	0.835				
IP	5	IP3	0.6905	0.5793	0.719	3.984	79.692
		IP4	0.654				
		IP5	0.7796				
		OS1	0.8001				
		OS2	0.7693				
OS	5	OS3	0.8137	0.6619	0.809	3.315	66.307
		OS4	0.8627				
		OS5	0.8193				

All constructs above exceeded Cronbach's alpha value of 0.60. In addition, KMO is above 0.5 and the Eigen-value is above 1, as indicated in Table 3.7 and Table 3.8 (Hair *et al.*, 2006). The reliability values for all constructs are between the range of 0.647 to 0.947. Moreover, the AT construct has item AT3 with low value -0.352 which is lower than the threshed value 0.7; thus, the AT3 item must be deleted. The final actual distribution was conducted with the AT3 item excluded only on the pilot study instrument.

3.9 Procedures of the Main Data Collection

The main data collection for this study started from April 16th 2017. Students in King Abdul-Aziz University, King Saud University, and King Faisal University in Saudi Arabia have been selected as the target population of this study. Data collection was carried out after obtaining approval from KSA's Embassy in Malaysia and the Deans of Higher Studies

Departments of selected, as shown in Appendix H. The questionnaires were given to the Deans to be distributed to the students via email as the universities did not grant access to the students' mailing list. Therefore, a total of 700 questionnaires were sent to the students at Kingdom of Saudi Arabia Universities (KSAU) to meet the suggestions in the literature. In this study, the usable response rate were 60% from King Saud University, 43% from King Abdul-Aziz University, and 67% from King Faisal University. Therefore, 68 respondents were classified as late response (more than one month) and 328 as early response (less than one month). The arrangements were made with the deans of higher studies departments on the appointed date for the data collection exercise (Table 3.9).

Table 3.9

Summary of the Main Data Collection Process

University	Instrument Distribution Date	No. of presented Participants	No. of Selected Participants	No. of Returned Questionnaires	Percentage of Returned Questionnaires
King Saud University	16/04/2017	57,143	98	96	98%
King Abdul-Aziz University	16/04/2017	165,509	283	178	63%
King Faisal University	16/04/2017	186,137	319	287	90%
Total		**408,789**	**700**	**561**	**80%**

3.10 Data Analysis Method

In this study, data analysis was conducted in three stages. The first stage addressed the respondents' response analysis to the research instrument. This stage contained respondent description, response rate, and test of non-response bias statistics to check the respondents' level of enthusiasm toward the research instrument. Following this stage, SPSS-20 was used to screen and prepare the data. This second stage is aimed to isolate any issues with the data prior to full data analysis.

The Structural Equation Model (SEM) was used in the third stage to test the research hypothesis and the theoretical model. SEM is a multivariate method that is able to evaluate and measure relationships in a model (Hoyle, 1995; Kline, 2015; Maruyama, 1997). SEM also enables the researcher to test a variety of relationships simultaneously (Gefen et al., 2000). This research evaluates and analyses cause and effect relationships between latent variables by using SEM. In this way, SEM is able to determine how exogenous constructs can have an influence on endogenous constructs. In the study of social sciences, SEM is the preferred research method of choice (Baumgartner and Homburg, 1996). SEM can be used to define the items of measurements, how the items are measured, and the reliability and validity of the items, and can identify complex cause and effect relationships (Hair et al., 2010). Due to the advantages of SEM, this method was employed to test the hypothesis and to validate the conceptual model. The third stage of data analysis uses SPSS-20 and SmartPLS 3.0 to evaluate relationships in this study's model.

3.11 Validation of Model

The major aim of this research is to develop and validate a model, which is designed to be useful for developing countries that m-learning has been implemented and for the once they has not implemented yet. In addition, research model can assist any decision makers who are involved in m-learning projects to better understand the contributing factors of m-learning success. Therefore, model validation is possibly the most important step in the model building sequence. It is also one of the most overlooked. In this study, the validation of a model will go through many statistical processes, then presenting the findings obtained in Chapter 4 and then to academic experts who are experienced in learning environment and analysis using Smart-PLS. Moreover, it would be discuss in Chapter 6.

3.12 Summary

Chapter 3 provides a detailed review of the research methodology, including the study process, approach, design, sampling procedure, the questionnaire used, and the process for data collection and data analysis. The steps for validating the questionnaire were detailed, as well as the specifics for the pilot testing. A summary on the data collection methods and data analysis methods are provided. In summary, the pilot study to validate the questionnaire was conducted on 55 students from the College of Sciences at King Faisal University, Al-Ahsa City/KSA. Out of 700 questionnaires that were distributed, 561 were returned. The return rate of the questionnaires was 80%. SPSS and PLS-SEM was used to analyse the data.

CHAPTER FOUR

DATA ANALYSIS AND RESULTS

4.1 Introduction

Data analysis conducted using Smart PLS 3.0 software and the International Business Management (IBM) Statistical Package for Social Sciences version 20, which Chapter 4 introduced. Data was collected from respondents at universities in the KSA. After analysis, the chapter presents the respondents' profiles, including a non-response bias test. Multicollinearity and normality tests were introduced to get reliable data. The analysis of measurement, structural, and mediating construct models was discussed, and all findings help formulate the study's hypothesis.

4.2 Response Analysis

Prior research stresses that key themes are recognised when collected field responses are analysed (David & Dursun, 2008; Ranjit, 2011; Refaat, 2010). Therefore, through collecting and analysing questionnaire responses, the researcher recognises and implements specific measures. Using the IBM SPSS version 20, the response rates, the non-response bias tests, and the statistics of each person, the collected data was analysed.

4.2.1 Response Rate

Data collection was conducted on April 16th, 2017. Most completed questionnaires were returned between May 15th and May 20th, 2017. A total of 700 sets of questionnaires was distributed among respondents.

Out of 700 questionnaires distributed among students, 561 were returned, equalling a response rate of 80.14%. The questionnaires contain a filter question that classify the respondents in two groups in terms of the m-learning BlackBoard system usage, including the users of m-learning BlackBoard system who ticked 'Yes' and non-users who ticked 'No'. 165 of respondents, 29%, tick on 'No', while 396 of respondents, 71%, tick on 'Yes' (Table 4.1).

This study utilised the students who used m-learning BlackBoard system as respondents. As mentioned in Table 4.1, 71% of the respondents were the users of the m-learning BlackBoard system. This portion included not only those students who utilised the m-learning BlackBoard system frequently, but also those who utilised it only one time, or those who have not utilise it for a long time since their last usage. In other words, all students who used m-learning BlackBoard system once only are also included.

This study evaluates the post-adoption phase of the m-learning BlackBoard system which comes after the initial usage of m-learning BlackBoard system. This indicates that the user has at the least one visit to the m-learning BlackBoard system in an early adoption phase. Following the first experience, users can make the decision to continue to use the m-learning BlackBoard system, or not. As such, this study examines the contributing factors of m-learning success among students.

Table 4.1

The Frequency of According to Filter Question

Respondents' Categories	Frequencies	Percentage (%)
No	165	29%
Yes	396	71%
Total	561	100%

Out of 700 questionnaires distributed to students, 561 were returned; out of 561 questionnaires returned, only 396 could be analysed. Therefore, the valid response rate was 57%. Sekaran (2003) and Hair et al. (2010) suggested a 30% response rate for each questionnaire to be fit for analysis. Table 4.2 illustrates that the response rate of 57% is valid and acceptable for this study's objective. Pallant (2001; 2011) states that the sample size needs to be ten times the independent variables of the model for the analysis of the interrelationship of the variables. Accordingly, the 396 useable questionnaires meet the requirements of the conceptual research model of this study, and the relationships between the variables can be examined (Liang & Yeh, 2011; Marchewka, Liu, & Kostiwa, 2007; Park et al., 2010; Venkatesh et al., 2011).

Table 4.2

Response Rate of the Questionnaires

University	Number of Questionnaire Distributed	Number of Questionnaires Returned	Questionnaires not returned	Usable questionnaires	Unusable questionnaires (Non-Users)	Response rate	Usable response rate
King Saud University	98	96	2	59	37	98%	60%
King Abdul-Aziz University	283	178	105	122	56	63%	43%
King Faisal University	319	287	32	215	72	90%	67%
Total	**700**	**561**	**139**	**396**	**165**	**80% (average)**	**57% (average)**

4.2.2 Non-Response Bias Test

Non-response Bias is considered the most important obstacle related to studies based on questionnaire research (Baker et al., 2010; Roger, 2007). Non-response bias is a systematic error due to the differences in response rates of participants in a study, and happens because of failure of many the respondents to answer all items on the questionnaire (Baker et al., 2010; Malhotra, 2010). According to Roger (2007), non-response bias happens because of inconsistency of the features among non-respondents and respondents of the population. In quantitative research, there are different methods of testing non-response bias (Malhotra, 2010). However, comparing the responses of the earlier returned survey with the late ones is the most efficient method (Baker et al., 2010). Some researchers believed that late respondents' questionnaires should be considered as unusable, since the follow-up approach (reminders by visit or phones) was done to collect data from them (Baker et al., 2010; Churchill & Brown, 2004; Malhotra, 2010). In this study, the samples were divided into early responses and late responses to normalise the process. Those respondents who returned the questionnaire within 3 weeks from the date of distribution were called early responses, whereas those respondents who returned the questionnaire after three weeks from the date of distribution were called late responses. As such, in this study, 68 of the respondents were classified as late responses and 328 of them as early responses.

During analysis of the data, the Chi-Square test of independence was conducted to categorise variables of late responses and early responses to determine if a significant difference exists among variables of study in one or more groups (Gorla & Somers, 2014). Moreover, the early and late responses were compared based on demographic characteristics, such as age, sex, level of education, marital status, the type of mobile device, experience, and time of using. This is in line with Venkatesh et al. (2011), Roger (2007), and Malhotra et al. (2006), who proposed that demographic variables are suitable when analysing the response bias test. Based on the results of the Chi-Square test, no significant difference exists among the demographic variables of respondents that were considered early and late. This is shown in Table 4.3 below.

Table 4.3

Test of Non-Response Bias (Chi-Square Test of Independence)

Demographic Variable	Category	Early respondents	Later respondents	Chi-Square (X^2)	p-value
Gender	Male	109 (33.2%)	18 (26.5%)	1.182	0.277
	Female	219 (66.8%)	50 (73.5%)		
Age	18-22	212 (64.6%)	37 (54.4%)	2.530	0.282
	23-35	109 (33.2%)	29 (42.6%)		
	>=45	7 (2.1%)	2 (2.9%)		
Marital Status	Single	278 (84.8%)	49 (72.1%)	7.042	0.030
	Married	49 (14.9%)	18 (26.5%)		
	Divorced	1 (0.3%)	1 (1.5%)		
Education Level	1st year	64 (19.5%)	16 (23.5%)	0.775	0.855
	2nd year	74 (22.6%)	14 (20.6%)		
	3rd year	67 (20.4%)	12 (17.6%)		
	4th year	123 (37.5%)	26 (38.2%)		
Mobile Device	Hand phone	63 (19.2%)	16 (23.5%)	0.984	0.805
	Laptop	19 (5.8%)	4 (5.9%)		
	Smart phone	213 (64.9%)	43 (63.2%)		
	Others	33 (10.1%)	5 (7.4%)		
Experience	Advance	217 (66.2%)	48 (70.6%)	0.5	0.480
	Normal	111 (33.8%)	20 (29.4%)		
Frequency	Daily	63 (19.2%)	13 (19.1%)	1.752	0.625
	Weekly	109 (33.2%)	18 (26.5%)		
	Monthly	59 (18%)	12 (17.6%)		
	Others	97 (29.6%)	25 (36.8%)		

The result of the descriptive statistics related to the non-response bias test is shown in Table 4.3. Based on the result of Chi-Square tests, all demographic variables of late and early responses are at the more than significant level, which is (0.5) (Gorla & Somers, 2014). For example, male and female early responses and late responses were considered to be the same ($X^2(1,396) = 1.182$, $P > 0.05$). Moreover, there is no statistical difference between early and late responses of different age groups $X^2(2, 396) = 2.530$, $P > 0.05$.

4.2.3 Descriptive Statistics of Respondents

The variables' statistical frequency distribution in the questionnaire categorises and reflects the originality of the research. The analytical tables were taken to test hypothesis and analyse the data. Therefore, the original data sets, as shown in frequency and analytical tables, can be seen in Appendix C. Table 4.4 displays the respondents' demographic information.

Table 4.4

Demographic Information of Respondents

Demographic Variable	**Category**	**(*N* = 396) Frequency**	**Percentage %**
Gender	Male	127	32.1
	Female	269	67.9
Age	18-22	249	62.9
	23 -35	138	34.8
	45 or above	9	2.3
Marital status	Single	327	82.6
	Married	67	16.9
	Divorced	2	0.5

Table 4.4 Continued

Education level	1st year	80	20.2
	2nd year	88	22.2
	3rd year	79	19.9
	4th year	149	37.6
Mobile-Device	Hand phone	79	19.9
	Laptop	23	5.8
	Smart phone	256	64.6
	Others	38	9.6
Experience	Advance	265	66.9
	Normal	131	33.1
Frequency	Daily	76	19.2
	Weekly	127	32.1
	Monthly	71	17.9
	Others	122	30.8

As shown in Figure 4.1, 32.1% of the respondents were male and 67.9% were female.

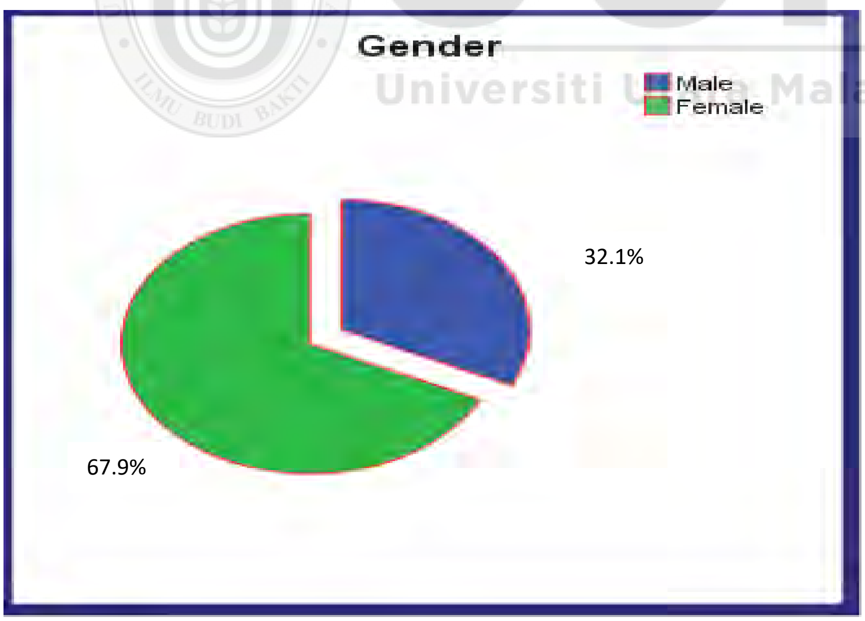

Figure 4.1. Gender of the Respondents

As shown in Figure 4.2, the majority of the respondents in this study were between the ages of 18 and 22 years old (62.9%), followed by 23 and 35 years old (34.8%), with the remaining respondents over the age of 45 years old (2.3%).

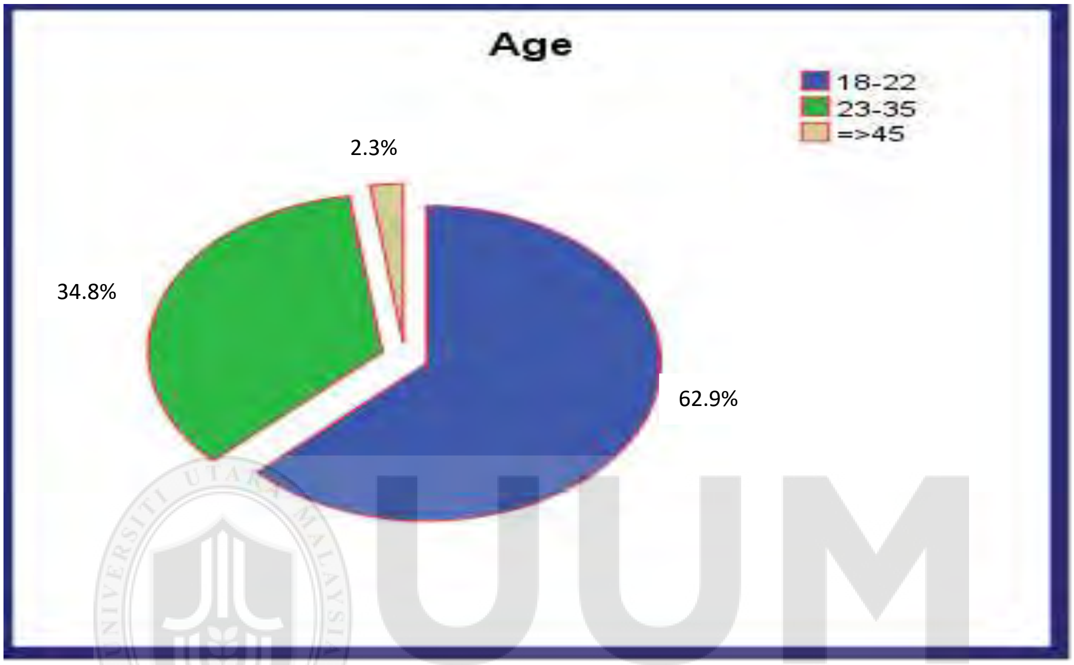

Figure 4.2. Age of the Respondents

Moreover, 67 of the respondents, or 16.9%, were married, and 327 of the respondents, or 82.6%, were unmarried. Therefore, most respondents were unmarried. Two the respondents were divorced, equalling 0.5%. The respondents' unequal answers to the questionnaire confirms that the current sampling includes all types of populations. Figure 4.3 illustrates the respondents' educational level. Eighty or 20.2% of the total number of respondents are in 1st year education; 88, or 22.2%, are in 2nd year education; 79, or 19.9%, are in 3rd year education; and, finally, 149, or 37.6%, are in 4th year education.

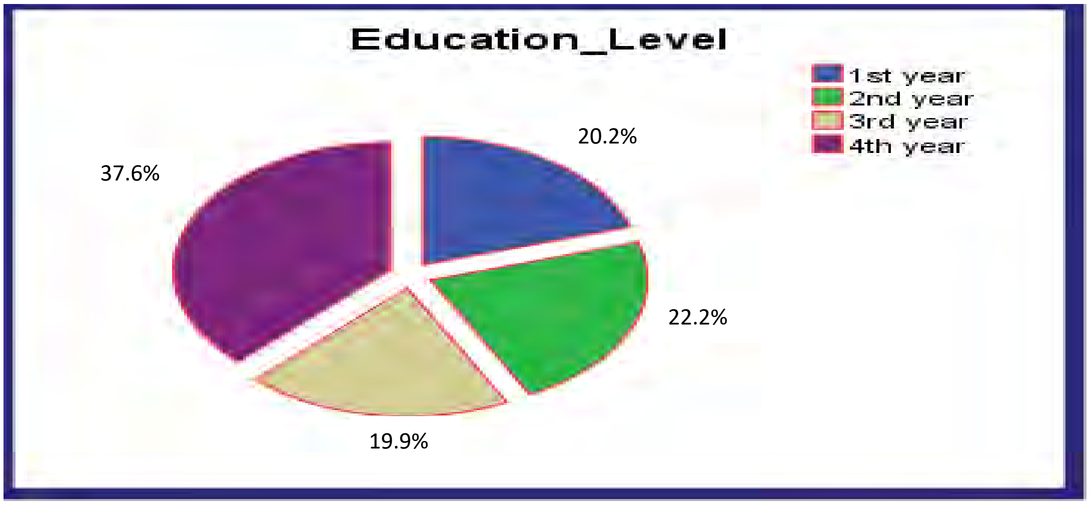

Figure 4.3. Education-level of the respondents

Considering the type of the mobile devices used by respondents as presented in Figure 4.4, 256 of the respondents, 64.6%, had smart phones; 79 of the respondents, 19.9%, had Hand Phone; 23 of the respondents, 5.8%, had laptops; and, finally, 38 of the respondents, 9.6%, had other devices, such as Tablets or Blackberry. All the original data sets in the shape of frequency and analytical tables can be seen in Appendix C.

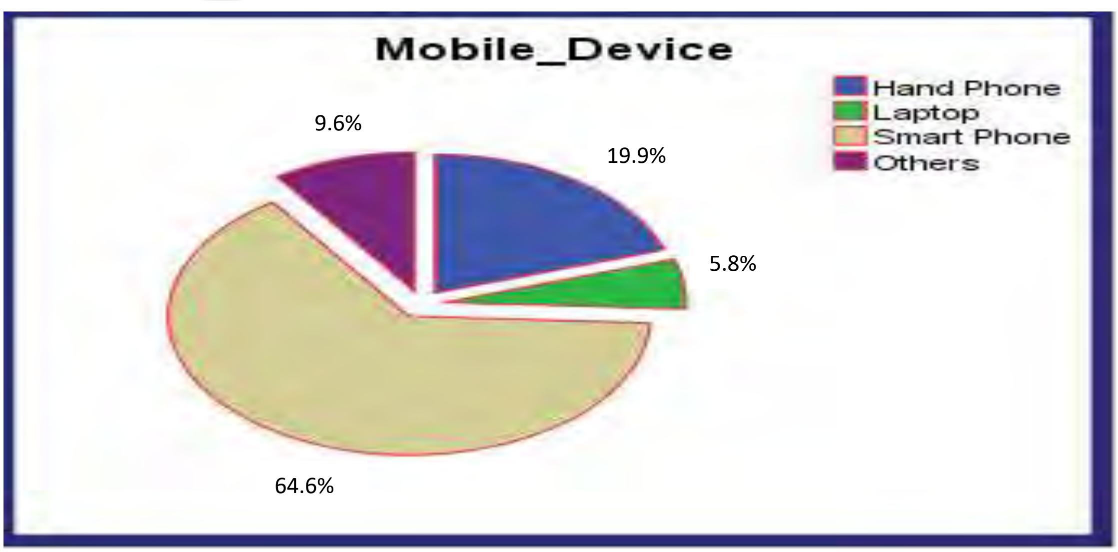

Figure 4.4. Mobile-device of the respondents

4.3 Test of Normality

According to Hair et al. (2006, 2010), normal distribution is an important characteristic for statistical testing and SEMs. Hair et al. (2006) argued that normality of the data enhances distribution, where a normal distribution is the benchmark for statistical methods. Moreover, Pallant (2011) emphasised that normality of the data to be used for the analysis can be determined through skewness and kurtosis values and the viewing of a histogram chart. Indeed, skewness value provides the indication about the symmetry of distribution, while the kurtosis provides information regarding the peakedness of distribution. Hence, for the data to be perfectly normal, both values of skewness and kurtosis must be zero (Pallant, 2011).

This study performs the normality test and found that both the values of skewness and kurtosis are either below or more than zero for all the variables as shown in Table 4.5, which means that the data are not normal. The results of the significant column in the Kolmogorov-Smirnov statistic are below 0.05, which is the indication of violation of assumption of normality. This indicates that the data are not normal. Besides that, all the generated histograms in the normality test show that the charts are not symmetrical. Hence, the non-normality of the collected data in this study calls for the usage of PLS-SEM for the data analysis, as PLS-SEM takes care of the standard error that may partially explain the data's non-normality (Hair et al., 2011, 2014).

Table 4.5

Result of Skewness and Kurtosis Test for Constructs

	N	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
MIQ	396	3.65	0.796	-.818	0.123	0.523	0.245
MSQ	396	3.74	0.725	-.789	0.123	1.316	0.245
MSEQ	396	3.69	0.781	-.641	0.123	0.382	0.245
MU	396	3.71	0.818	-.844	0.123	0.584	0.245
MUS	396	3.95	0.809	-.893	0.123	1.191	0.245
MNB	396	3.76	0.718	-1.100	0.123	1.220	0.245
MAT	396	3.71	0.752	-.794	0.123	1.228	0.245
MSN	396	3.61	0.800	-.705	0.123	-0.015	0.245
MPBC	396	3.50	0.987	-.707	0.123	-0.173	0.245
MTT	396	3.76	0.767	-.647	0.123	0.090	0.245
MTO	396	3.61	0.808	-.686	0.123	0.236	0.245
MIP	396	3.76	0.769	-.905	0.123	1.201	0.245
MOS	396	3.76	0.771	-.491	0.123	0.312	0.245
Valid N (list wise)	396						

Table 4.6

Result of Shapiro-Wilk Test for Constructs

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	Df	Sig.
MIQ	0.123	396	0.000	0.949	396	0.000
MSQ	0.104	396	0.000	0.952	396	0.000
MSEQ	0.113	396	0.000	0.966	396	0.000
MSN	0.125	396	0.000	0.952	396	0.000
MAT	0.109	396	0.000	0.951	396	0.000
MIP	0.122	396	0.000	0.945	396	0.000
MOS	0.083	396	0.000	0.968	396	0.000
MTO	0.134	396	0.000	0.953	396	0.000
MTT	0.143	396	0.000	0.950	396	0.000
MPBC	0.162	396	0.000	0.932	396	0.000
MUS	0.156	396	0.000	0.913	396	0.000
MU	0.146	396	0.000	0.936	396	0.000
MNB	0.166	396	0.000	0.914	396	0.000

a. Lilliefors Significance Correction

4.4 Test of Multicollinearity

Before assessing the structural model, it is important examine the structural model for collinearity. Multicollinearity is a level at which independent variables are related, where a relationship exists if the value is 0.90 or higher (Tabachnick & Fidell, 2007; Hair et al., 2010; Pallant, 2011).

Multicollinearity of the data can be evaluated using the Tolerance and Variance Inflation Factor (VIF) values (Meyers, Gamst & Guarino, 2006; Hair et al., 2006, 2014). The data is illustrated in Appendix D. The level of the independent variable's variability that is not a result of other variables is known as the tolerance value. In contrast, the level of the independent variable's variable that is a direct result of other variables is the variance inflation factor (VIF). When the VIF value is greater than 10 and the tolerance value is below the threshold of 0.10, there is an issue of multicollinearity (Hair et al., 2010; Pallant, 2011).

As illustrated in Table 4.7, multicollinearity is not an issue in the model as VIF values and tolerance values were within the acceptable range (Hair et al., 2014).

Table 4.7

Result of Multicollinearity Test

D.Vs & I.Vs	US		U		NB	
	Tolerance	VIF	Tolerance	VIF	Tolerance	VIF
IQ	0.591	1.692	0.515	1.943	-	-
SQ	0.593	1.686	0.551	1.815	-	-
SEQ	0.678	1.475	0.538	1.858	-	-
U	-	-	-	-	0.833	1.200
US	-	-	0.416	2.404	0.833	1.200
NB	0.687	1.456	0.438	2.282	-	-
AT	-	-	0.466	2.146	-	-
SN	-	-	0.535	1.869	-	-
PBC	-	-	0.546	1.831	-	-
TT	-	-	0.577	1.732	-	-
TO	-	-	0.645	1.549	-	-
IP	-	-	0.612	1.634	-	-
OS	-	-	0.503	1.987	-	-

4.5 Structural Equation Modelling

Structural Equation Modelling (SEM) is a statistical methodology in which structural theory approach is confirmed, and observations are generated for various variables with some bearing on a phenomenon (Barbara, 2010; Bentler, 1988). As an alternative analytical method, SEM was created to perform tasks like multiple-regression (Barroso, Carrión & Roldán, 2010; Reinartz et al., 2009). Emphasised by Hair et al. (2010), when investigating relationships of one or more dependent variables, either continuous or discrete, SEM is useful. Therefore, SEM was selected to be the analytical tool in this research when analysing various relationships between dependent and independent variables, as it is a superior model to others, such as linear regression and ANOVA (Muraina, 2015).

Distinguished and categorised by objective differences, there are two kinds of SEM: Partial Least Square SEM (PLS-SEM) and Covariance-Based SEM (CB-SEM) (Monecke & Leisch, 2012; Hair et al., 2011; Barroso et al., 2010). Each of these types of SEM will be discussed below.

PLS-SEM predicts the dependent variables by maximising the variance that can be explained (R^2) (Ringle et al., 2012; Hair et al., 2011; Barroso et al., 2010). PLS-SEM is capable of examining and assessing data that is both normally distributed, as well as non-normally distributed data (Ringle et al., 2009; Reinartz et al., 2009: Hair et al., 2014).

CB-SEM is method that can evaluate various parameters; however, it is limited as it makes it difficult to distinguish between sample covariance and theoretical model predictions (Barroso et al., 2010; Hair et al., 2011). Model fit is emphasised by CB-SEM, and aims to examine the strength of a theory, and thus, is an appropriate method for confirmation (Barroso et al., 2010).

PLS-SEM is the statistical method that was used to identify factors of m-learning success amongst students of universities in KSA. CB-SEM was excluded because it was limited and unable to meet the objectives of this study. In addition, PLS-SEM was the preferred method because one is the smallest number of items permitted as a construct (Hair et al., 2011). CB-SEM only examines and assesses normal data distributions (Hair et al., 2014).

PLS-SEM analysis results are reported, according to Chin (2010) and Hair et al., (2001) in two phases. The first phase assesses the validity and reliability of the outer measurement model. The next phase assesses the hypothesised relationships of the inner structural model. Evaluation results are presented in the following subsections.

4.5.1 Assessment of Measurement Model

PLS-SEM assesses every measure within each construct for reliability and validity when evaluating the measurement model (Wilson, 2010; Hair et al., 2014). Scholars and researchers emphasize the importance of confirming reliability (indicator and internal) and validity (discriminant and convergent) prior to evaluating the data (Hair et al., 2010, 2011; Chin, 2010). The threshold values used in this study to measure the reliability and validity are illustrated in Table 4.8.

Table 4.8

Threshold Values for Evaluating the Reliability and Validity of the Measurement Model

Assessment Subjects	Measures	Threshold Values	Reference
Internal Consistency Reliability	Composite Reliability	> 0.7	Bagozzi and Yi (1988), Chin (2010), Hair et al. (2010), Henseler et al. (2009), Henseler et al. (2015), and Ringle et al. (2006)
Indicator Reliability	Factor Loadings	> 0.7	
Convergent Validity	Average Variance Extracted (AVE)	> 0.5	
Discriminant Validity	Heterotrait-Monotrait ratio of correlations (HTMT)	< 0.85	

4.5.1.1 Results of Reliability and Validity of Measurement Model

SmartPLS 3.0 software was employed to evaluate the measurement model, giving the validity and reliability results. Construct reliability was evaluated using Cronbach's Alpha and composite reliability. The Cronbach's Alpha of all constructs was higher than the 0.60 threshold and is shown in Table 4.9 (Hair et al. 2006). Composite reliability results were investigated and showed that the model's latent variables' reliability constructs were greater than the threshold value of 0.70. Based on these results, it can be concluded that the constructs are reliable. Figure 4.5 illustrates the SmartPLS 3.0 outcome of the measurement model.

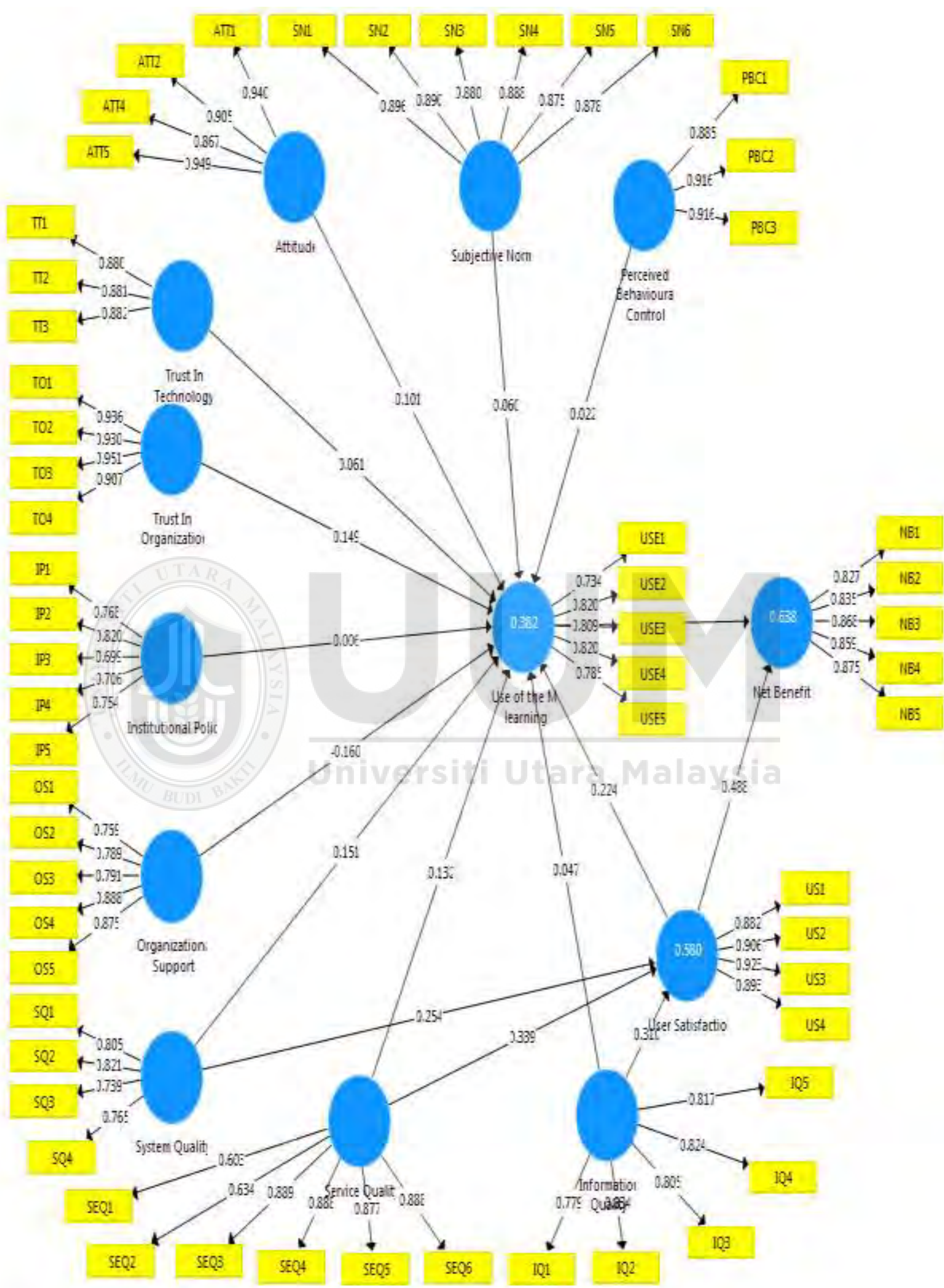

Figure 4.5. Measurement Model

Table 4.9

Constructs Items Loadings, Average Variance Extracted, and Composite Reliability

Constructs	Items	Loadings	* (CA)	*(CR)	*(AVE)
	ATT1	0.940			
AT	ATT2	0.905	0.935	0.954	0.839
	ATT4	0.867			
	ATT5	0.949			
	IP1	0.768			
IP	IP2	0.820	0.813	0.866	0.564
	IP3	0.699			
	IP4	0.706			
	IP5	0.754			
	IQ1	0.779			
IQ	IQ2	0.834	0.871	0.906	0.660
	IQ3	0.805			
	IQ4	0.824			
	IQ5	0.817			
	NB1	0.827			
NB	NB2	0.835	0.906	0.930	0.728
	NB3	0.868			
	NB4	0.859			
	NB5	0.875			
	OS1	0.759			
OS	OS2	0.789	0.881	0.912	0.676
	OS3	0.791			
	OS4	0.888			
	OS5	0.875			
PBC	PBC1	0.885	0.891	0.932	0.821
	PBC2	0.916			
	PBC3	0.916			
	SEQ1	0.603			
SEQ	SEQ2	0.634	0.885	0.916	0.650
	SEQ3	0.889			
	SEQ4	0.888			
	SEQ5	0.877			
	SEQ6	0.888			

Table 4.9 Continued

SN	SN1	0.896	0.945	0.956	0.782
	SN2	0.890			
	SN3	0.880			
	SN4	0.888			
	SN5	0.875			
	SN6	0.878			
SQ	SQ1	0.805	0.790	0.864	0.613
	SQ2	0.821			
	SQ3	0.739			
	SQ4	0.765			
TO	TO1	0.936	0.949	0.963	0.867
	TO2	0.930			
	TO3	0.951			
	TO4	0.907			
TT	TT1	0.880	0.856	0.912	0.776
	TT2	0.881			
	TT3	0.882			
U	USE1	0.734	0.854	0.895	0.631
	USE2	0.820			
	USE3	0.809			
	USE4	0.820			
	USE5	0.785			
US	US1	0.882	0.923	0.945	0.812
	US2	0.906			
	US3	0.923			
	US4	0.893			

Discriminant and convergent validity evaluate the constructs' validity. Employing factor loadings of the constructs and their average variance extracted (AVE) evaluates convergent validity. The AVE of the constructs must be over the specified threshold value of 0.5 to confirm that the constructs meet the convergent validity requirement (Fornell and Larcker, 1981; Hair et al., 2011). As shown in Table 4.9, all constructs' AVE values are higher than the 0.50 threshold, establishing the constructs' convergent validity. The items had absolute standardised outer loadings ranging from 0.603 to 0.940, greater than the threshold value specified by Henseler et al. (2009) and Hair et al. (2011). Chin (1998b) argued that if other indicators are in the block for comparisons, factor loadings above a threshold value of 0.5 are considered to be acceptable. Therefore, the factors above 0.70 composite reliability were considered useful in the study. Entire items are significant at the 0.001 level. Thus, the constructs' convergent validity is established. The next step is the discriminant validity test, explained in the next subsection.

HTMT for Discriminant Validity

As a prerequisite for analysing latent variable relationships, discriminant validity is typically evaluated. A common method is the Fornell-Larcker criterion and cross-loading test. These are commonly used for the evaluation of discriminant validity for variance-based SEM, including PLS. According to Henseler, Ringle and Sarstedt (2015) these approaches are not reliable in identifying an absence of discriminant validity in typical research settings. In fact, the Fornell-Larcker (1981) may only be appropriate under particular circumstances, and cannot be generalised across all situations as previously proposed (Ronkko and Evermann, 2013; Henseler et al., 2014). Therefore, researchers must find other methods to evaluate the construct validity subtypes and their results (Sarstedt and Mooi 2014). This study evaluates discriminant validity in SmartPLS by using the approach of heterotrait-monotrait ratio of correlations (HTMT). The threshold value used in evaluating the HTMT is 0.90, as proposed by Henseler et al. (2015). A value greater than 0.90 indicates that discriminant validity does not exist. The HTMT of the entire constructs was less than the 0.9 threshold, as illustrated in Table 4.10 (Henseler et al., 2015). The result from HTMT suggested that all constructs are greatly different at HTMT threshold, which was less than 0.90 (Henseler et al., 2014). However, the discriminant validity assessments are valid. This study will use the modern assessment as presented in Table 01.4, and will mention Fornell and Larcker options (eraeVA lfaefooeorcæraeqs e ht d cross loading)ente the tables below.

Table 4.10

HTMT Assessment for Discriminant Validity

	AT	IQ	IP	NB	OS	PBC	SEQ	SN	SQ	TO	TT	U	US
AT													
IQ	0.583												
IP	0.336	0.404											
NB	0.739	0.654	0.426										
OS	0.531	0.508	0.706	0.492									
PBC	0.702	0.616	0.416	0.651	0.586								
SEQ	0.476	0.606	0.520	0.587	0.593	0.561							
SN	0.719	0.478	0.455	0.582	0.566	0.645	0.464						
SQ	0.477	0.769	0.320	0.626	0.404	0.548	0.616	0.340					
TO	0.386	0.422	0.386	0.392	0.499	0.552	0.438	0.354	0.360				
TT	0.553	0.506	0.442	0.529	0.595	0.677	0.524	0.495	0.402	0.635			
U	0.477	0.530	0.294	0.767	0.319	0.494	0.525	0.403	0.567	0.411	0.440		
US	0.600	0.728	0.470	0.775	0.564	0.602	0.706	0.544	0.730	0.362	0.478	0.585	

Table 4.11

Cross Loading

	AT	IQ	IP	NB	OS	PBC	SEQ	SN	SQ	TO	TT	U	US
ATT1	0.940	0.510	0.275	0.635	0.460	0.598	0.396	0.643	0.386	0.347	0.463	0.402	0.515
ATT2	0.905	0.470	0.266	0.611	0.437	0.583	0.414	0.631	0.371	0.358	0.466	0.400	0.505
ATT4	0.867	0.477	0.296	0.620	0.416	0.568	0.374	0.589	0.380	0.315	0.429	0.402	0.507
ATT5	0.949	0.476	0.283	0.620	0.448	0.594	0.404	0.627	0.360	0.314	0.462	0.383	0.518
IQ1	0.404	0.779	0.293	0.411	0.345	0.441	0.410	0.354	0.460	0.346	0.375	0.329	0.476
IQ2	0.449	0.834	0.263	0.491	0.319	0.428	0.389	0.359	0.472	0.281	0.345	0.356	0.513
IQ3	0.368	0.805	0.264	0.431	0.351	0.407	0.428	0.310	0.559	0.290	0.330	0.378	0.518
IQ4	0.471	0.824	0.290	0.498	0.418	0.480	0.466	0.369	0.569	0.307	0.365	0.385	0.565
IQ5	0.447	0.817	0.319	0.532	0.404	0.449	0.489	0.390	0.539	0.336	0.368	0.437	0.581
IP1	0.219	0.270	0.768	0.330	0.285	0.315	0.336	0.286	0.207	0.200	0.265	0.217	0.310
IP2	0.264	0.297	0.820	0.348	0.354	0.355	0.395	0.342	0.254	0.300	0.296	0.239	0.362

Table 4.11 Continued

IP3	0.175	0.214	0.699	0.182	0.501	0.192	0.278	0.264	0.113	0.245	0.254	0.111	0.259
IP4	0.144	0.192	0.706	0.227	0.470	0.163	0.291	0.236	0.165	0.172	0.215	0.158	0.259
IP5	0.307	0.320	0.754	0.291	0.642	0.315	0.355	0.386	0.242	0.365	0.357	0.213	0.348
NB1	0.519	0.511	0.275	0.827	0.317	0.443	0.464	0.398	0.483	0.315	0.391	0.621	0.608
NB2	0.539	0.482	0.298	0.835	0.389	0.507	0.444	0.440	0.485	0.327	0.380	0.588	0.618
NB3	0.604	0.504	0.351	0.868	0.400	0.558	0.463	0.479	0.458	0.345	0.406	0.601	0.643
NB4	0.597	0.478	0.365	0.859	0.407	0.475	0.421	0.483	0.408	0.276	0.410	0.542	0.575
NB5	0.642	0.517	0.348	0.875	0.407	0.511	0.453	0.528	0.440	0.293	0.412	0.551	0.588
OS1	0.406	0.308	0.447	0.275	0.759	0.437	0.313	0.460	0.203	0.357	0.428	0.133	0.320
OS2	0.504	0.438	0.373	0.394	0.789	0.540	0.378	0.454	0.346	0.413	0.450	0.268	0.435
OS3	0.334	0.344	0.531	0.356	0.791	0.324	0.390	0.422	0.236	0.297	0.341	0.228	0.380
OS4	0.365	0.364	0.512	0.375	0.888	0.389	0.506	0.407	0.283	0.398	0.441	0.244	0.456
OS5	0.376	0.388	0.527	0.408	0.875	0.446	0.573	0.375	0.322	0.416	0.462	0.290	0.502
PBC1	0.643	0.548	0.339	0.583	0.460	0.885	0.439	0.567	0.438	0.422	0.513	0.392	0.528

Table 4.11 Continued

PBC2	0.537	0.473	0.354	0.504	0.471	0.916	0.447	0.520	0.381	0.499	0.548	0.414	0.473
PBC3	0.561	0.456	0.325	0.504	0.483	0.916	0.473	0.525	0.419	0.462	0.553	0.376	0.484
SEQ1	0.504	0.585	0.316	0.467	0.393	0.539	0.603	0.374	0.498	0.309	0.348	0.371	0.527
SEQ2	0.258	0.250	0.361	0.328	0.332	0.276	0.634	0.323	0.276	0.187	0.274	0.263	0.400
SEQ3	0.394	0.456	0.370	0.461	0.484	0.429	0.889	0.377	0.439	0.376	0.422	0.400	0.564
SEQ4	0.298	0.410	0.360	0.406	0.427	0.351	0.888	0.318	0.413	0.343	0.370	0.380	0.511
SEQ5	0.314	0.442	0.367	0.414	0.479	0.384	0.877	0.330	0.433	0.353	0.367	0.397	0.507
SEQ6	0.304	0.417	0.390	0.443	0.469	0.400	0.888	0.336	0.412	0.355	0.401	0.397	0.542
SN1	0.652	0.444	0.378	0.541	0.445	0.548	0.424	0.896	0.314	0.327	0.401	0.388	0.503
SN2	0.630	0.422	0.365	0.524	0.415	0.529	0.420	0.890	0.306	0.321	0.395	0.384	0.485
SN3	0.575	0.367	0.364	0.488	0.463	0.507	0.388	0.880	0.255	0.317	0.415	0.341	0.432
SN4	0.597	0.358	0.362	0.447	0.467	0.529	0.334	0.888	0.220	0.277	0.377	0.285	0.424
SN5	0.568	0.346	0.350	0.413	0.449	0.509	0.323	0.875	0.241	0.262	0.377	0.270	0.417
SN6	0.572	0.371	0.355	0.443	0.457	0.521	0.348	0.878	0.235	0.279	0.407	0.302	0.445

Table 4.11 Continued

SQ1	0.290	0.539	0.233	0.444	0.258	0.294	0.407	0.204	0.805	0.179	0.214	0.361	0.551
SQ2	0.274	0.448	0.201	0.367	0.231	0.326	0.379	0.190	0.821	0.206	0.218	0.319	0.470
SQ3	0.388	0.508	0.161	0.404	0.306	0.459	0.400	0.242	0.739	0.332	0.320	0.377	0.403
SQ4	0.335	0.511	0.255	0.449	0.296	0.359	0.436	0.299	0.765	0.260	0.287	0.415	0.529
TO1	0.368	0.374	0.336	0.369	0.438	0.515	0.379	0.345	0.320	0.936	0.544	0.338	0.347
TO2	0.364	0.366	0.338	0.365	0.435	0.496	0.393	0.334	0.277	0.930	0.605	0.384	0.325
TO3	0.322	0.353	0.319	0.330	0.448	0.461	0.377	0.294	0.289	0.951	0.512	0.337	0.311
TO4	0.301	0.334	0.297	0.295	0.392	0.422	0.364	0.289	0.265	0.907	0.469	0.331	0.279
TT1	0.464	0.425	0.292	0.434	0.452	0.553	0.425	0.407	0.329	0.467	0.880	0.350	0.397
TT2	0.401	0.345	0.362	0.362	0.480	0.471	0.406	0.363	0.262	0.519	0.881	0.307	0.352
TT3	0.444	0.385	0.338	0.436	0.435	0.540	0.379	0.410	0.279	0.535	0.882	0.349	0.374
USE1	0.415	0.444	0.235	0.579	0.267	0.355	0.433	0.395	0.395	0.307	0.349	0.734	0.491
USE2	0.397	0.413	0.235	0.587	0.294	0.397	0.395	0.377	0.403	0.335	0.336	0.820	0.467
USE3	0.316	0.341	0.136	0.519	0.210	0.366	0.315	0.226	0.375	0.294	0.258	0.809	0.365
USE4	0.263	0.291	0.197	0.511	0.160	0.280	0.322	0.218	0.332	0.249	0.254	0.820	0.363

Table 4.11 Continued

USE5	0.305	0.339	0.227	0.493	0.222	0.315	0.354	0.250	0.355	0.290	0.302	0.785	0.386
US1	0.509	0.577	0.349	0.674	0.449	0.496	0.592	0.451	0.547	0.300	0.378	0.533	0.882
US2	0.443	0.578	0.376	0.574	0.459	0.459	0.574	0.430	0.561	0.303	0.392	0.409	0.906
US3	0.498	0.591	0.397	0.631	0.481	0.511	0.593	0.463	0.587	0.292	0.379	0.473	0.923
US4	0.940	0.510	0.275	0.635	0.460	0.598	0.396	0.643	0.386	0.347	0.463	0.402	0.515

Table 4.12

Discriminant Validity Values (Fornell-Larcker Criterion)

	AT	**IQ**	**IP**	**NB**	**OS**	**PBC**	**SEQ**	**SN**	**SQ**	**TO**	**TT**	**U**	**US**
AT	0.916												
IQ	0.528	0.812											
IP	0.306	0.353	0.751										
NB	0.680	0.585	0.383	0.853									
OS	0.481	0.455	0.580	0.450	0.822								
PBC	0.640	0.544	0.375	0.586	0.520	0.906							
SEQ	0.434	0.540	0.448	0.527	0.541	0.500	0.806						

Table 4.12 Continued

SN	0.681	0.440	0.411	0.545	0.506	0.593	0.428	0.884					
SQ	0.409	0.643	0.275	0.534	0.349	0.455	0.520	0.301	0.783				
TO	0.365	0.384	0.347	0.366	0.461	0.510	0.407	0.340	0.309	0.931			
TT	0.497	0.439	0.374	0.469	0.516	0.594	0.458	0.448	0.331	0.575	0.881		
U	0.434	0.467	0.262	0.683	0.296	0.435	0.464	0.378	0.472	0.375	0.382	0.794	
US	0.559	0.657	0.417	0.712	0.522	0.546	0.639	0.514	0.630	0.340	0.426	0.529	0.901

4.5.2 Assessment of Structural Model

Once the measures of the conceptual model are considered reliable and valid, the next step is to evaluate the structural model using PLS-SEM. The variance in the model is identified and the importance of the path coefficients are established (Hair et al., 2011, 2014; Ringle & Spleen, 2007). The endogenous variables' R^2, both primary and secondary, is gotten using PLS algorithms, and, between endogenous and exogenous variables, the path coefficients' significance was discovered via the bootstrapping technique.

The endogenous variables' effect size (f^2) was assessed to see if it was affected by a specific exogenous variable in the structural model assessment stage of PLS (Chin, 2010; Hair et al., 2011, 2014). The exogenous variable was removed and replaced to assess the effect size (f^2) of a specific exogenous variable on the endogenous variable. The mathematics of effect size f^2 are provided in equation 5.3:

$$f^2 = \frac{R^2{}_{included} - R^2{}_{excluded}}{1 - R^2{}_{included}} \qquad equation\ 5-3$$

Where,

f^2 is the effect size of R^2 when a specific exogenous variable is present and excluded.

$R^2{}_{included}$ is the value of R^2 when all the exogenous variables exist.

$R^2{}_{excluded}$ is the value of R^2 when a particular exogenous variable is excluded.

The model's Predictive Relevance (Q^2) is also assessed when the structural model is examined. The Q^2 uses a blindfolding method and is re-validated to identify the magnitude of the endogenous variable (Hair et al., 2011). The method of blindfolding can be used to determine if the model can be used as a predictor, as complete elements of the path and structural model are incorporated (Hair et al., 2011). Hair et al. (2014) recommends the use of PLS-SEM to examine the measurement model based on the effect size (q^2), which is a measurement of the impact that an exogenous variable has on the predictive relevance of the endogenous variable. The mathematics of q^2 are presented in equation 5.4:

$$q^2 = \frac{Q^2{}_{included} - Q^2{}_{excluded}}{1 - Q^2{}_{included}} \qquad equation\ 5-4$$

Where,

Q^2 is the effect size of Q^2 when a particular exogenous variable is excluded.

$Q^2{}_{included}$ is the value of Q^2 when all the exogenous variables exist.

$Q^2{}_{excluded}$ is the value of Q^2 when a particular exogenous variable is excluded.

Table 4.13

Measures and Threshold Values for the Structural Model Evaluation

Assessment Subjects	Measures	Threshold Values	Source
Coefficient of Determination	R^2	0.19 (weak), 0.33 (moderate), 0.67 (substantial).	Henseler et al. (2009), Hair et al. (2011), Hair et al. (2014), Chin (1998a), Ringle et al. (2006), and Ringle and Spreen (2007)
Path Coefficient	t-value	1.65 ($p < 0.10$), 1.96 ($p < 0.05$), 2.58 (0.01)	
Effect Sizes	f^2 and q^2	0.02 (small), 0.15 (medium), 0.35 (large)	
Predictive Relevance	Q^2	0.02 (small), 0.15 (medium), 0.35 (large)	

PLS-SEM is used to evaluate the structural model's parameters. The parameters that were evaluated are shown in Table 4.13. Illustrated in Table 4.13 are the measures and thresholds used in this study to test the structural model.

4.5.2.1 Result of Assessment of Structural Model

Once the measurement model has been assessed for reliability and validity, the structural model must next be evaluated. Presented in Chapter 2, Section 2.9 are the twenty-two hypotheses that comprise the conceptual research model of this study. The main hypotheses (which are hypotheses H_1, H_2, H_3, H_4, H_5, H_6, H_7, H_8, H_9, H_{10}, H_{11}, H_{12}, H_{13}, H_{14}, H_{15}, and H_{16}) along with the mediation hypotheses (which include hypotheses H_{19}, H_{20}, H_{21}, and H_{22}) were investigated as structure Model-1. Based on Hair et al. (2014), it is not allowed to include the loops of relationships (bidirectional relationships) between latent variables in the structural model. Thus, hypotheses H_{17} and H_{18}, which are reflective or feedback relationships, were investigated as structure Model-2, as illustrated in Figures 4.5 and 4.8.

Bilateral or two-way relationships are ones where there are two directions between dependent variables, which include US and U toward NB of m-learning, with the feedback relationships between NB toward US and U. In the structure Model-1 (where there are no reflective relationships), the IS success outcome variable is NB of m-learning. This is used as a dependent variable and is measured through five items. Meeting the needs and desires of users' results in the increase of satisfaction, which in turn results in an increase in both the frequency of use and amount of usage. The increase of US and U lead to realise NB positively affects the individual's decision to continue the usage of m-learning services, as illustrated in Structure Model-1 in Figure 4.6. Reflective relationships (the second direction from NB to U and US) are illustrated in structure Model-2 in Figure 4.8. These reflective relationships indicate that if NB has a positive effect on individuals, it results in re-use, and the increased satisfaction also results in re-use of m-learning services (and vice versa).

To conclude, the Smart-PLS is run in this section by the researcher to evaluate the models. The first model (Model-1) assesses the main hypotheses along with the mediation hypotheses. The second model (Model-2) examines the feedback relationships. The results of analyses of these models are discussed in the following section.

Results of Assessment of Structural Model-1

The main hypotheses (which are hypotheses H_1-H_{16}) along with the mediation hypotheses (H_{19}-H_{22}) were tested in structural Model-1 (not including the reflective relationships). This model has IS success outcome variable is NB of m-learning. The variable is employed as a dependent variable and is measured using four items. Fulfilling the needs and demands of the users' results in greater satisfaction, which itself results in growth of usage and increased frequency of use. The increase in user satisfaction results in more benefits and advantages, which have a positive effect in people's decision to continue using m-learning services (Delone & Mclean, 1992, 2003), as illustrated in Figure 4.6.

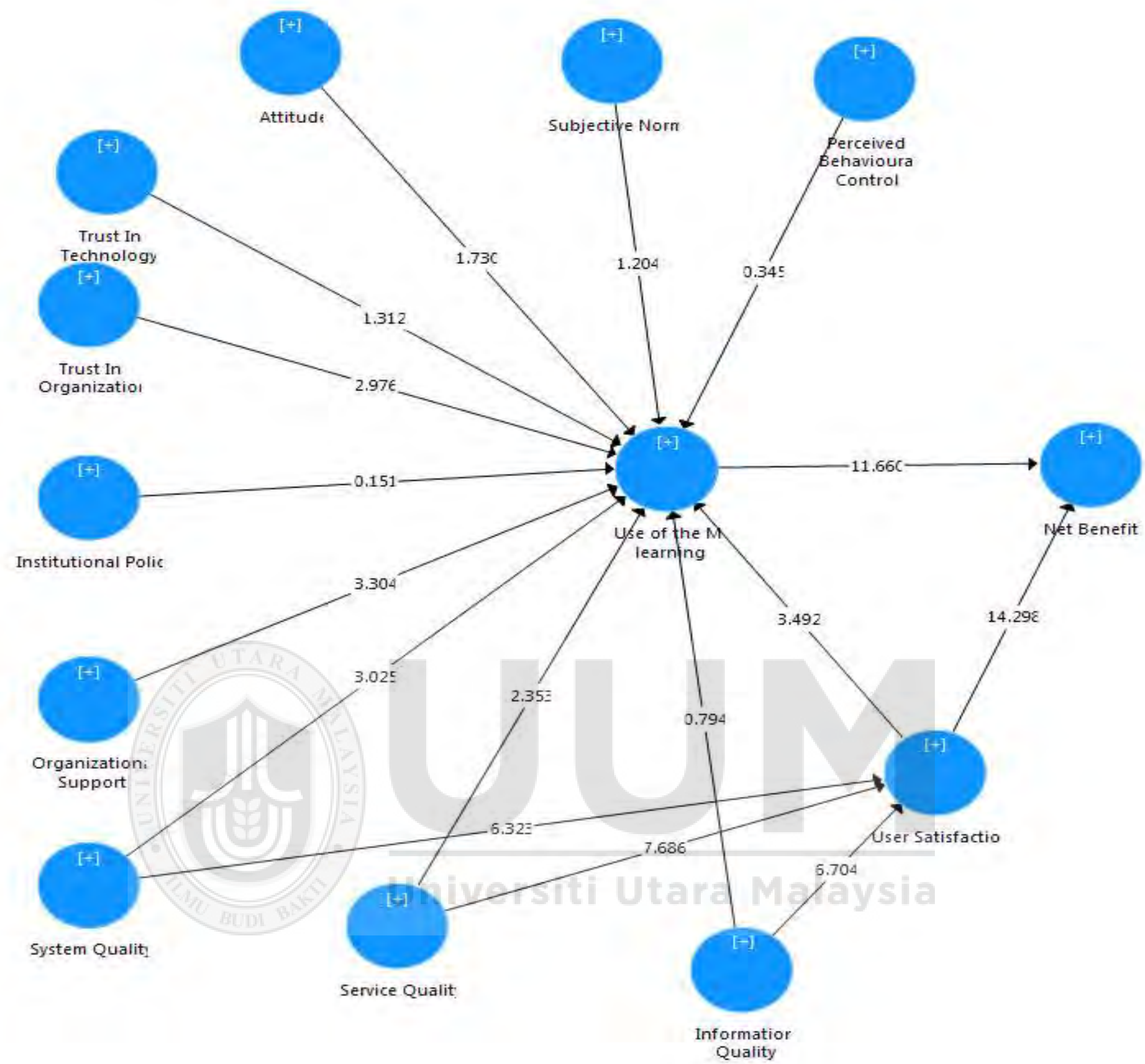

Figure 4.6. Structure Model-1

Evaluated for both primary and secondary endogenous latent variables in this study is the coefficient of determinations (R2), as proposed by several researchers (Henseler et al., 2009; Hair et al., 2011, 2014). A substantial R^2 refers to a value of 0.67, while a moderate

R^2 refers to a value of 0.33 and a weak R^2 refers to a value of 0.19 (Chin, 1998a; Hair et al., 2011, 2014).

According to the results, 0.38 was found as the R^2 value for U, which is an almost moderate level. 0.64 was the R^2 value for NB and 0.58 was the R^2 value for US, indicating that the R^2 value of both was at a moderate level. Table 4.14 displays the analysis results of endogenous latent variables' coefficient of determination.

Table 4.14

Values of Coefficient of Determination (R^2)

Construct Type	Constructs	R^2
Primary endogenous variable	NB	0.64
Secondary endogenous variable	U	0.38
	US	0.58

The path coefficients' confidential intervals were identified with the bootstrapping technique, where randomly selected samples are used to generate the samples. Through these bootstrap samples, the standard error is identified (Hair et al., 2011, 2014). According to Chin (1998a, 1998b), the number of usable samples is 396, with the number of bootstrap samples as 1000 before even running the bootstrapping. Bootstrap case numbers must be the same as original observation case numbers, to gain t-statistics and standard errors (Hair et al. 2011). Table 4.15 and Figure 4.6 display that 14 of 16 hypotheses support the proposed hypotheses.

Table 4.15

Results of Path Coefficients (Direct Relationship) in Model-1

Hypothesis No.	Hypothesis Statement	Original Sample (Path Coefficient)	Standard Error (STERR)	T Statistics (|O/STERR|)	p-Value	Findings
H1	OS -> U	-0.160	0.049	3.304***	0.000	Supported
H2	IP -> U	0.006	0.042	0.151	0.440	Not Supported
H3	SQ -> U	0.151	0.050	3.025***	0.001	Supported
H4	SQ -> US	0.254	0.040	6.323***	0.000	Supported
H5	SEQ -> U	0.132	0.056	2.353***	0.009	Supported
H6	SEQ -> US	0.339	0.044	7.686***	0.000	Supported
H7	IQ -> U	0.047	0.059	0.794	0.214	Not Supported
H8	IQ -> US	0.310	0.046	6.704***	0.000	Supported
H9	AT -> U	0.101	0.058	1.730*	0.042	Supported
H10	SN -> U	0.060	0.049	1.204	0.114	Not Supported
H11	PBC -> U	0.022	0.064	0.345	0.365	Not Supported
H12	TT -> U	0.061	0.046	1.312*	0.095	Not Supported
H13	TO -> U	0.149	0.050	2.976***	0.001	Supported
H14	U -> NB	0.425	0.036	11.660***	0.000	Supported
H15	US -> NB	0.488	0.034	14.298***	0.000	Supported
H16	US -> U	0.224	0.064	3.492***	0.000	Supported

1.65 (*p < 0.10), 1.96 (**p < 0.05), 2.58 (***p< 0.01)

Sixteen (16) direct hypotheses were tested, and the results showed the OS has a negative effect on the U at the 0.001 significance level (β= -0.160, t=3.304, p<0.1), so H_1 is supported (Table 4.15). IP was evaluated and found that IP has no impact on U with (β= 0.006, t=0.042, p>0.01), so this hypothesis did not support H_2. The finding indicated that H3 which was examine SQ on U, the results found a positive significant impact between SQ and U at the 0.01 significance level (β= 0.151, t=3.025, p<0.05). On the other hand, the data analysis show that SQ has a strong influence on US at a significance level of 0.01 (β= 0.254, t=6.323, p<0.001), supporting hypothesis H_4. Moreover, this study indicates that SEQ has a positively significant effect on U and US (β= 0. 0.132, t=2.353, p< 0.01; β= 0. 0.339, t=7.686, p< 0.01 respectively). Thus, H_5 and H_6 are supported.

Moreover, the results showed that the IQ does not influence U (β= 0.047, t= 0.794, p<0.01). This result did not support the postulated hypothesis H_7. The effect of IQ on US was examined and found that IQ has a positive effect on US at a significance level of 0.01 (β= 0. 0.310, t= 6.704, p< 0.001), so this hypothesis supported H_8.

AT was shown to significantly and positively influence U at a significance level of 0.01 (β= 0.101, t= 1.730, p<0.05), supporting H_9. Moreover, the effect of SN was examined and found that SN has no effect on U (β= 0.060, t=1.204, p<0.1), so this hypothesis did not support H_{10}. U was not significantly influenced by PBC (β= 0.022, t=0.345, p<0.01). This result, however, did not support the hypothesis, H_{11}. The influence of TT on the U was examined and found that U was not significantly influenced by TT (β= 0.061, t= 1.312, p<0.05), not supporting hypothesis H_{12}. U was also significantly influenced by TO (β= 0.149, t=2.976, p>0.01), supporting H_{13}.

Moreover, this study examines the effect of U on the NB (β= 0.518, t=8.316, $p<0.01$) and found it to be significant. Therefore, H_{14} is supported. Similarly, US in this study has a significant effect on NB (β= 0.488, t=14.298, $p<0.001$), supporting H_{15}. US was shown to influence US significantly (β= 0.224, t= 3.492, $p<0.05$), supporting H_{16}. Further discussion regarding these findings is provided in Chapter Five.

Assessment of Mediation Effect

Mediation has been defined as a process where many variables affect others through intervening variables regarded as 'mediators' by Preacher and Hayes (2008). Therefore, the relationship between the criterion and predictor variables and the extent of this relationship is shown and explained by a mediator (Hair et al., 2014; Preacher & Hayes, 2004, 2008). That mediation happens in cases where a dependent variable is indirectly affected by a predictor through at least one mediator variable (as an intervening variable). A mediating variable allows the impact of the independent variable to be transferred to the dependent variable, which helps in clarifying the relationship between the variables (MacKinnon & Fairchild, 2009). Moreover, mediating variables play a key role both in research and theory (MacKinnon & Fairchild, 2009).

Various methods have been used in evaluating the mediation effect in different studies over the last two decades. Using the Sobel test proposed by Preacher and Hayes (2004) is the best and most suitable approach to testing the effect of simple mediation (Muraina, 2015). By configuring the SPSS macro in version 20 of SPSS package, the Sobel test can be evaluated (Preacher & Hayes, 2004, 2008). A macro program is one that is run in cases giving a shortcut command for execution. The entire outputs required in examining the mediation through Baron and Kenny (1986) criteria are also provided by macros. Baron and Kenny (1986) suggested using macros in examining simple mediation, as followed, to decide whether mediation has occurred between endogenous and exogenous variables:

1) The complete impact of the independent variable (X) on the dependent variable (Y).

2) The impact of the independent variable (X) on the proposed mediator (M).

3) The impact of the mediator (M) on the dependent variable (Y), while guiding the independent variable (X).

4) The direct independent variable (X) on the dependent variable (Y), while controlling the mediator (M).

Various researchers (MacKinnon et al., 2002; Rucker et al., 2011; Shrout & Bolger, 2002; Hayes, 2009) support Preacher and Hayes' (2004) Sobel test. These researchers concluded that in examining the mediating effect, a total or direct test that is not significant should not be considered as a prerequisite of indirect testing, as suggested by Baron and Kenny (1986). Researchers have focused on indirect effect as the main factor in testing the mediating effect, which process was proposed by Preacher and Hayes in their Sobel test (Hayes, 2009; MacKinnon et al., 2002; Shrout & Bolger, 2002; Zhao, Lynch, & Chen, 2010). Furthermore, the two-tailed *p*-value and normal distribution values (z) also need to be considered in determining the mediating effect (Preacher & Hayes, 2004).

Results of Mediation Effect

In testing Hypotheses H_{19}, H_{20}, H_{21}, and H_{22}, Sobel (1982) test, which was proposed by several researchers who have used PLS (Bontis et al., 2007; Helm et al., 2010), was employed in determining the mediating effect's significance. In this study, the Sobel test that was underlined by Preacher and Hayes (2004) was used in examining the simple mediation path, the mathematical representation of which is shown in equation 5.5:

$$Z = \frac{a \times b}{\sqrt{b^2 \times Sa^2 + a^2 \times Sb^2 + Sa^2 \times Sb^2}} \qquad equation\ 5 - 5$$

Where,

a is the PLS estimate of the path coefficients between X->M

b is the PLS estimate of the path coefficients between M->Y, and

Sb^2 *and* Sa^2 *are the bootstrap standard errors of a and b respectively.*

Thus, in examining the effect of Hypotheses H_{19}, H_{20}, H_{21}, and H_{22}, Preacher and Hayes (2004) recommend considering the p value and the z value, which should be at $p < 0.05$ and z to be ± 1.96, respectively.

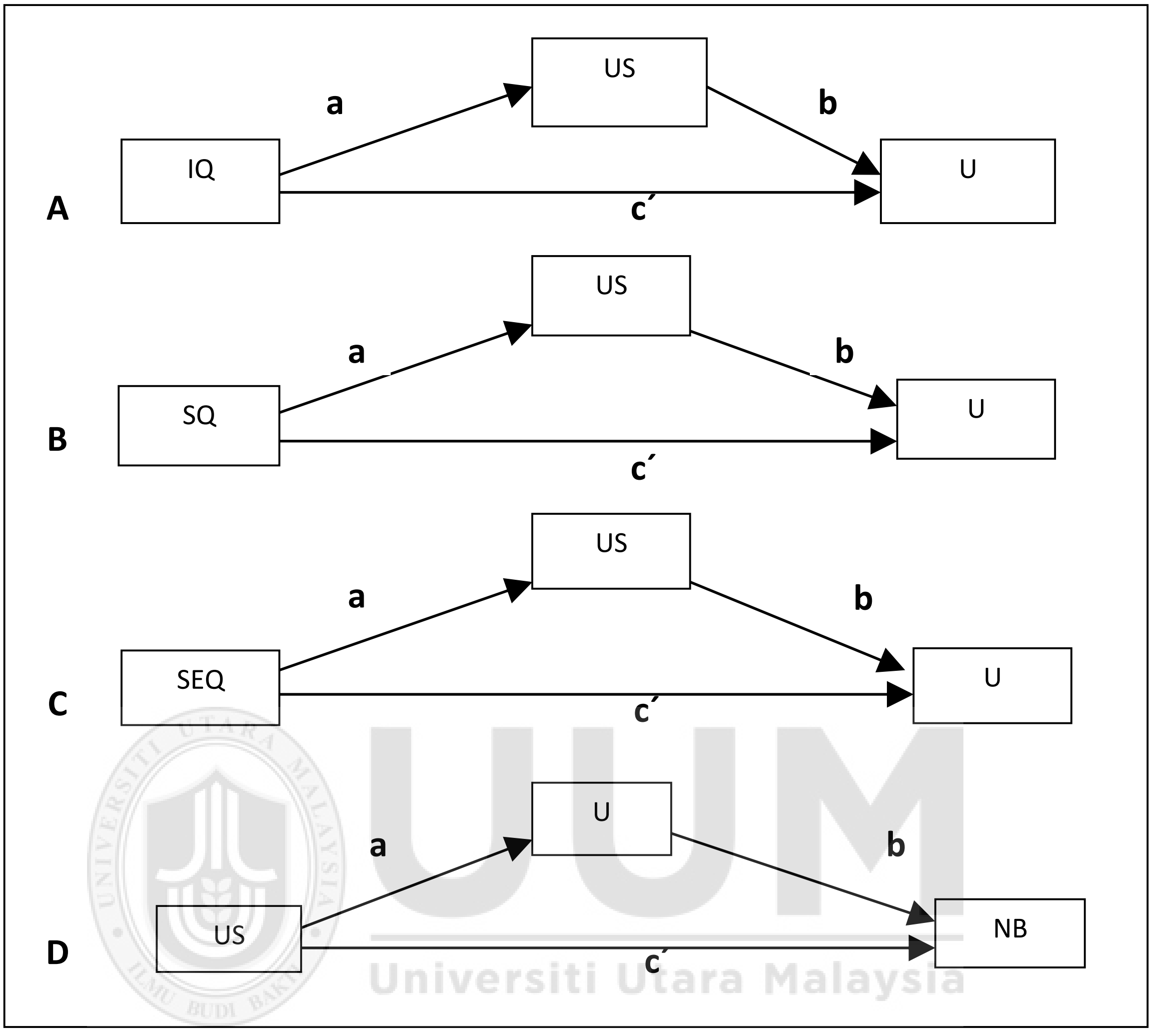

Figure 4.7. Phases of the Mediation Analysis

The mediating effect in the PLS model is determined by the bootstrapping analysis in tandem with the formulated hypotheses (Hair et al., 2013). Particularly, mediation is determined by multiplying the average of paths 'a' and 'b', and then dividing the obtained value by the standard error of the paths (Kock, 2014) as displayed in this formula: T=(a*b)/(C(a*b)). Therefore, this formula helps to identify the mediating effects of mediators on the independent dependent variables relationship in this study. As showed in Figure 4.7 and the formula, 'a' represents the direct path between predictor variables

(Information Quality, System Quality, and Service Quality on the mediator's variable), and 'b' represents the path between mediator's variables (User Satisfaction) and m-learning service usage. Usage of m-learning mediates the relationship between user satisfaction and net benefits of m-learning services. Both paths 'a' and 'b' must be obtained from the PLS bootstrapping to ascertain the significance of their coefficients and standard error (Hair et al., 2013; Kock, 2014). Lastly, 'c' represents the standard deviation of paths 'a' and 'b'. Generally, in PLS bootstrap mediation calculation, 'T' represents the significance coefficient. Mediation is established if the 'T' value is equal to or greater than 1.96 at 0.05 significance level using two tail tests, or 1.64 at 0.05 significance level using one-tail test (Hair et al., 2010).

Table 4.16

Mediation Testing Results

Hypothesis	Relation	Beta	SE	T-Value	p-value	Findings
H19	IQ → US →U	0.069	0.023	3.079	0.001	Supported
H20	SQ → US →U	0.057	0.019	3.036	0.001	Supported
H21	SEQ →US →U	0.076	0.024	3.165	0.001	Supported
H22	US → U →NB	0.095	0.028	3.345	0.000	Supported

As illustrated in Table 4.16, US is found to mediate the relationship between IQ and U with (β= 0.069, t=3.079, p<0.01), which is illustrated in Table 4.16. This indicates the statistical significance of H_{19}. As illustrated in Figure 5.8, US is a mediator between SQ and U with (β= 0.057, t=3.036, p<0.01), showing that Hypothesis (H_{20}) is significant. Furthermore, as showed in Figure 5.8, US is a mediator between SEQ and U with (β= 0.076, t=3.165, $p<0.01$), showing that Hypothesis (H_{21}) is significant. Moreover, the statistical significance of the mediating impact of U on the relationship between US and NB was tested (shown in Figure 4.7). The results indicated that U has a mediating effect between US and NB with (β= 0.095, t=3.345, $p<0.01$), Thus, Hypothesis (H_{22}) is determined to be significant.

Results of Assessment of Structural Model-2

The reflective relationships (the second directions from NB to U and US) are tested in Structural Model 2. Hypotheses (H_{17} and H_{18}) represented these relationships. It indicates that if NB positively affects individuals, it results in re-use or continue of m-learning services and more satisfaction from the re-use of the services, as illustrated in Figure 4.8.

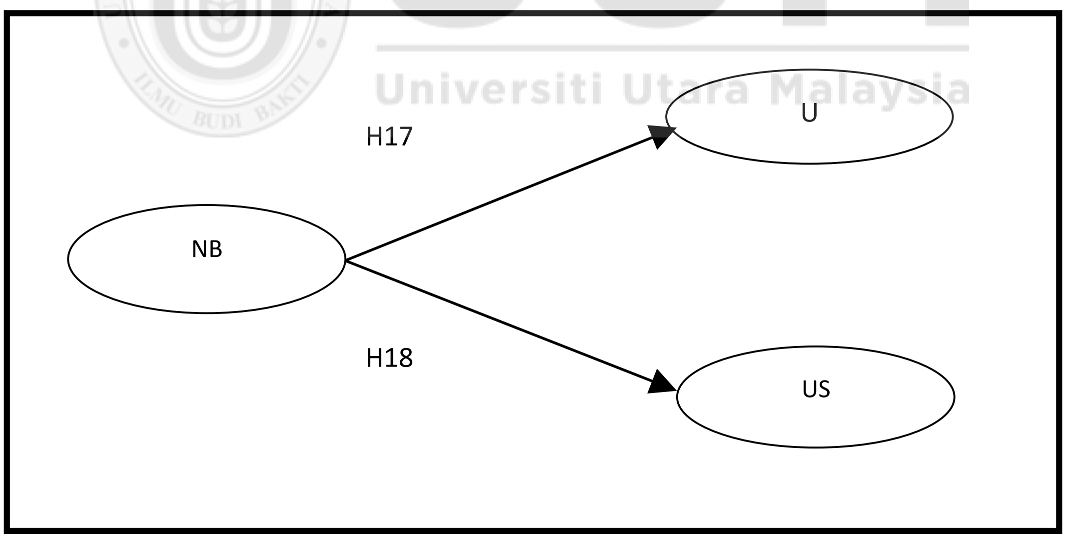

Figure 4.8. Structural Model-2

The Structural Model-2 is tested in this part (illustrated in Figure 4.8), which involves not the direct relationship from US and U toward NB but the feedback relationship from NB towards US and U. In Model-2, the coefficient of determination R^2 was evaluated as was suggested by a few studies (Henseler et al., 2009; Hair et al., 2011a, 2014). The value of R^2 attained for U was at 0.46 which is at significant level. The value of R^2 attained for US was at 0.51 which is at appropriate level. Table 4.17 illustrates the endogenous latent variables' coefficient of determination for Model-2.

Table 4.17

Values of Coefficient of Determination (R^2) for Model-2

Construct Type	**Constructs**	**R^2**
endogenous variable	U	0.46
	US	0.51

Using the bootstrapping technique, the path coefficients were calculated. Repeated random sampling is used in the bootstrapping technique, where bootstrap samples are created by replacements from the original sample to gain the standard errors of the hypothesis testing (Hair et al., 2011, 2014). Before conducting the PLS 3.0 bootstrap method, the number of cases that could be used from the sample was set at 365 (n = 365), while the number of bootstrap samples was set at 1,000, based on Chin's (1998) suggestion. To generate the standard error and t-statistic, the number of observations should be equivalent to the number of bootstrap cases. Therefore, the developed hypotheses are supported by the two hypotheses on the feedback relationships with a significant level of $p < 0.01$, which is shown in Table 4.18, the illustration of which is depicted in Figure 4.8.

Table 4.18

Results of Path Coefficients for Structural Model-2

Hypothesis No.	**Hypothesis Statement**	**Original Sample (Path Coefficient)**	**Standard Error (STERR)**	**T Statistics**	**p-Value**	**Finding**
H17	NB -> U	0.681	0.029	23.720***	0.000	**Supported**
H18	NB -> US	0.714	0.023	30.457***	0.000	**Supported**

1.65 (*p < 0.10), 1.96 (**p < 0.05), 2.58 (***0.01)

Hypotheses (H_{17} and H_{18}) were tested, as illustrated in Table 4.19, and show that U is significantly impacted by NB (β= 0.681, t=23.72, p<0.01), supporting H_{17}. The results also suggest that US is positively influenced by NB (β= 0.714, t=30.457, p<0.01). Thus, Hypothesis (H_{18}) is also verified.

The validated structural Model-2 is represented in Figure 4.9, where both the supported path coefficients and the non-supported path coefficient of the hypotheses are presented. In testing the significant degree of the formed hypothesis, the number of sample size in bootstrapping was chosen to be 1,000. Figures 4.9 and 4.10 illustrate the testing of structural Model-2, with the path coefficient being represented by the values outside the parentheses and the t-values being represented by the values in the parentheses.

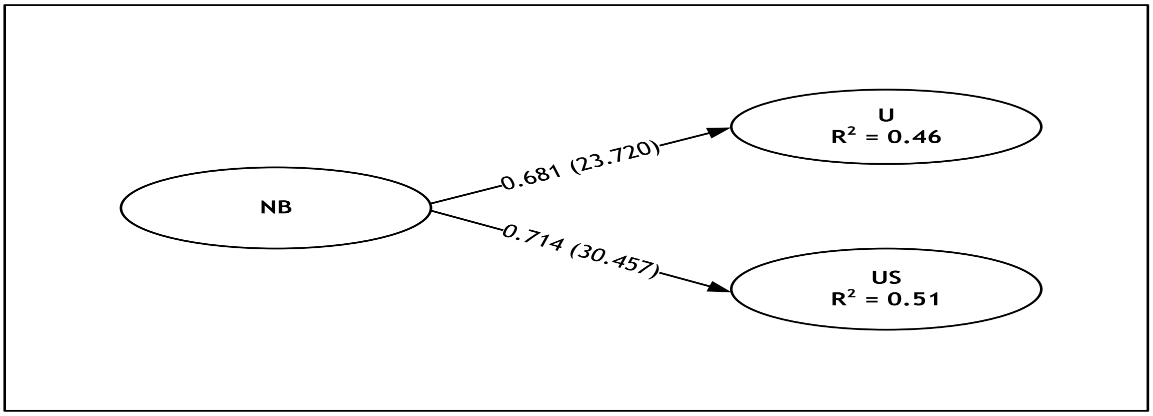

Figure 4.9. Validated Structural Model-2

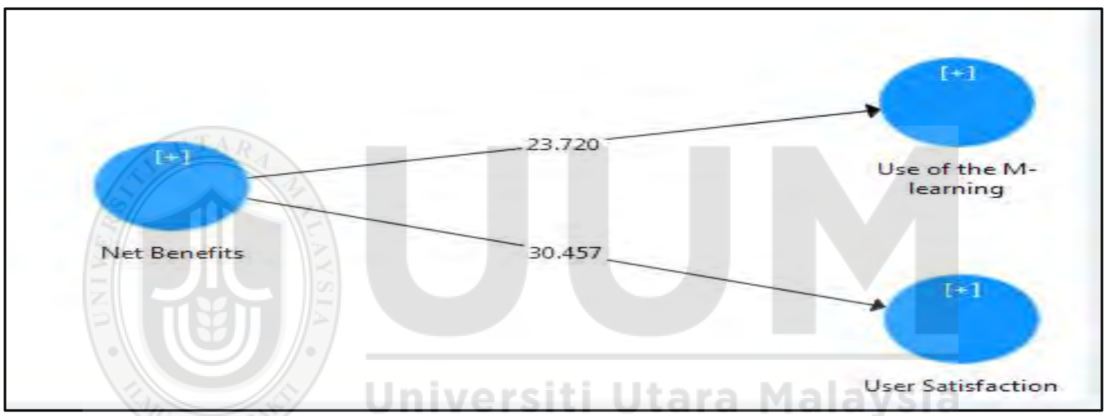

Figure 4.10. Validated Structural Model-2 from SmartPLS3

The outcomes of testing the hypotheses in Model-1 and Model-2 indicate the positive significant effect of OS, SQ, SEQ, AT, TO, and US on U, whereas IP, IQ, TT, SN, and PBC are shown to not influence U. Moreover, the hypotheses tests indicate that SQ, SEQ, and IQ have a significant positive effect on US. Furthermore, the effect of U and US on NB was supported; also, the relationships between U, US, and NB with reflective relationships are supported. Lastly, the hypotheses tests indicate that IP, IQ, TT, SN, and PBC have no effect on U. Table 4.19 illustrates the results of t-values and hypotheses for Model-1and Model-2.

Table 4.19

Hypotheses Testing Based on Structural Estimates

Relationships	Model-1 Path-Coefficient (β)	Model-1 t-Value	Model-2 Path-Coefficient (β)	Model-2 t-Value	Assessment
H1: OS → U	-0.160	3.304	-	-	Supported
H2: IP → U	0.006	0.151	-	-	Not Supported
H3: SQ → U	0.151	3.025	-	-	Supported
H4: SQ → US	0.254	6.323	-	-	Supported
H5: SEQ → U	0.132	2.353	-	-	Supported
H6: SEQ → US	0.339	7.686	-	-	Supported
H7: IQ → U	0.047	0.794	-	-	Not Supported
H8: IQ → US	0.310	6.704	-	-	Supported
H9: AT → U	0.101	1.730	-	-	Supported
H10: SN → U	0.060	1.204	-	-	Not Supported
H11: PBC → U	0.022	0.345	-	-	Not Supported
H12: TT → U	0.061	1.312	-	-	Not Supported
H13: TO → U	0.149	2.976	-	-	Supported
H14: U → NB	0.425	11.660	-	-	Supported
H15: US → NB	0.488	14.298	-	-	Supported
H16: US → U	0.224	3.492	-	-	Supported
H17: NB → U	-	-	0.681	23.720	Supported
H18: NB → US	-	-	0.714	30.457	Supported

The validated structural model is illustrated in Figure 4.10, which illustrates both the supported path coefficient and the non-supported from the hypotheses formed in Model-1 and Model-2. In Figure 4.11, the t-values are shown by the values in parentheses and the path coefficients are shown by the ones outside the parentheses. Furthermore, the significant relationships are represented by solid lines while the non-significant relationships are represented by the dotted lines.

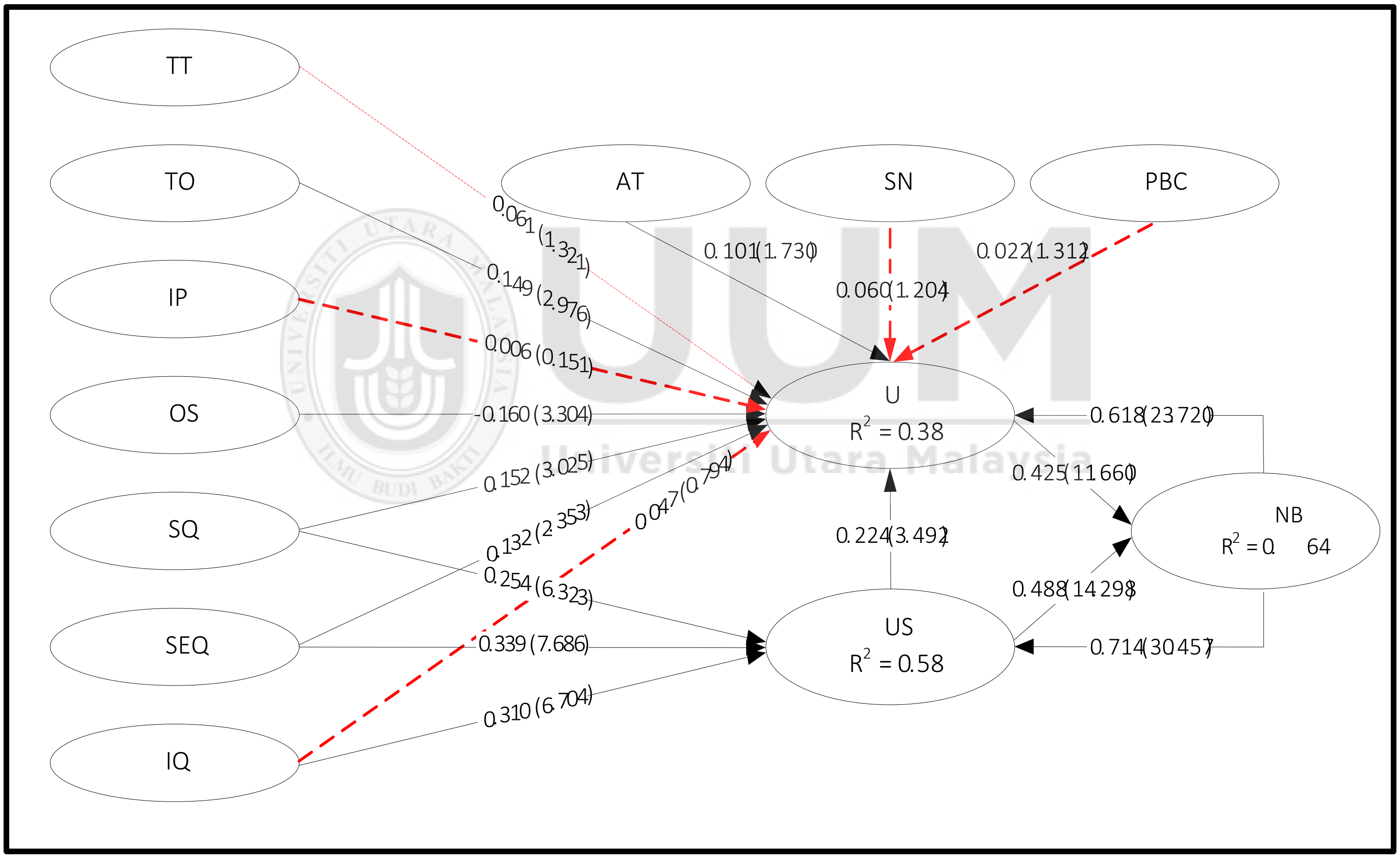

Figure 4.11. Validated Structural Model

4.5.2.2 The Prediction Quality of the Model

The model's predictive relevance and quality, explained by effect size and R^2, are described in the following sections.

R square and Effect Size

The effect size measures the endogenous constructs, as it relates to R^2. Hair et al. (2014) has shown that the value of R^2 can be altered based on the absence of different exogenous variables in the PLS model. The R^2 value alteration, before and after removing the exogenous construct, assesses the impact on the endogenous constructs. This indicates the effect size (f^2). Cohen (1988) stated that an effect size of 0.02 is small, 0.15 is medium, and greater than 0.35 is large. From the outcome provided by SmartPLS 3, the effect size for this study between the exogenous latent variable on endogenous latent variable of the structural model included the mediators illustrated in Table 4.20.

Table 4.20

Effect Size of Predictive Variables

Endogenous variables	Predecessor latent variables	Effect size (f^2)	Effect size rating
U	AT	0.008	None
	IP	0.000	None
	OS	0.019	small
	PBC	0.000	None
	SEQ	0.014	small
	SN	0.003	None
	SQ	0.025	medium
	TO	0.022	medium
	TT	0.003	None
	US	0.035	medium
US	IQ	0.121	small
	SEQ	0.181	small
	SQ	0.084	small
NB	U	0.359	Large
	US	0.474	Large

In this study, the f^2 effect size was examined and the effect sizes of AT, IP, OS, PBC, SEQ, SN, SQ, TO, TT, US to U are found to be none, none, small, none, small, none, medium, medium, none, and medium; IQ, SEQ, SQ to US are small, small, and large; finally, U and US to NB are found to be large, considering the recommendation of some researchers, the f^2 effects of 0.02 is small, 0.15 is medium, and 0.35 is large (Chin, 1998a; Ringle et al., 2006; Ringle & Spreen, 2007; Henseler et al., 2009; Hair et al., 2011, 2014).

Cross-Validated Redundancy

Predictive relevance (Q^2) is further explored in the study through the employment of blindfolding procedure, where cross-validated redundancy approach is used. Q^2 values of above zero (0) for a specific endogenous latent construct are an indication of the predictive relevance of the latent variable in explaining the endogenous latent construct (Hair et al., 2014; Henseler et al., 2009; Ringle & Spreen, 2007; Ringle et al., 2006). Furthermore, the blindfolding procedure relies on the omission distance (D). D must be in the range of 5 and 10, and the observations number utilised in the original data set should be greater than the number of cases (Hair et al, 2011; Ringle & Spreen, 2007). The reason behind that is the number of observations in the original data divided by the omission distance should not be an integer. Thus, the study carried out the blindfolding procedure with 63 cases and an omission distance of 6. As illustrated in Table 4.21, the entire Q^2 values are above zero, which means that predictive relevance exists.

Table 4.21

Values of Predictive Relevance (Q2) for Endogenous Constructs of Model-1 and Model-2

Total	SSO	SSE		1-SSE/SSO (Q2)	
		Model-1	Model-2	Model-1	Model-2
NB	2,835	1535.098	-	0.459	-
U	2,835	2229.688	2021.463	0.214	0.287
US	2,268	1213.314	1342.777	0.465	0.408

The effect size (f^2) tests the impact a specific exogenous latent construct on an endogenous latent construct's predictive relevant (Q^2). The blindfolding procedure was used in examining the effect size through the cross-validated redundancy approach. Furthermore, the researchers recommended that the f^2 values of 0.35 is large, 0.15 is medium, and 0.02 is small in its predictive relevance on the endogenous construct (Chin, 1998a; Hair et al., 2011, 2014; Henseler et al., 2009; Ringle et al., 2006; Ringle & Spreen, 2007).

4.6 Summary

The results of the study and data analysis were described in Chapter 4, along with the data describing the sample's demographic characteristics and descriptive statistics. The reliability and validity of the measurement model's results were also presented in the chapter. This chapter states the results met the requirements for composite reliability and discriminant validity. Out of 18 main hypotheses (direct relationship), 13 were supported, and entire phases mediating effects were also supported as hypothesised.

CHAPTER FIVE

RESEARCH FINDINGS

5.1 Introduction

This chapter presents findings discovered in precious chapters, along with discussion of these results and an overview of the research. Subsequently, there will be a discussion of the hypotheses from the output acquired from the SEM. Moreover, the chapter contains the revised model for contributing factors to evaluate m-learning success amongst students in the universities of KSA.

5.2 Overview of the Research

The IS success of social and economic activities, and public services' efficiency, occur because IS uses modern technological innovations (OECD, 2011; Raman, 2011; Yfantis et al., 2013). This study investigated the contributing factors of m-learning success amongst students in the universities of KSA. Assessing the m-learning success in KSA is important especially in universities.

Despite the efforts of the government and universities to enhance the m-learning services' penetration rate among students and staff in KSA's universities, the degree of utilisation remains in the initial stages (AlAlhareth, 2014; Alkhalaf, 2014; Alshwaier, Youssef & Emam, 2012; Bellaaj, Zekri, & Albugami, 2015). Many of the students employ traditional methods when dealing with the various departments in their university in KSA. This phenomenon could result in the failure of m-learning initiative, instead of the success.

The importance of this study's findings is either further supported or unsupported by prior studies, and the results of hypotheses testing are discussed in the subsequent sections.

5.3 Discussion of Hypotheses Testing

In discussing the hypothesis testing, the focus will be placed on the main effect and the mediating effect, which present the interactions amongst all the contributing factors in evaluating m-learning success amongst students in the universities of KSA.

5.3.1 Discussion of Main Effect Hypotheses

The main effect hypotheses deal with the direct relationship between some elements towards the net benefits of applying m-learning services between students in universities of KSA. This could include the relationship between Organisational Support, Institutional Policy, Subjective Norm, Perceived Behavioural Control, Attitude Toward, Trust in Technology, Trust in Organisation, Information Quality, System Quality, Service Quality, User Satisfaction, Net Benefit, and Use, as well as the relationship between Information Quality, System Quality, Service Quality, Net Benefit, and User Satisfaction. Also included is the relationship between Use, User Satisfaction, and Net Benefit.

5.3.1.1 Relationship between Organisational support and Use of m-learning Services (H1)

In this study, Organisational Support indicates the level that the student perceives that a university or educational system has the appropriate infrastructure and technical capabilities to successfully support m-learning (Ndonje, 2013). Five items adapted from Ndonje (2013) to measure OS.

The statistical results indicated that Organisational Support has a significant effect on U at a significance level of 0.1 (β= -0.160, t=3.304, p<0.01) and indicates there is a significant relationship; therefore, H1 is supported. This result is supported by many scholars, including Arman and Wiyono (2015) who indicated that, without support by the organisation, the result will not be sufficient.

The OS was hypothesised to have a significant effect on U of the m-learning services in Saudi' universities, as shown in Table 4.15; it was statistically significant within the selected 0.1 significant level. Thereupon, hypothesis H_1 was supported. As expected, this finding support H_1 at the negative significant effect hypothesised. There are several reasons for this negative significance. Firstly, several universities in KSA suffer from inexperienced IS experts and staff. Secondly, there are financial issues in most universities, and especially new universities, obtaining IS technologies. Thirdly, these universities suffer from low infrastructure and resources. The top management of universities makes the usage of technology voluntary. The Saudi students are used to a lack of this kind of technology, and only sometimes use these services to find exam results or download scientific topics related to their subjects, whether supported by the university or not.

This information is important because there are students who are accustomed to using the m-learning services whether supported or not by their organisation. In other words, despite all efforts by the organisation to ensure success of IS, there are some obstacles to ensure usage within their organisations, including financial, infrastructure, and low resources issues, especially in a new university. If the students believe that there is not enough resources available when they need them, the students are unlikely to use IS (Lewis, Agarwal, and Sambamurthy, 2003).

5.3.1.2 Relationship between Institution Policy and Use of m-Learning Services (H2)

Several experimental studies examined the impact of institutional policy on IS success in several contexts of different countries (Lwoga, 2012; Ndonje, 2013). In this study, Institutional Policy refers to the policies that limit the wide utilisation of m-learning to support learning and teaching in a higher learning institution (Ndonje, 2013). IP was measured by five items adapted from Ndonje (2013); Umrani-Khan and Iyer (2009).

Examining the hypothesis regarding the effect of IP on U results determined that IP has no significant impact on the U (β= 0.0056, t=0.151, p<0.01). Thus, hypothesis (H_2) is not reinforced (see Table 4.15). Unexpectedly, this finding did not support H_2 at the level of significant effect hypothesised. This result indicates that there is problem in institutional policy and strategies regarding usage of m-learning and others IS.

The use of these technologies is mainly driven by individual efforts rather that institutional policies and strategies, which limits the wide utilisation of these technologies to support learning and teaching in higher learning institutions (Lwoga, 2012). Therefore, supportive institutional and national policies, based on individual values, are not necessary to encourage and motivate individuals towards the desired directions and motivate students creatively (Asiimwe et al., 2017).

5.3.1.3 Relationship between System Quality and Use, User Satisfaction of m-learning Services (H3, H4)

Empirical studies examined the effect of system quality measuring IS success in several contexts (Bento & Costa, 2013; Nelson, et al., 2005; DeLone & McLean, 1992; 2003; Chatterjee et al., 2009; Rai et al., 2002; Wixom & Todd, 2005). In this study, System Quality (SQ) is how well the m-learning service performs technically, meaning the quality, retrieval, and delivery of information (Delone & Mclean, 2003). Four items established measures of SQ, and were adapted from AlKhatib (2013), Delone and Mclean (2003), Wangpipatwong, Chutimaskul, and Papasratorn (2005), Wixom and Todd (2005).

Examining the hypothesis regarding the effect of SQ on U results determined that SQ has a positive effect on the U ($\beta = 0.151$, $t=3.025$, $p<0.01$), supporting H_3 (see Table 4.15). As expected, the findings indicated that SQ has a positive effect in enhancing the students' usage of m-learning services in distinct cultural settings, including universities in KSA. The result implies that the students can use m-learning as a voluntary system, even though the Saudi' communities have distinct cultures and different traditions. These cultures and traditions can affect students and staff positively. Moreover, the finding suggests that most of the students have experience using m-learning services, applications, and the Internet. Therefore, there is a need for more trainings and workshops in universities. The services are not easily accessible or available. Most of the m-learning services may be designed to be compatible with one mobile operation systems, instead of the various operation systems (Android, Apple IOS) familiar to users. Therefore, the system quality is critical for students to decide whether to use the m-learning system. This result (H_3) is consistent with empirical studies stating that SQ plays a critical role in IS success (Dwivedi et al., 2013; Iivari, 2005; Khayun & Ractham, 2011; Yim & Shin, 2014).

The results show that SQ has a noteworthy positive effect on US (β= 0.254, t=6.323, $p<0.001$). This supports the postulated hypothesised association of H_4 (see Table 4.15). The finding suggests that students have high expectations of system quality, and that their needs have been met. Therefore, it can be concluded that US is affected by SQ. Moreover, the supported result in hypothesis H_4 is compatible with previous studies which indicated that SQ influences the US (Alshibly, 2014; Dwived et al., 2013; Chen & Cheng, 2009; Khayun & Ractham, 2011; Lee & Chung, 2009; Rai et al., 2002; Teo et al., 2009; Zhou, 2013).

5.3.1.4 Relationship between Service Quality and Use, Use Satisfaction of m-learning Services (H5, H6)

Several studies have highlighted the significance of a service quality (SEQ) factor when evaluating the success of IS in various settings (Alshibly, 2014; Chen & Cheng, 2009; DeLone & McLean, 2003; Zhou, 2013). This study defined SEQ as the result of interaction between students and departments of a university, and compared expected performance with actual performance of m-learning services (Delone & Mclean, 2003; Vanparia & Ganguly, 2010). SEQ was measured through six items adapted from Pitt, Watson and Kavan (1995).

The results show that SQ has an important impact on U (β= 0. 0.132, t=2.353, $p < 0.01$). This supported H_5 in the positive significant effect hypothesised (see Table 4.15). The findings revealed that there is a lack of institutional support (trainings and workshops) for the educational community that reduces the use of m-learning services, which leads to less experience dealing with m-learning services without needing help or having problems. Moreover, many students are still hesitant about perceived risk, the price increase associated with changing services, and relative price, reducing usage of m-learning services. According to Alksasbeh (2012), service quality can limit these impacts, giving more attention to m-learning usage. The result explains that the students who perceived the m-learning system high-quality will positively encourage them to participate effectively in m-learning services, and eventually their level of usage will be enhanced.

This result (H_5) corroborates the findings of most prior studies in the IS field (Akour, 2009; Alshibly, 2014; DeLone & McLean, 1992, 2003; Dwived et al., 2013; Khayun & Ractham, 2011; Yim & Shin, 2014; Ying & Kaewmee, 2011).

The hypothesis (H_6) on the relationship between SEQ and US towards m-learning success among students in universities of KSA gains empirical support from the results of this study (β= 0. 0.339, t=7.686, $p < 0.01$). The result of hypothesis H_6 indicates that the students will be satisfied when the service is high-quality. Therefore, it is implied that if institutions cannot ensure reliable, prompt, personalised service, students will doubt the service's ability to provide high-quality service, thereby decreasing their satisfaction levels.

Universities can also implement encryption certificates to guarantee the service is secure and reliable. Otherwise, students may perceive risks and cease using the services. The results show that the students will be satisfied with SEQ when their requirements are met. Hence, the result of hypothesis H_6 confirms the effect of SEQ on US in accordance with several previous studies (Chiu & Chang, 2007; Devaraj et al., 2002; Halawi et al., 2008; Leclercq, 2007; Palmer, 2002).

5.3.1.5 Relationship between Information Quality and Use, Use Satisfaction of m-learning Services (H7, H8)

Experimental studies examined the impact of information quality on IS success in several contexts of different countries (Bento & Costa, 2013). In this study, Information Quality (IQ) is the students' perception of the quality of information provided through m-learning, including accuracy, completeness, comprehension, current, and an acceptable format (Delone & Mclean, 2003). Five items were used to measure IQ, based on the items proposed by Al-adaileh (2009), Doll and Torkzadeh (1988), Bharati and Chaudhury (2004), Delone and Mclean (2003), Bailey and Pearson (1983), and Rai et al. (2002).

When the relationship between IQ and U is examined in the context of the related hypothesis, the results indicate that IQ has no impact on U (β= 0.047, t= 0.794, p>0.01). This result does not support the postulated hypothesised relationship of H_7 (see Table 4.15). The finding indicates that the IQ does not influence the use of M-Learning in the universities. It might be because the quality of the information in M-learning application does not meet the students expectation. Therefore, the use of m-learning service and its informational products does not impact or influence the student in conducting his or her work. Furthermore, the result implies that providing that good quality of information does not impact use of the m-learning service. Thus, IQ may not act as a strong usage signal. The result implies that the students in KSA universities would have positive feelings regarding the m-learning services if they found they could gain accurate, understandable, clear, up-to-date information, and could conduct m-learning services from any location at any time. When the information is inaccurate and dated, students do not feel in control.

When the relationship between IQ and US is examined in the context of the related hypothesis, the results implied that there was a strong impact of IQ on the US ($\beta = 0.$ 0.310, $t = 6.704$, $p < 0.001$). This supports the postulated hypothesised relationship of H_8 (see Table 4.15). The finding shows a strong association between high-quality information and elevated levels of m-learning services user satisfaction. User satisfaction indicates the student's feelings toward the m-learning services. Thus, information quality provided by these services influences the student's feelings whether the service meets his or her needs. The result implies that the students in universities of KSA can obtain relevant information to meet their requirements at any time and in any location. Furthermore, they utilised these services to meet their needs. Therefore, meeting students' information requirements leads to greater satisfaction. User requirements must be fulfilled by the service; therefore, a user cannot be satisfied unless this is achieved. Thus, the service providers (universities) should consider the students' needs, further leading to their satisfaction. This result (H_8) is in line with other studies that have given empirical evidence of the significant positive effect of IQ on US (Alshibly, 2014; Bento

& Costa, 2013; DeLone & McLean, 2003; Glood et al., 2016; Wang & Liao, 2008; Zhou, 2013).

5.3.1.6 Relationship between Attitude and Use of m-learning Services (H9)

Many experimental studies investigated the influence of AT on IS success in innumerable contexts of different countries (Akour, 2009; Brown, 2002; Cheon, Lee, Crooks, & Song, 2012; Ngai et al., 2005; Park, Nam, & Cha, 2011). In this study, Attitude (AT) is about the student's positive or negative feelings regarding behaviour, where the behaviour is use of m-learning services (Ajzen, 1991). Moreover, AT was measured by five items that were based on the items proposed by Cheon, Lee, Crooks, and Song (2012) and Taylor and Todd (1995).

When the relationship between AT and U is examined in the context of the related hypothesis, the results indicate that AT has a significant effect on U (β= 0.101, t= 1.730, p<0.01). This result, shown in Table 4.15, supported the postulated hypothesised H_9 relationship, corresponds to previous results in empirical studies, supporting the evidence of a strong positive effect that AT has on U (Amadi & Paul, 2017; McGill & Hobbs, 2008; Park, 2009; Ndubisi & Chukwunonso, 2004). However, the findings indicated that attitude has a significant role in enhancing the student m-learning usage in unfamiliar cultural settings, such as higher education in KSA. The result implies that the students in the universities of KSA may have experienced positive behaviours regarding the usage of m-learning services if they believed that the usage m-learning services was a good and wise idea, pleasant, and lovely. If users feel annoyed and not in control, their usage will be undermined. Therefore, this result asserted that AT is a crucial factor in using m-learning in higher education in KSA.

5.3.1.7 Relationship between Subjective Norm and Use of m-learning Services (H10)

Many experimental studies investigated the impact of SN on IS success in several contexts of different countries (Akbulut & Houston, 2002; Chung, Skibniewski & Kwak, 2008; Wu et al., 2008; Park et al., 2006; Yang, 2007). In this study, Subjective Norm (SN) refers to the level of social influence that an individual feels towards using m-learning services from their teachers or their peers (Park et al., 2006). Six items were used to measure AT, based on the items proposed by Khac (2012), Park et al. (2006), and Taylor and Todd (1995).

When the relationship between SN and U is examined in the context of the related hypothesis, the results showed that SN has no significant impact on U (β= 0.060, t=1.204, p>0.1). Thus, the hypothesis (H10) is not supported (see Table 4.15). The findings indicated that SN has no effect to enhance the students' usage of m-learning services in unfamiliar cultural such as higher education in KSA. Alenezi (2011) asserted that the effect of subjective norm might be positive or negative depending on the examined cultures and its mandatory or voluntary settings. Moreover, the unsupported result in hypothesis H10 is compatible with the study done by Chang, Huang and Chang in (2013), while it is incompatible with some of the previous studies (Lee, 2010; Park, 2009).

5.3.1.8 Relationship between Perceived Behavioural Control and Use of m-learning Services (H11)

Many experimental studies investigated the impact of PBC on IS success in many contexts of different countries (Klopping & McKinney, 2006; Shih & Huang, 2009; Teo et al., 2009). In this study, PBC is a student's beliefs of the difficulty or ease of engaging in a particular behaviour, where the behaviour is use of m-learning services (Ajzen, 1991). Three items were used to measure PBC, based on the items proposed by Ajzen (1991) and Taylor and Todd (1995).

When the relationship between PBC and U is examined in the context of the related hypothesis, the results indicate that PBC has no impact on U (β= 0.022, t=0.345, $p<0.01$). This result does not support the postulated hypothesised relationship of H_{11} (see Table 4.15). Finally, this result (H11) is inconsistent with most prior studies in the IS field (Ndubisi, 2004; Ndubisi & Chukwunonso, 2004; Al-Harbi, 2011).

More specifically, the findings indicated that students did not consider m-learning services as more interesting than traditional methods like PCs or face-to-face. The result also explains that students are not confident with M-Learning usage since they did not have experience or skills that encourage them to participate effectively in m-learning services. Therefore, the students in the universities of KSA are not interested in the usage of m-learning services (Al-Fahad, 2009).

5.3.1.9 Relationships between Trust in Technology, Trust in Organisation and Use of m-learning Services (H12, H13)

Several studies have focused on various issues of trust regarding mobile technology, and investigated the effect of trust on IS success in various contexts of different countries (Al-Mushasha & Hassan, 2009; Barakat & El-Sheikh, 2010; Benamati, Fuller, Serva, & Baroudi, 2010; Ghosh & Xu, 2010; Mahatanankoon, Wen, & Lim, 2006; Siau & Nah, 2006; Termsnguanwong, 2010; Tyler & Degoey, 1996; Zhou, 2011). In this study, trust is divided to two key ingredients: (i) trust in the university as an institution, and (ii) trust in the mobile channels as electronic channels. Trust in organisation (TO) refers to a student's trust that the organisation providing the online service will have security and privacy settings that protect the user's personal information and transactions. Four items were used to measure TO, based on the items proposed by Carter & Bélanger (2005) and Lee and Turban (2001). Trust of technology (TT) refers to the level that students trust in the technology. TT was measured by three items, based on the items proposed by Lee and Turban (2001) and Carter and Bélanger (2005).

Examining the hypothesis regarding the effect of TO on U results determined that TO influences U (β= 0.149, t=2.976, p>0.001). Expectedly, this result supports H_{13} at the positive significant effect hypothesised (see Table 4.15). The findings suggest that TO effects U because most universities in KSA used a security system to keep the personal information and students' data faithfully (such as exam results and student ID). Furthermore, the result implies that students have high trust with their universities to provide accurate, up-to-date, and secure m-learning services that created a trust between students and institutions when using m-learning services.

The results indicate that TT has no impact on U ($\beta= 0.061$, $t= 1.312$, $p<0.01$). Therefore, the postulated hypothesised relationship of H_{12} is not supported (see Table 4.15). The finding suggest that concern regarding data security does not influence the lack of trust among students. Many students remain cautious to share confidential information, particularly personal information, over the Internet. This means, the students did not have high trust in mobile learning services. As a result, most of students usually use the traditional learning, or face-to-face learning, in which trust is based on personal relationships and on interactions between students and the institution. Nevertheless, generally, students require more assurance of privacy protection and more control over the personal information that can be released (Khalifa & Shen, 2006). Therefore, the reliability of m-learning system is still far from perfect.

The obtained findings do not support previous studies (Al-Sukkar, 2005; Barakat & El-Sheikh, 2010; Benamati, Fuller, Serva, & Baroudi, 2010; Gefen et al., 2003b; Reid & Levy, 2008; Tyler & Degoey, 1996; Zhou, 2011). The findings are supported by a recent study by Barakat and El-Sheikh (2010) which indicate that the TT is not significant with usage and need to be considered as crucial in post implementation of mobile application.

5.3.1.10 Relationship between Use of m-learning Services and Net Benefits of m-learning Services (H14)

Experimental research examined the effect of Use of Services on IS in numerous contexts (Abdul-Gader, 1997; Igbaria & Tan, 1997; Kositanurit et al., 2006; Lee et al., 2007; Seddon & Kiew, 1996; Torkzadeh & Doll, 1999). In this study, U is the utilisation of m-learning services by students, specifically frequency of use, usage time, and the number of access events impacting expected results (Delone & Mclean, 2003). The use of m-learning was evaluated via five items based on Delone and Mclean (2003) and Wu and Wang (2006).

When the relationship between U and NB is examined in the context of the related hypothesis, the results imply that the there is a strong effect of U on the NB (β= 0.425, t=11.660, p<0.01). This supports the postulated hypothesised association of H_{14} (see Table 4.15).

This indicates that students (users) in universities increased frequency of use of m-learning services intensifies positive user behaviour, thus increasing the benefits received. Moreover, the results show that effective use of services brings positive developments in their lives. For example, when a student achieves a comfort level of service access, experience levels increase, resulting in additional advantages gained through use of the service (time efficiency, cost efficiency, notifications on-time of any situation, student status).

The supported result of hypothesis H_{14} support with previous studies indicating that U influences the NB (Almutairi & Subramanian, 2005; Alshibly, 2014; D'Ambra & Rice, 2001; Khayun & Ractham, 2011; Hou, 2012; Urbach et al., 2010; Wang & Liao, 2008; Yim & Shin, 2014).

5.3.1.11 Relationship between User Satisfaction and Use, Net benefits of m-learning Services (H15, H16)

Experimental research examined the impact of user satisfaction on IS success in several contexts of different countries (DeLone & McLean, 1992, 2003; Igbaria & Tan, 1997; Kim et al., 2009). In this study, US is the users' belief level and net pleased or displeased perception that the m-learning services fulfilled expectations (Delone & Mclean, 2003; Mahlakõiv, 2010). User satisfaction was measured via four items adapted from Wu and Wang (2006) and Delone and Mclean (2003).

When the relationship between US and U is examined in the context of the related hypothesis, the result implies that the effect of US on U has a noteworthy impact (β= 0.224, t= 3.492, p<0.01). This supports the postulated hypothesised association of H_{16} (see Table 4.15).

The finding suggests that meeting many students' needs and requests through the m-learning services leads to satisfaction, thus increasing the use of m-learning services. Moreover, during data collection, the respondents showed enthusiasm for m-learning services, as they are confident that their use would provide prompt responses to their requests. In other words, the provision of suitable services relevant to the needs and wants of users may encourage more students to use or re-use m-learning services. This result indicated that students prefer to use m-learning services to obtain information and services rather than any traditional way, if these services can meet their needs and requirements.

Therefore, it can be concluded that US influences the U of m-learning services amongst students in the universities of KSA.

The finding of (H_{16}) aligns with empirical studies that provided experiential evidence of the noteworthy positive effect of US on U (DeLone & McLean, 2003; Ding, 2010; Halawi et al., 2008; Hsieh & Wang, 2007; Khayun & Ractham, 2011; Hou, 2012; McGill et al., 2003).

The findings indicate that US has a positively substantial effect on NB ($\beta= 0.488$, $t=14.298$, $p<0.01$), supporting H_{15} (see Table 4.15). User satisfaction is achieved through compiling all users' anticipated benefits garnered through use of the information system. The finding suggests that achievement of the expected benefits of m-learning services relied on the provision of suitable services relevant to students' needs. Meeting of these needs would increase the students' positive feelings towards the use of m-learning services to obtain the desired benefits. Therefore, it can be concluded that US influences the NB of m-learning services amongst students in the universities of KSA.

Moreover, the supported result in hypothesis H_{15} is compatible with previous studies stating that US influences NB (Alhendawi & Baharudin, 2014a; 2014b; Alshibly, 2014; Chen et al., 2015; Halawi et al., 2008; Khayun & Ractham, 2011; Koh, Prybutok, Ryan, & Wu, 2010; Hou, 2012; McGill & Klobas, 2005; Urbach et al., 2010; Wang & Liao, 2008).

5.3.1.12 Relationship between Net Benefits and Use, User Satisfaction of m-learning Services (H17, H18)

Various previous studies investigated the net benefits (NB) effect on the success of IS in different countries (DeLone & McLean, 2003; Chatterjee et al., 2009; Bento & Costa, 2013; Attaran, 2012; Wixom & Watson, 2001; Vuolle, 2011; Zhou, 2013). In this study, Net Benefits (NB) are assessment of expected and actual benefits of the totality of net benefits obtained from the use of m-learning services (Delone & Mclean, 2003). NB was measured using five items based on Delone and Mclean (2003) and Wu and Wang (2006).

When the relationship between NB and U is examined in the context of the related hypothesis, the result implies that the effect of NB on U has a noteworthy impact ($\beta = 0.681$, $t=23.720$, $p<0.01$), supporting H_{17} (see Table 4.19).

The finding indicates that following the use of m-learning services, the positive impact of net benefits gained subsequently increased the levels of use and reuse. This shows that users (students) are persuaded to continue to use and reuse the services if their prior expected benefits correlate to the actual benefits attained. In other words, the student has an initial expectation of the benefits of using m-learning services. If benefits after actual use exceed initial expectations, students are encouraged to reuse these services. Therefore, reuse and revisits to the m-learning services are dependent upon the net benefits after actual use. This repeated usage serves as feedback for this relationship.

Moreover, the supported result in hypothesis H_{17} is compatible with previous studies purporting that NB influences U (DeLone & McLean, 2003; Seddon, 1997; Hsieh & Wang, 2007; Venkatesh & Morris, 2000; Wixom & Watson, 2001; Wang, 2006; Wu & Wang, 2006).

When the relationship between NB and US is examined in the context of the related hypothesis, the result implies that the outcome of NB on US is noteworthy ($\beta = 0.714$, $t=30.457$, $p<0.01$), supporting H_{18} (see Table 4.19).

The results show that the compatibility between initial expectations of the benefits and the benefits generated from the actual use of services, with respect to meeting their needs and desires, generated a feeling of satisfaction for the user, which encouraged students to use these services repeatedly. In other words, a student uses m-learning services to meet his or her needs and requirements, which is presented as benefits. Achieving these benefits leads to greater user satisfaction levels. When m-learning services fulfil the users' requirements, the user (student) becomes satisfied and contented, encouraging repeat use of the services to obtain the benefits on a continual basis. This user satisfaction also serves as feedback of positive benefits. Moreover, the supported result of hypothesis H_{18} is compatible with previous studies postulating that NB influences US (Wu & Wang, 2006; Leclercq, 2007; Abdul-Gader, 1997; Bharati & Chaudhury, 2006; Guimaraes et al., 1996; Hsieh & Wang, 2007; Rai et al., 2002;).

5.3.2 Discussion of Mediating Effect Hypotheses

A mediating effect can be described as a situation in which a variable exerts an influence on the dependent and independent variables' relationship (Preacher & Hayes, 2008). This study tested the effect of user satisfaction as the mediator on the relationship between system quality, information quality, and service quality as the independent variables, and use as the dependent variable of m-Learning services. Moreover, the impact of the use mediating effect of m-Learning services on the relationship between user satisfaction and net benefit was tested.

5.3.2.1 Influence of User Satisfaction as Mediator

This study tested US as a mediating variable between IQ, SQ, SEQ, and U of m-Learning services. The hypotheses are as follows:

H_{19}: User Satisfaction mediates the association amid Information Quality and use of m-learning services in Public Universities in the Kingdom of Saudi Arabia.

H_{20}: User Satisfaction mediates the relationship between System Quality and use of m-learning services in Public Universities in the Kingdom of Saudi Arabia.

H_{21}: User Satisfaction mediates the connection amongst Service Quality and use of m-learning services in Public Universities in the Kingdom of Saudi Arabia.

Hypothesis H_{19} proposed the mediating effect of US on the association amid IQ and U of m-learning services amongst students in universities of KSA, and was empirically supported by the results of the analysis. As explained previously in subsection 4.4.2.1.3, the results revealed that all the phases of direct and total effect analytical paths have t values which are statistically significant (above of 1.96). Hence, hypothesis H_{19} is supported as US mediates the relationship between IQ and U ($t = 3.079$; $p < 0.001$) (see Table 4.17). Moreover, the result of the mediating effect of US proves lower than its direct relationship on IQ and U of m-learning services. This result is expected since the IQ can directly and indirectly influence U of m-learning services through US. This indicates, again, that user satisfaction with m-learning services can increase students' frequency and willingness of use.

In addition, Hypothesis H_{20} tested the influence of US on the relationship between SQ and U of m-learning services amongst students in universities of KSA and was supported. This means that SQ can drive the US, which, in turn, can drive the U of m-learning services. Moreover, the result of hypothesis H_{20} indicates that the higher the simplicity, accessibility, and flexibility of m-learning services, the greater the frequency of use amongst students in universities. Hence, SQ is accepted as one of the contributing factors for the use of m-learning services amongst students in higher level educational settings. This is demonstrated by the direct/indirect relationships which reveal the importance of the SQ in this study.

Similarly, Hypothesis H_{21} tested the influence of US on the connection amongst SEQ and U of m-learning amid students in universities of KSA, and was supported. This is empirically and statistically proven from Table 4.17 with ($t = 3.165$; $p < 0.001$) (see Table 4.17). This result explains that the SEQ can indirectly influence U of m-learning services through US amid students in universities. This indicates that SEQ can drive US, which, in turn, can drive the use of m-learning services. Moreover, the result of hypothesis H_{21} shows that the higher the SEQ, the greater the usage of m-learning services amongst students in universities. Hence, SEQ is accepted as one of the contributing factors towards the usage of m-learning services amongst students in universities. This is demonstrated by the direct/indirect relationships, which reveal the importance of SEQ in this study.

5.3.2.2 Influence of Use of m-learning Services as a Mediator

H_{22}: The students Usage of m-learning mediate the relationship between User Satisfaction and Net Benefits of m-learning services in the Public Universities in Kingdom of Saudi Arabia.

The results of this study supported the mediation role of U of m-learning services in Hypothesis H_{22} (see Table 4.17).

Hypothesis H_{22}, which proposed that the mediating effect of U of m-learning services on the relationship between US and NB of m-learning services amongst students in universities of KSA, was empirically supported by the result of the analysis. This is statistically confirmed in Table 4.17, with ($T = 3.345$; $p < 0.01$) (see Table 4.17). Moreover, the result of the mediating effect of U proves lower than its direct relationship on US and NB of m-learning services. This result is expected since US can directly and indirectly influence the NB attained from U of m-learning services. This indicates that the NB of using the service can be best explained or demonstrated by actual experience of using the service. Essentially, the mediation role of the use of m-learning services (U) depicted the importance of actual usage to attain the net benefits (NB). Hence, there is an indirect noteworthy relationship between US and NB of m-learning amongst students in universities of KSA.

In conclusion, the significant findings among the eighteen main hypothesis and four mediating effect hypotheses revealed that the hypotheses H_1, H_3, H_4, H_5, H_6, H_8, H_9,H_{12}, H_{14}, H_{15}, H_{16}, H_{17}, H_{18}, H_{19}, H_{20}, H_{21}, H_{22} supported the hypothesis structural relationships and enumerated as OS with U, SQ with U, SQ with US, SEQ with U, SEQ with US, IQ with US, AT with U, TT with U, TO with U, U with NB, US with NB, US with U, NB with U, and NB with US. Conversely, H_2, H7, H10, and H_{11} are not supported by the hypothesis relationships (IP with U, IQ with U, SN with U, PBC with U). Meanwhile, mediation hypothesis enumerated as US on IQ with U, US on SQ with U, US on SEQ with U, and U on US with NB.

Therefore, IP, AT, SN, PBC, TT, SQ, SEQ, IQ, U, US, and NB are the contributing factors for the success of m-learning services amongst students in universities of KSA. Figure 5.1 depicts the revised model of the success m-learning services amongst students in universities of KSA.

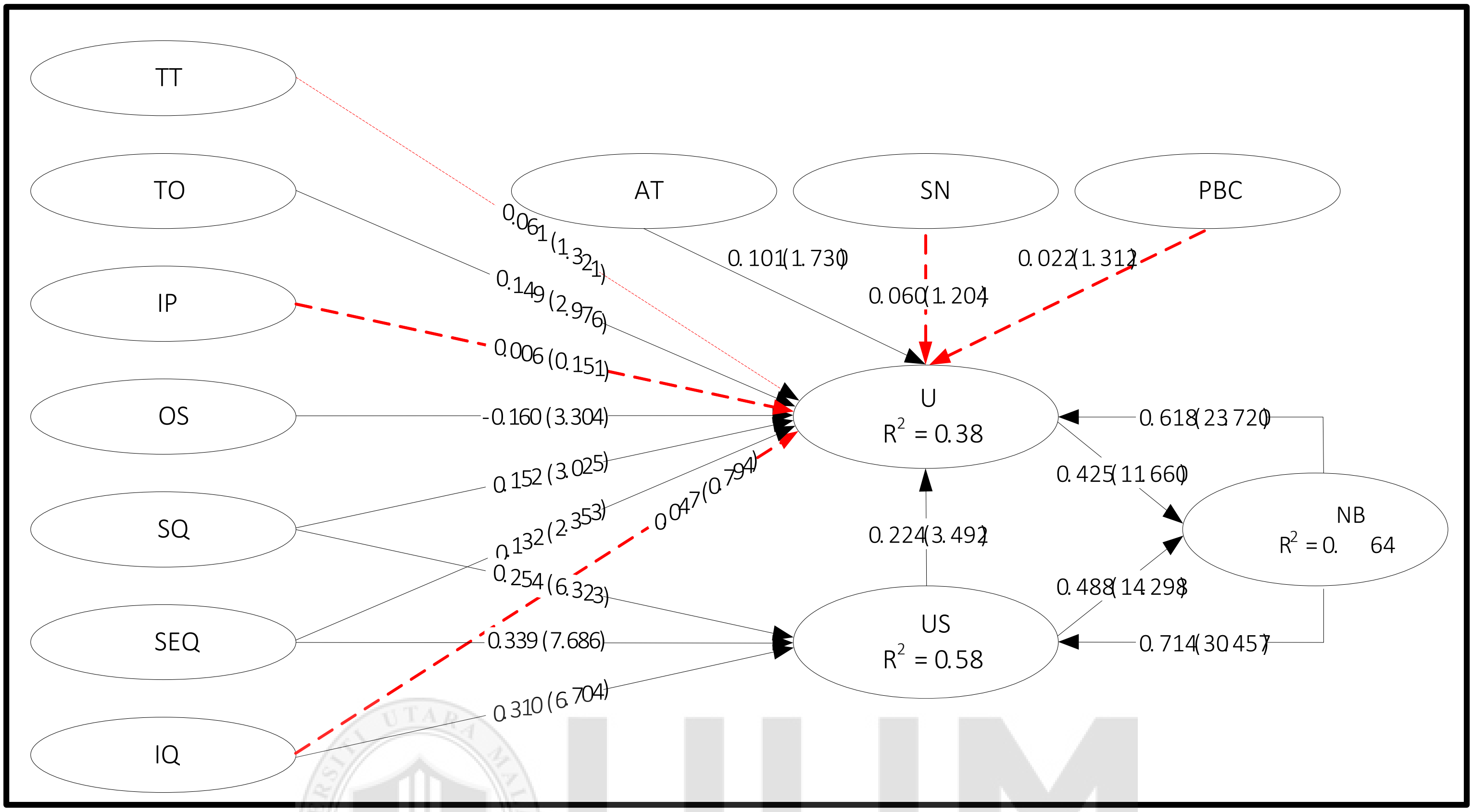

Figure 5.1. Revised model of M-learning Success Amongst Students in Universities of KSA

5.4 Validation of the Model through Experts

The revised model and the steps of data analysis of this study were presented to several experts in the IS field, and specialists in Smart-PLS analysis. Dr. Jamal Alekam is a specialist in Smart-PLS analysis and lecturer at Utara Universiti Malaysia. He confirmed that the various stages of analysis were suitable, and proved the validity of the revised model. Dr. Alekam said:

> *"I found that all required steps for the thesis were considered in your report. The logical flow is acceptable in reporting the findings. The statistical analysis for modelling using Smart-PLS also is perfect consisting of both measurement*

evaluation and also path modelling. In my opinion the whole analysis was done precisely and it's seem to be perfect data analysis".

Furthermore, Dr. Hashed Mabkhot is a specialist in Second generation analysis technique and Assistant Professor at King Fisal University. Dr. Mabkhot proved that all steps of the analysis are correct, and the revised model is valid. He said that:

> *"I have gone through your thesis, and partially analysis chapter. It seems well written and the analysis was validated by using Smart-PLS v3. You followed all steps of the PLS approach that referred by Hair, and the analysis met all the requirements of measurement model and structural model as shown in chapter analysis. So your model was valid".*

Moreover, Dr. Ebrahim Almatari is a specialist in Smart-PLS analysis. Almatari proved that all steps of the analysis are correct, and the proposed model is valid. He said that:

> *"I have gone through your chapter analysis. It seems well written and the analysis was validated by using Smart PLS. You followed all steps of the PLS approach and the analysis met all the requirements of measurement model and structural model as shown in chapter analysis. So, your model was valid".*

As well as, Dr. Zahayu binti Md Yusof from School of quantitative in University Utara Malaysia and she is specializing in quantitative approach. She studied the final results and compared them with the steps of the methodology and the problem statement, and confirmed that we have followed the appropriate steps in the analysis and we got the right final model. Appendix L shows the profile for all the previous experts.

5.5 Summary

In this chapter, detailed discussion was presented on the findings of the hypothesis concerning the dependent and independent variables' relationship. A total of 22 hypotheses were tested. Subsequently, their implications towards attaining the objectives of the study were discussed. In the direct hypotheses testing, only four were not significant, whereas 16 hypotheses were determined to be so. All four of the mediating effect hypotheses were found to be significant, and were supported as proposed in Chapter Two of this study. Therefore, the proposed model of contributing factors for m-learning success amongst students in universities of KSA is valid. Therefore, the next chapter of this study is the final one, and will include the conclusion, future research, and contributions of study.

CHAPTER SIX

CONCLUSION, LIMITATIONS, AND FUTURE RESEARCH

6.1 Introduction

The concluding chapter of this study, this section summarises the results. In this chapter, the achieved objectives are presented, and the research questions are answered. The chapter also accentuates how the study adds to the topic, the confines of the research, and the proposals for any upcoming research on this topic.

6.2 Summary of Findings

The main research questions posed in this research are as follows:

i. What factors influence m-learning usage among students in universities of KSA?
ii. What factors influence students' satisfaction to use m-learning in universities of KSA?
iii. How do the net benefits influence the use of m-learning among the students in universities of KSA?
iv. To what extent does use of the m-learning mediate the relationship between user satisfaction and the net benefits of m-learning services in KSA?
v. How to develop the model that explains the m-learning usage among students in universities in KSA?

This study attempt to extend the IS updated Success Model proposed by DeLone and McLean (2003) and tested it in the context of using m-learning services amongst students in universities in developing countries. It measured the success of m-learning services in universities of Saudi Arabia. NB, U, and US were dependent variables, whereas IQ, SQ, SEQ, OS, IP, TT, TO, SN, BC, and AT were deemed independent variables in this study. Furthermore, this study used SEM techniques in analysis, and an Arabic instrument (questionnaire) with a 5-Likert scale was tested through reliability and validity methods. A conceptual model was developed and tested. Subsequently, a proposed (generated) model will be introduced for the decision makers in Ministry of Higher Education. In the following sub-sections, the answers of each research questions will be elaborated towards achieving the research objectives.

Research Question (i):

What factors influence m-learning usage among students in universities of KSA?

Research Objective (i):

Identify what factors influence use of m-learning among students in universities of KSA.

A provisional answer to this question entails assessment and review of many models and previous studies in the IS success field. The study finally adapted the IS success updated model along with external factors like TT, TO, SN, BC, AT, OS, and IP. Ultimately, 13 contributing factors for m-learning success in this research context were determined. These were: AT, IQ, SQ, SEQ, OS, IP, TT, TO, BC, SN, U, US, and NB. Several of these factors are related to the quality characteristics IQ, SQ, and SEQ. Other factors are linked to the user's environment and conditions, including TT, TO, SN, BC, IP, OS, and AT.

Research objective (i) was achieved. Figure 6.1 depicts the contributing factors of m-learning success amongst students in Universities of KSA. Two factors, namely U and US, have a direct effect on the NB of m-learning, and vice versa. This would imply that a bilateral relationship exists between U, US, and NB. Additionally, US was found to have an indirect effect on NB through U. Conversely, IQ, SYQ, and SQ were found to have an indirect effect on NB through US. Hence, this study proposes a conceptual model to examine the success of m-learning amongst students in the Universities of Saudi Arabia. This conceptual model includes thirteen contributing factors to the success of m-learning, verified by the study's hypotheses, illustrated in Figure 6.1.

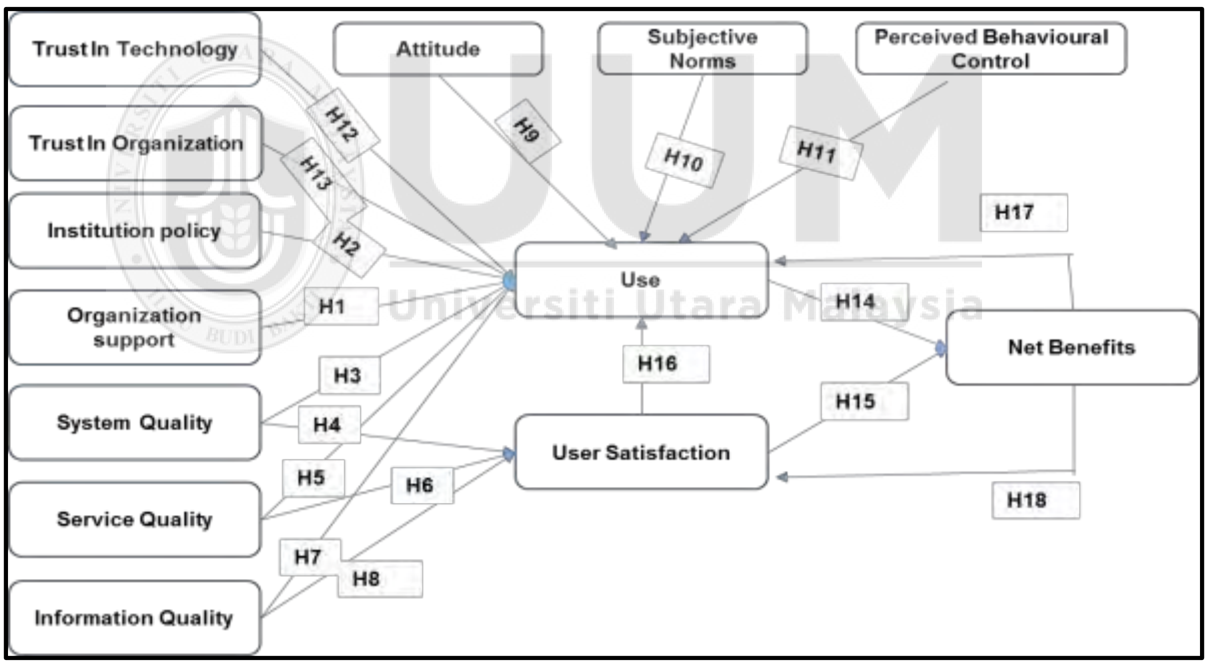

Figure 6.1. The contributing Factors of M-learning Success among Students in the Universities of the KSA

Research Question (ii)

What factors influence students' satisfaction to use m-learning in universities of KSA?

Research Objective (ii):

To identify the factors that influence students' satisfaction to use m-learning in universities.

Answering this question entails the assessment of the alternate model, which is comprised of 13 constructs: IQ, SYQ, SQ, IP, OS, AT, TT, TO, SN, PBC (or called BC), U, US, and NB. The relationships between the constructs were initially represented by 16 primary hypotheses. The subsequent findings indicated that only 5 hypotheses were rejected (IP→U, NS→U, TT→U, PBC→U and IQ→U), whereas 11 hypotheses were supported, as enumerated (OS→U, SQ→U, SQ→US, SEQ→US, SEQ→U, IQ→US, AT→U, TO→U, U→NB, US→NB and US→U). This includes 9 determinants supported by the hypothesised structural relationships. Consequently, OS, SQ, SEQ, IQ (for US), AT, TO, U, and US are suggested as significant factors that determine m-learning success amongst students in KSA. Research objective (ii) was achieved and is illustrated below.

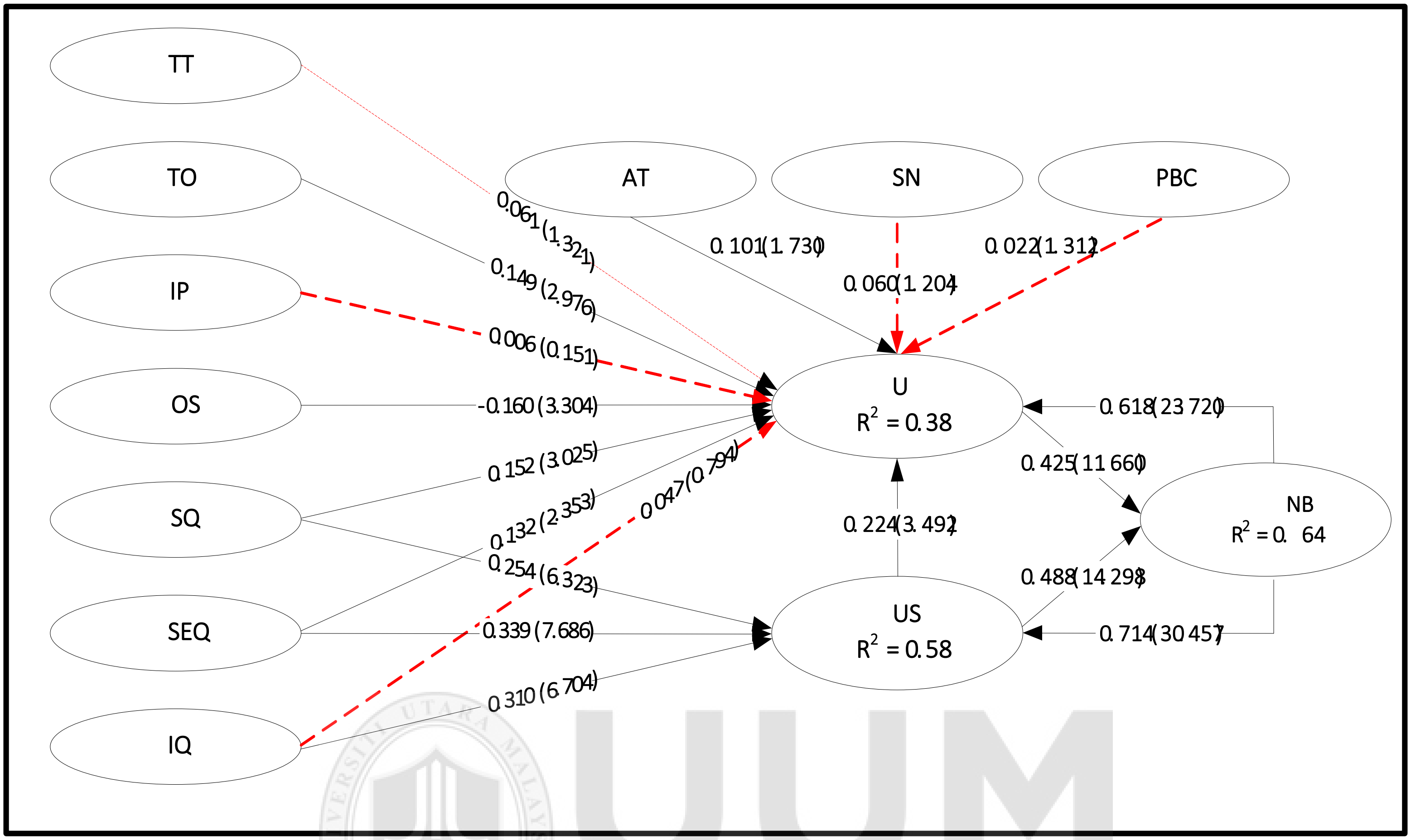

Figure 6.2. The Significant Factors for M-learning Success among Students in the Universities of KSA

Research Question (iii)

How do the net benefits influence the use of m-learning among the students in universities of KSA?

Research Objectives (iii)

To evaluate the influence of net benefits towards the use of m-learning among students in universities.

Answering this research question entails rigorous review of previous literature on the benefits of using m-learning services, particularly of those focused on developing countries. The study indicates that reducing the benefits has a significant impact on the use of m-learning services in higher educational settings of KSA. In other words, low benefits lead to low usage. Low benefits and usage are vulnerable to social and economic issues, which have an adverse effect on the development of the educational process. A lack of adequate benefits attained using m-learning services may be a negative impact on the daily activities of an individual. Indeed, the study reveals that reduced benefits lead to reduced usage of m-learning in university, which consequently generates a small number of student's involvement in m-learning programs and failure to achieve the goals of the government.

Research Question (iv)

To what extent does use of the m-learning mediate the relationship between user satisfaction and the net benefits of m-learning services in KSA?

Research Objectives (iv)

To analyse the role of use of system as a mediator in the relationship between student satisfaction and net benefits of m-learning services.

A mediating effect can be described as a situation in which a variable exerts an influence on the relationship between dependent and independent variables. With regards to the mediating effect of U on the relationship between US and NB of M-learning services in the

Public Universities in Kingdom of Saudi Arabia, the results supported the mediation role of U of M-learning in Hypothesis H22. This indicates that the NB of using the service can be best explained or demonstrated by actual experience of using the service. Essentially, the mediation role of the use of ML services (U) depicted the importance of actual usage in order to attain the net benefits (NB). Hence, there is an indirect significant relationship between US and NB of ML amongst students in universities of KSA.

Research Question (v)

How to develop the model that explains the m-learning usage among students in universities of KSA?

Research Objectives (v)

To develop the model that explains the m-learning usage among students in universities of KSA.

The main purpose of the current empirical research is to highlight on the theoretical comprehensive model for mobile learning use in KSA. The first stage to achieve this goal was reviewing the literature and the related theories related to this phenomenon. Based on the evidences, there are several factors that influence the continuous use of mobile learning. In the second stage, the researcher investigated the particular factors that affect the use of m-learning in KSA through distributed online-survey among students in selected universities in KSA. Moreover, the collected data were analyzed using SEM-PLS. Furthermore, the results of the analyzed data were used to finalize the model that increases m-learning usage among students in universities. Finally, to answer the fifth research question, the revised model was obtained. The model and the steps of data analysis of this study were presented to several academic experts in the IS field and specialists in Smart-PLS analysis.

Dr. Jamal Alekam is a specialist in Smart-PLS analysis and lecturer in the Universiti Utara Malaysia. He confirmed that the various stages of analysis were suitable, and proved the validity of the revised model. Specifically, Dr. Alekam said that *"I found that all required steps for the thesis were considered in your report. The logical flow is acceptable in reporting the findings. The statistical analysis for modelling using PLS-SEM also is perfect consisting of both measurement model and structural model. In my opinion the whole analysis was done precisely and perfect manner."*

Furthermore, Dr. Hashed Mabkhot is a specialist in Second generation analysis technique and Assistant Professor in the College of Business in King Faisal University. Dr. Mabkhot proved that all steps of the analysis are correct, and the revised model is valid. He said that *"I have gone through your thesis, and partially analysis chapter. It seems well written and the analysis was validated by using Smart-PLS v3. You followed all steps of the PLS approach that referred by Hair, and the analysis met all the requirements of measurement model and structural model as shown in chapter analysis. So your model was valid."*

Moreover, Dr. Ebrahim Almatari is a specialist in Smart-PLS analysis. Almatari proved that all steps of the analysis are correct, and the proposed model is valid. He said that *'I have gone through your chapter analysis. It seems well written and the analysis was validated by using Smart PLS. You followed all steps of the PLS approach and the analysis* *met all the requirements of measurement model and structural model as shown in chapter analysis. So, your model was valid'.*

As well as, Dr. Zahayu binti Md Yusof from School of Quantitative Sciences in Universiti Utara Malaysia and she is specialized in quantitative approach. She studied the final results and compared them with the steps of the methodology and the problem statement, and confirmed that the researcher has followed the appropriate steps in the analysis and got the right final model. Appendix L shows the profile for all the previous experts.

The researcher highlighted the significant factors that influence on the m-learning success and evaluated by three of experts on the learning environment, IS and specialists in Smart-PLS analysis. They confirmed that the various stages of analysis were suitable, and proved the validity of the revised model.

6.3 Contributions of the Study

There are many invaluable contributions made by this study, both applied and academic. It examines the effect of IQ, SYQ, and SQ on m-learning usage behaviour and the m-learning services net benefits. Moreover, it investigates the effect of IP, SN, TT, TO, PBC, and AT on usage and net benefit of m-learning services. The investigation of the mediation effect of user satisfaction is the unique aspect of this study, as it attempts to investigate the hypothesised relationship in developing countries. Therefore, it has generated different contributions to the theory together with practice, which will be described in detail in the next sections.

6.3.1 Theoretical Contributions

This study provides many contributions to the existing body of knowledge on m-learning services in a country that is still developing. Some of these contributions are:

- This study developed a model based on the updated D&M IS success model in the context of m-learning services. The model was extended through incorporating new variables such as TT, TO, and AT in the developing environment setting. Moreover, the power of the IS success updated model will be increased through the inclusion of external variables in the context of the evaluation of m-learning success. It is important that the D&M model be examined in different research studies to test its validity in different contexts.

- This study enhances the existing body of information through examining the issue of m-learning success in universities in developing nations. It indicates how the net benefit of the individual's opinion can affect the use of m-learning services leading to the success of m-learning initiatives. Moreover, it provides a theoretical understanding regarding the importance of the variables of the study including IQ, SEQ, SQ, TT, TO, AT, U, and US in explaining the success of m-learning services in KSA. More specifically, this study examined the joint influence of the variables on the success of m-learning services.

- This study has contributed to the literature through examination of the mediating effect of US in explaining the impact of independent variables (IQ, SEQ, SQ) on U. Simultaneously, it examined the mediating effect of U in explaining the influence of independent variable US on the NB of using m-learning services. Most of the studies that have attempted to examine the updated success model were undertaken in developed countries, whereas there have been minimal studies carried out in the context of developing areas. Therefore, this study examines the D&M updated success model in an unstable area, like the Middle East.

- This study is one of limited research that was conducted in Arab countries for m-learning success by assimilating the effects of TT, TO, IP, SN, PBC, and AT factors.

- The final outcome is to construct a new model to evaluate mobile learning success among students in higher education universities to enhance the continues-use of m-learning.

6.3.2 Practical Contributions

Various beneficial and helpful insights are provided by this research which could benefit professionals and practitioners. The findings of this study are valuable and useful for the Ministry of Higher Education and practitioners concerned with successful provision of m-learning services. The study examines the effect of numerous factors on m-learning usage behaviour, net benefits, and user satisfaction, the factors that have the greatest effect, and how their interaction creates success can be determined.

Moreover, the findings of this research, which are provided as empirical data, can be of use to developing countries governments who are attempting to promote m-learning services to their universities. Finally, governments should ensure that m-learning services are available to all universities, in the hope that they will try the services, embrace them, and incorporate them into their daily work.

6.3.3 Methodology Contribution

To investigate the developed model, the PLS-SEM technique was employed, as it allows the concurrent evaluation of the suitability of the measurement as well as the conceptual model used to evaluate the behaviour in question. Although PLS-SEM is popular and widely used, particularly when studying management information systems (MIS), the method has not been used in many studies to examine the success of IS updated models when explaining the m-learning service. Thus, this results of this study indicate that PLS-SEM is useful to predict the success of the IS updated model used to demonstrate m-learning among students in KSA.

Moreover, this study utilized a new statistical technique provided by Henseler et al. (2015), namely the Hetero Trait-Mono Trait (HTMT). According to Voorhees et al. (2016), HTMT is more comprehensive and less constrained test of discriminant validity for researchers doing PLS-SEM. Voorhees et al. (2016), also mentioned that, when researchers are using multi-item measures and have adequate sample size to conduct measurement model testing, it is most appropriate to use HTMT. Furthermore, Henseler, Ringle & Sarstedt (2015) stated that, when the model includes the constructs intention to use and the actual use (although these constructs are conceptually different), they may be difficult to distinguish empirically in all research setting. Therefore, the choice of using HTMT seems warranted.

6.4 Limitations

Several limitations hinder this study, regardless of how valuable and advantageous it is overall. Since this is the initial study assessing the amount to which m-learning services have been effective in universities of Arabic countries, further research needs to be conducted to confirm the results. Secondly, since only three universities (King Faisal University, King Abdul-Aziz University, and King Saud University) and were used to compile a sample, the sample size is relatively small. Moreover, the study solely targeted students in universities. Thus, the behaviours found in other universities and of other stakeholders (lecturers and managers) are unknown. Thirdly, since the data was garnered through a self-administered questionnaire, the possibility of same source bias error must be raised. However, it should be noted that the self-administered questionnaire provided a high response rate. Fourthly, the use of m-learning services is voluntary (indicating that it is under the users' volition); therefore, the results may not be generalisable to a required standard.

6.5 Directions for Future Research

This study's limitations open possibilities for forthcoming research. A variety of routes for prospective studies have been suggested in this research. The study assumes that further research needs to test the model for assessment of the success of m-learning services amongst the universities which have and use the technologies in the learning process and those which use technologies less to make a comparison between the results. The study scope included only the universities considered the three top universities in KSA. Thus, future studies should investigate other universities to confirm the relationship between the proposed contributing factors. Also, the researcher only employed a survey questionnaire as the research instrument in this study. Therefore, the researcher proposes qualitative methods and in-depth interviews to determine more factors that might have an impact on the users of m-learning services and further enhance the success of m-learning services in KSA.

Further studies on m-learning settings in KSA can also be conducted, since the m-learning in KSA has been examined in few studies previously. Moreover, KSA can be compared with other countries that use m-learning services in a comparative study. As this research was conducted based on the updated D&M model, future studies can extend the model and apply it in a new m-learning setting. Alternatively, other successful theories and models, such as Wixom and Todd (2005), Seddon's model, and TAM, can be applied in the context of KSA. Furthermore, future studies can investigate other factors that effect m-learning in KSA, as variables are suggested for examination on a larger scale in future studies, with specific attention to m-learning services. The variables that can be examined include resistance to change, motivation, security, time, cost, enjoyment, readiness, and safety. To conclude, a longitudinal study horizon is proposed for application in future studies, as user satisfaction is regarded as a factor that is accumulated over time.

6.6 Conclusion

This study was empirically conducted based on previous studies to test the proposed research models with the objective of exploring the contributing factors for m-learning success amongst students of Saudi Arabia Universities. Mobile learning benefits for individuals have been a key construct of the m-learning success model. Much research has focused on IS use or user satisfaction when investigating IS success. Relatively little research has been undertaken to explore the net benefits as a crucial construct of IS success. Furthermore, related studies were conducted typically in the individual IS context rather than at the organisational level.

This study studies the causal factors of m-learning success in Saudi Arabia Universities using SEM, including IQ, SEQ, SQ, IP, TT, TO, NS, PBC, AT, U, US, and NB. Certainly, the results from the correlations amongst the influencing factors indicated that there are 13 distinct noteworthy relationships, and 5 unimportant relationships in this investigation. Additionally, as depicted in Figure 6.2, there are 4 indirect significant mediating effect relationships. These results indicate that they are related, and call for a basis for the model of m-learning success amongst students in selected universities.

This study suggests that the D&M updated success model can be extended to other contexts, including m-learning service usage. The proposed extension, IQ, SYQ, SQ, TO, AT, OS, US, and NB, was effectively combined with the IS success updated model.

As previously mentioned, the purpose of this study was to address the applicability of the D&M updated success model to developing countries. The major belief is that the majority of technology adoption and post-adoption theories are constructed based on developed countries, and thus, may be socially and culturally biased. This bias might arrest the applicability of these technology theories when moving to other diverse cultures and environments. Moreover, this study indicates that the D&M updated success model was successful in studying the contributing factors of m-learning in KSA. Thus, this study has contributed significantly to the cumulative research on the IS success field.

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Appendix A

Questionnaire (English Version)

UNIVERSITI UTARA MALAYSIA

COLLEGE OF ARTS AND SCIENCES

QUESTIONNAIRE

Research Title: "A MODEL FOR MEASURING MOBILE LEARNING SUCCESS AMONG STUDENTS IN SAUDI ARABIA UNIVERSITIES"

Dear Respondents,

I am a doctoral student from the College of Arts and Sciences (CAS), Universiti Utara Malaysia (UUM). This questionnaire is designed to find out factors for measuring Use and Net Benefits of m-Learning services among students in KSAU.

Part of my work is to conduct a survey on the current state of using mobile learning among students in Kingdom of Saudi Arabia Universities. I hereby would like to invite you to participate in this survey by completing the attached questionnaire.

The success of this study highly depends on your kind cooperation. This study is only for academic purpose and not for other use. All of the answers provided will be kept strictly confidential. The questionnaire is designed to take minimum of your valuable time.

Your participation and contribution are highly appreciated

Best regards,

ALORFI, ALMUHANNAD SULAIMAN M

PhD candidate

School of Computing, College of Arts and Sciences (CAS)

University Utara Malaysia (UUM), Sintok 06010, Kedah Darul Alman, Malaysia

Date: ________.

Researcher e-mail address:

Phone Number: +60123286695

This questionnaire consists of three sections. Section A consists of the questions regarding your demographic profile. Section B consists of some statements about The Factors that Affect M-learning Services in KSAU. Section C includes Two (2) open ended questions if you like to add some comments.

Section A: Personal Information

We would like to collect some information about yourself so that we can understand better your decisions related to the m-learning services (Please tick (✓(the appropriate box).

1. Your Gender: ☐ Male. ☐ Female.
2. Your Age: ☐ 18-22. ☐ 23 -35. ☐ ≤ 45.
3. Your marital status: ☐ Single. ☐ Married. ☐ Divorced. ☐ Widowed.
4. Your Education level: ☐ First year. ☐ Second year. ☐ Third year. ☐ Last year
5. What type of mobile device(s) do you own? ☐ Hand Phone. ☐ Laptop. ☐ Smart phone. ☐ Others
6. Experience using mobile devices: ☐ Advance. ☐ Normal.
7. Do you use blackboard in learning in university (if "No" move to section C): ☐ Yes ☐ No
8. Using mobile blackboard: ☐ Daily ☐ Weekly ☐ Monthly ☐ Other

Section B: The Factors that Affect M-learning Services in KSAU

We would like to understand your opinions about the factors that are affecting Utilization, User Satisfaction and Net Benefits of M-leaning services in KSAU (Please circle the appropriate number based on a 5-point scale where 1= Strongly Disagree; 2= Disagree; 3= Neutral; 4= Agree; 5= Strongly Agree).

Please follow the numbers which denote the following answers to circle one answer for each question.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

Please follow the numbers which denote the following answers to circle one answer for each question.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

1.0 – Information Quality	Degree of Agreement				
1. The information in mobile learning system is accurate	1	2	3	4	5
2. Mobile learning provide sufficient information.	1	2	3	4	5
3. The information in mobile learning system is up-to-date.	1	2	3	4	5
4. The information in mobile learning system is presented in a clear way.	1	2	3	4	5
5. Mobile learning provide me with the information that I need to do my job.	1	2	3	4	5
2.0– System Quality	**Degree of Agreement**				
6. It is easy to navigate within M-learning system.	1	2	3	4	5
7. It only takes a few clicks to locate information on M-learning system.	1	2	3	4	5
8. This M-learning system is available all the time.	1	2	3	4	5
9. M-learning system website loads all the text and graphics quickly.	1	2	3	4	5

Please follow the numbers which denote the following answers to circle one answer for each question.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

3.0– Service Quality	Degree of Agreement				
10. I have sufficient understanding about M-learning system.	1	2	3	4	5
11. I have gained enough training on how to operate M-learning system	1	2	3	4	5
12. If the Service Support promises to do something by a certain time they will.	1	2	3	4	5
13. The Service Support provide prompt service.	1	2	3	4	5
14. The Service Support has adequate knowledge to help me if I experience any problems with M-learning system.	1	2	3	4	5
15. The Service Support understands my needs.	1	2	3	4	5

Please follow the numbers which denote the following answers to circle one answer for each question.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

4.0–Use of the E-learning	Degree of Agreement				
16. I use M-learning system to help me make decisions.	1	2	3	4	5
17. I use M-learning system to help me record my knowledge	1	2	3	4	5
18. I use M-learning system to communicate knowledge and information with colleagues.	1	2	3	4	5

19. I use M-learning system to share my general knowledge.	**1 2 3 4 5**
20. I use M-learning system to share my specific knowledge.	**1 2 3 4 5**

Please follow the numbers which denote the following answers to circle one answer for each question.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

5.0– User Satisfaction	Degree of Agreement
21. I am satisfied that M-learning system meet my knowledge or information processing needs.	**1 2 3 4 5**
22. I am satisfied with M-learning system efficiency.	**1 2 3 4 5**
23. I am satisfied with M-learning system effectiveness.	**1 2 3 4 5**
24. Overall, I am satisfied with M-learning system.	**1 2 3 4 5**

Please follow the numbers which denote the following answers to circle one answer for each question.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

6.0– Net Benefits	Degree of Agreement
25. M-learning helps me acquire new knowledge and innovative ideas.	**1 2 3 4 5**
26. M-learning helps me effectively manage and store knowledge that I need.	**1 2 3 4 5**
27. M-learning enable me to accomplish tasks more efficiently.	**1 2 3 4 5**
28. My performance on the study is enhanced by M-learning.	**1 2 3 4 5**
29. M-learning improves the quality of my study.	**1 2 3 4 5**

Please follow the numbers which denote the following answers to circle one answer for each question.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

7.0– Attitude	Degree of Agreement
30. Using M-learning would be a wise idea	**1 2 3 4 5**
31. Using M-learning is a good idea	**1 2 3 4 5**
32. Using Mobile technology in education is unpleasant	**1 2 3 4 5**

33. I like to use M-learning	**1 2 3 4 5**
34. Using M-learning would be a wise idea	**1 2 3 4 5**

Please follow the numbers which denote the following answers to circle one answer for each question.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

7.0– Subjective Norm	**Degree of Agreement**
35. People who are important to me would think that using M-learning would be a wise idea	**1 2 3 4 5**
36. People who are important to me would think that using M-learning is a good idea	**1 2 3 4 5**
37. Most people who are important to me would think that I should use M-learning	**1 2 3 4 5**
38. My family who is important to me would think that using M-learning would be a wise idea	**1 2 3 4 5**
39. My family who is important to me would think that using M-learning is a good idea	**1 2 3 4 5**
40. My family important to me would think that I should use M-learning.	**1 2 3 4 5**

Please follow the numbers which denote the following answers to circle one answer for each question.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

8.0– Perceived Behavioral Control	**Degree of Agreement**
41. I would be able to operate M-learning	**1 2 3 4 5**
42. I have the resource to use M-learning	**1 2 3 4 5**
43. I have the knowledge to use M-learning	**1 2 3 4 5**

Please follow the numbers which denote the following answers to circle one answer for each question.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

9.0–Trust In Technology	**Degree of Agreement**
44. The internet has enough safeguards to make me feel comfortable using it to interact with the university online.	**1 2 3 4 5**
45. I feel assured that legal and technological structures adequately protect me from problems on the internet.	**1 2 3 4 5**
46. In general, the internet is now a robust and safe environment in which to transact with the university.	**1 2 3 4 5**

Please follow the numbers which denote the following answers to circle one answer for each question.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

10.0– Trust In Organization	Degree of Agreement				
47. I think I can trust the University	**1**	**2**	**3**	**4**	**5**
48. The University can be trusted to carry out online works faithfully.	**1**	**2**	**3**	**4**	**5**
49. In my opinion, University is trustworthy.	**1**	**2**	**3**	**4**	**5**
50. I trust University to keep my best interests in mind.	**1**	**2**	**3**	**4**	**5**

Please follow the numbers which denote the following answers to circle one answer for each question.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

11.0– Institutional Policy	Degree of Agreement				
51. I am aware of the current ICT policy	**1**	**2**	**3**	**4**	**5**
52. The ICT policy, addresses the issues regarding m-Learning	**1**	**2**	**3**	**4**	**5**
53. My University provides incentives to Teachers who use m-Learning	**1**	**2**	**3**	**4**	**5**
54. My University provides incentives to students who use m-Learning	**1**	**2**	**3**	**4**	**5**
55. My University promotes the adoption of m-learning through proper ICT policy implementation	**1**	**2**	**3**	**4**	**5**

Please follow the numbers which denote the following answers to circle one answer for each question.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

12.0– Organizational Support	Degree of Agreement				
56. I have heard of my university Mobile Learning System	**1**	**2**	**3**	**4**	**5**
57. I have used my m-Learning System	**1**	**2**	**3**	**4**	**5**
58. My head of department is supportive to me on the use of m-Learning for my work	**1**	**2**	**3**	**4**	**5**
59. There are technical help available if required while using m-Learning	**1**	**2**	**3**	**4**	**5**

60. When I encounter issues during my work, I am always given technological and pedagogical support	**1 2 3 4 5**

Section C: Comments and Advices

We would like to seek your general comments and advices regarding the reasons and barriers that affect for reducing to use m-learning services among students in KSAU.

1.0 Why you did not use the m-learning services?

………
………
………
………

2.0 Please, use this space to write any suggestions regarding m-learning services.

………
………
………
………

Your time and cooperation are highly valued

Thank you.

Appendix B

Questionnaire (Arabic Version)

ملحق أ: استبيان النسخة الإنجليزية   استبيان رقم:

جامعة أوتارا الماليزية

كلية الآداب والعلوم

استبيان

عنوان البحث: "نموذج قياس نجاح التعلم عن طريق الجوال المبني على الويب في الجامعات السعودية"

أعزائي المشاركون،

أنا طالب دكتوراه في جامعة الآداب والعلوم، جامعة أوتارا الماليزية. صمم هذا الاستبيان لقياس استخدام خدمات التعلم عن طريق الجوال والفوائد الصافية منه المبني على الويب في الجامعات السعودية.

وجزء من عملي هو إجراء استقصاء عن الحالة الراهنة لاستخدام التعلم عن طريق الجوال المبني على الويب في جامعات المملكة العربية السعودية. وأود هنا أن أدعوك للمشاركة في هذا الاستقصاء باستكمال الاستبيان المرفق.

يعتمد نجاح هذه الدراسة بشكل كبير على حسن تعاونكم. هذه الدراسة للاستخدام الأكاديمي فحسب وليست للاستخدام الآخر. جميع الإجابات المقدمة ستحفظ في سرية تامة. صمم الاستبيان ليأخذ وقتا قليلا من أوقاتكم القيمة.

مشاركتكم ومساهمتكم محل تقدير كبير

مع أطيب تحياتي

المن سليمان العنزي

طالب دكتوراه

كلية الحاسبات، كلية الآداب والعلوم

جامعة أوتارا الماليزية، سينتوك 01060، كيدا دار الأمان، ماليزيا

تاريخ:

البريد الالكتروني للباحث:

رقم التليفون: +10628231106

يتكون هذا الاستبيان من ثلاثة أجزاء. **الجزء أ** يحتوي على أسئلة تتعلق ببياناتك الشخصية. **الجزء ب** يحتوي على بعض البيانات عن العوامل التي تؤثر في خدمة التعلم عن طريق الجوال في الجامعات السعودية. **الجزء ج** يحتوي على (2) سؤال مفتوح النهاية في حالة الرغبة في إضافة بعض التعليقات.

الجزء أ: المعلومات الشخصية

6. النوع: ذكر ☐ أنثى ☐
2. السن: 22-63 ☐ 86-28 ☐ ≤56 ☐
8. الحالة الاجتماعية: أعزب ☐ متزوج ☐ مطلق ☐ أرمل ☐
5. المستوى التعليمي: السنة ☐ السنة الثانية ☐ السنة الثالثة ☐ السنة الرابعة ☐
6. ما هو نوع الجهاز المحمول الذي تملكه؟: هاتف محمول ☐ كمبيوتر محمول ☐ هاتف ذكي ☐ أخرى
1. الخبرة في استخدام أجهزة المحمولة: متقدمة ☐ عادية ☐

الجزء ب: العوامل المؤثرة على خدمات التعلم عن طريق الجوال في الجامعات السعودية

نود أن نفهم آرائكم عن العوامل المؤثرة على استخدام التعلم عن طريق الجوال في الجامعات السعودية، ولغرض المستخدم، الرجاء وضع دائرة حول الرقم المناسب من 6 الخيارات حيث 6= غير موافق بشدة؛ 2= غير موافق؛ 8= محايد؛ 5= أوافق؛ 6= أوافق بشدة(.

يرجى إتباع الرقم الذي يدل على العبارات التالية وضع دائرة على إجابة واحدة لكل سؤال.

غير موافق بشدة	غير موافق	محايد	أوافق	أوافق بشدة
6	2	8	5	6

0.1 جودة المعلومات	درجة الموافقة				
6 المعلومات في نظام التعلم عن طريق الجوال دقيقة.	6	2	8	5	6
2 يوفر التعلم عن طريق الجوال المعلومات الكافية.	6	2	8	5	6
8- المعلومات في نظام التعلم عن طريق الجوال محدثة.	6	2	8	5	6
5- تقدم المعلومات في نظام التعلم عن طريق الجوال بطريقة واضحة.	6	2	8	5	6
6 يقدم نظام التعلم عن طريق الجوال المعلومات التي احتاجها في الوقت.	6	2	8	5	6

يرجى إتباع الرقم الذي يدل على العبارات التالية وضع دائرة على إجابة واحدة لكل سؤال.

غير موافق بشدة	غير موافق	محايد	أوافق	أوافق بشدة
6	2	8	5	6

0.1- جودة النظام	درجة الموافقة				
1 يسهل التنقل بين المعلومات في نظام التعلم عن طريق الجوال.	6	2	8	5	6
7- يتطلب إيجاد المعلومات على نظام التعلم عن طريق الجوال القليل من الجهد.	6	2	8	5	6
3- هذا النظام التعليمي عن طريق الجوال متاح طوال الوقت.	6	2	8	5	6
0- يقوم موقع نظام التعلم عن طريق الجوال بتحميل النصوص والصور بسرعة.	6	2	8	5	6

يرجى اتباع الرقم الذي يدل على البيانات التالية بوضع دائرة على إجابة واحدة لكل سؤال.

غير موافق بشدة	غير موافق	محايد	أوافق	أوافق بشدة
6	2	8	5	6

0.1- جودة الخدمة

	درجة الموافقة				
60 أفهم نظام التعلم عن طريق الجوال بشكل كافي.	6	2	8	5	6
66 تلقيت تدريب على كيفية العمل على نظام التعلم عن طريق الجوال بشكل كاف.	6	2	8	5	6
62 تقدم خدمة الدعم شرح التي يعدها في الوقت المحدد.	6	2	8	5	6
68 تقدم خدمة الدعم خدمات فورية.	6	2	8	5	6
65 تمتلك خدمة الدعم معلومات لتسهيل مساعدتي في حالة مواجهة أي مشكلة في نظام التعلم عن طريق الجوال.	6	2	8	5	6
66 تفهم خدمة الدعم احتياجاتي.	6	2	8	5	6

يرجى اتباع الرقم الذي يدل على البيانات التالية بوضع دائرة على إجابة واحدة لكل سؤال.

غير موافق بشدة	غير موافق	محايد	أوافق	أوافق بشدة
6	2	8	5	6

0.1 استخدام التعلم عن طريق الجوال

	درجة الموافقة				
61 استخدم التعلم عن طريق الجوال يساعدني في اتخاذ القرارات.	6	2	8	5	6
67 استخدم التعلم عن طريق الجوال يساعدني في تسجيل معلوماتي.	6	2	8	5	6
63 استخدم التعلم عن طريق الجوال في تواصل المعلومات والمعرفة مع ز .	6	2	8	5	6
60 استخدم نظام التعلم عن طريق الجوال لمشاركة معلوماتي العامة.	6	2	8	5	6
20 استخدم التعلم عن طريق الجوال لمشاركة معلوماتي المحددة.	6	2	8	5	6

يرجى اتباع الرقم الذي يدل على البيانات التالية بوضع دائرة على إجابة واحدة لكل سؤال.

غير موافق بشدة	غير موافق	محايد	أوافق	أوافق بشدة
6	2	8	5	6

0.1- رضا المستخدم

	درجة الموافقة				
26 يلبي نظام التعلم عن طريق الجوال احتياجاتي في معالجة البيانات والمعرفة بشكل يرضيني.	6	2	8	5	6
22- أنا راض عن كفاءة نظام التعلم عن طريق الجوال.	6	2	8	5	6
28- أنا راض عن فعالية نظام التعلم عن طريق الجوال.	6	2	8	5	6
25- أنا راض عن نظام التعلم عن طريق الجوال بشكل عام.	6	2	8	5	6

يرجى اتباع الرقم الذي يدل على البيانات التالية بوضع دائرة على إجابة واحدة لكل سؤال.

غير موافق بشدة	غير موافق	محايد	أوافق	أوافق بشدة
6	2	8	5	6

0.1 الفوائد الصافية

	درجة الموافقة				
26 يساعدني التعلم عن طريق الجوال في اكتساب معلومات جيدة ومبتكرة.	6	2	8	5	6
21 يساعدني التعلم عن طريق الجوال في إدارة وحفظ المعلومات التي احتاجها بكفاءة.	6	2	8	5	6
27 يساعدني التعلم عن طريق الجوال في إنجاز مهماتي بكفاءة.	6	2	8	5	6
23 تحسن أدائي الدراسي باستخدام التعلم عن طريق الجوال.	6	2	8	5	6
20 يحسن التعلم عن طريق الجوال من جودة دراستي.	6	2	8	5	6

يرجى إتباع الأرقام التي تدل على البيانات التالية بوضع دائرة على إجابة واحدة لكل سؤال.

غير موافق بشدة	غير موافق	محايد	أوافق	أوافق بشدة
6	2	8	5	6

0.1- وجهة النظر	درجة الموافقة				
80- استخدام التعلم عن طريق الجوال فكرة حكيمة.	6	2	8	5	6
86- استخدام التعلم عن طريق الجوال فكرة جيدة.	6	2	8	5	6
82- استخدام تقنية الجوال في التعليم غير مرضية	6	2	8	5	6
88- أحب أن استخدم التعلم عن طريق الجوال.	6	2	8	5	6
85- استخدام التعلم عن طريق الجوال فكرة حكيمة	6	2	8	5	6

يرجى إتباع الأرقام التي تدل على البيانات التالية بوضع دائرة على إجابة واحدة لكل سؤال.

غير موافق بشدة	غير موافق	محايد	أوافق	أوافق بشدة
6	2	8	5	6

0.1- المعيار الشخصي	درجة الموافقة				
86- يعتقد الأشخاص المهمين بالنسبة لي أن استخدام التعلم عن طريق الجوال فكرة حكيمة.	6	2	8	5	6
81- يعتقد الأشخاص المهمين بالنسبة لي أن استخدام التعلم عن طريق الجوال فكرة جيدة.	6	2	8	5	6
87- يعتقد معظم الأشخاص المهمين بالنسبة لي أنه يجب أن استخدم التعلم عن طريق الجوال.	6	2	8	5	6
83- يعتقد أفراد أسرتي المهمين أن استخدام التعلم عن طريق الجوال فكرة حكيمة.	6	2	8	5	6
80- يعتقد أفراد أسرتي المهمين ان استخدام التعلم عن طريق الجوال فكرة جيدة.	6	2	8	5	6
50- يعتقد أفراد أسرتي المهمين أنه يجب أن استخدم التعلم عن طريق الجوال.	6	2	8	5	6

يرجى إتباع الأرقام التي تدل على البيانات التالية بوضع دائرة على إجابة واحدة لكل سؤال.

غير موافق بشدة	غير موافق	محايد	أوافق	أوافق بشدة
6	2	8	5	6

0.1 الضوابط السلوكية الظاهرة	درجة الموافقة				
56- أستطيع العمل بنظام التعلم عن طريق الجوال.	6	2	8	5	6
52- أملك الموارد اللازمة لاستخدام التعلم عن طريق الجوال.	6	2	8	5	6
58- أملك المعلومات اللازمة لاستخدام التعلم عن طريق الجوال.	6	2	8	5	6

يرجى إتباع الأرقام التي تدل على البيانات التالية بوضع دائرة على إجابة واحدة لكل سؤال.

غير موافق بشدة	غير موافق	محايد	أوافق	أوافق بشدة
6	2	8	5	6

0.1 الثقة في التكنولوجيا	درجة الموافقة				
55- تملك شبكة الإنترنت ضمانات فنية تجعلني أشعر بالراحة عند استخدامها للتفاعل مع الجامعة إلكترونيا.	6	2	8	5	6
56- أشعر بأن الوجود القانوني والتقنية الإلكترونية تحميني من مشاكل الإنترنت.	6	2	8	5	6
51- يعتبر الإنترنت بشكل عام بيئة قوية وآمنة للتعامل مع الجامعة.	6	2	8	5	6

يرجى اتباع الأرقام التي تدل على الإجابات التالية بوضع دائرة على إجابة واحدة لكل سؤال.

غير موافق بشدة	غير موافق	محايد	أوافق	أوافق بشدة
6	2	8	5	6

01.1 الثقة في الجامعة	درجة الموافقة				
57- أعتقد أنه يمكنني الوثوق في الجامعة.	6	2	8	5	6
53- الجامعة موثوق بها في تنفيذ أعمال عبر الإنترنت بأمانة.	6	2	8	5	6
50- في رأيي، الجامعة جديرة بالثقة.	6	2	8	5	6
60- أثق في قيام الجامعة بالحفاظ على مصلحتي.	6	2	8	5	6

يرجى اتباع الأرقام التي تدل على الإجابات التالية بوضع دائرة على إجابة واحدة لكل سؤال.

غير موافق بشدة	غير موافق	محايد	أوافق	أوافق بشدة
6	2	8	5	6

00.1 السياسة المؤسسية	درجة الموافقة				
66- أنا على علم بسياسة تكنولوجيا المعلومات والاتصالات (ICT).	6	2	8	5	6
62- تخاطب سياسة تكنولوجيا المعلومات والاتصالات (ICT) الموضوع الخاص بالتعلم عن طريق الجوال.	6	2	8	5	6
68- تقدم جامعتي حوافز للعاملين المستخدمين للتعلم عن طريق الجوال.	6	2	8	5	6
65- تقدم جامعتي حوافز للطلاب المستخدمين للتعلم عن طريق الجوال	6	2	8	5	6
66- تشجع جامعتي التكيف مع التعلم عن طريق الجوال عن طريق تطبيق سياسة تكنولوجيا المعلومات والاتصالات بشكل صحيح	6	2	8	5	6

يرجى اتباع الأرقام التي تدل على الإجابات التالية بوضع دائرة على إجابة واحدة لكل سؤال.

غير موافق بشدة	غير موافق	محايد	أوافق	أوافق بشدة
6	2	8	5	6

00.1 الدعم التنظيمي	درجة الموافقة				
61- سمعت عن نظام التعلم عن طريق الجوال بجامعتي.	6	2	8	5	6
67- استخدمت نظام التعلم عن طريق الجوال.	6	2	8	5	6
63- يشجعني رئيس القسم على استخدام التعلم عن طريق الجوال.	6	2	8	5	6
60- تتوفر المساعدة التقنية أثناء استخدام التعلم عن طريق الجوال.	6	2	8	5	6
10- يتوفر الدعم التقني والتوجيه في حالة مواجهة مشاكل أثناء الاستخدام.	6	2	8	5	6

الجزء ت التعليقات والنصائح

نود الحصول على بعض النصائح العامة والتعليقات عن باب والمعوقات التي تحد من استخدام خدمات التعلم عن طريق الجوال بين الطلاب في الجامعات السعودية.

6.0 لماذا لم تستخدم خدمات التعلم عن طريق الجوال ؟

....
....
....
....

2.0 من فضلك، اكتب أية اقتراحات تتعلق بنظام التعلم عن طريق الجوال.

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تعاونكم قيم للغاية حقيقتنا

شكرا لكم

Appendix C

Demographic Statistics of Respondents

Statistics									
		University	Gender	Age	Marital Status	Education Level	Mobile Device	Experince	Times of Using
N	Valid	396	396	396	396	396	396	396	396
	Missing	0	0	0	0	0	0	0	0
Mean		1.77	1.68	1.39	1.18	2.75	2.64	1.33	2.6
Std. Deviation		0.893	0.467	0.534	0.397	1.161	0.908	0.471	1.115
Minimum		1	1	1	1	1	1	1	1
Maximum		3	2	3	3	4	4	2	4
Sum		699	665	552	467	1089	1045	527	1031

		IQ1	IQ2	IQ3	IQ4	IQ5	SQ1	SQ2
N	Valid	396	396	396	396	396	396	396
	Missing	0	0	0	0	0	0	0
Mean		3.64	3.58	3.71	3.59	3.73	3.75	3.64
Std. Deviation		1.005	.955	1.062	1.021	.965	.902	.923
Minimum		1	1	1	1	1	1	1
Maximum		5	5	5	5	5	5	5
Sum		1442	1417	1469	1421	1478	1487	1441

		SQ3	SQ4	SEQ1	SEQ2	SEQ3	SEQ4	SEQ5
N	Valid	396	396	396	396	396	396	396
	Missing	0	0	0	0	0	0	0
Mean		3.79	3.79	3.78	3.65	3.71	3.77	3.69
Std. Deviation		.964	.933	.938	1.036	1.006	.995	1.042
Minimum		1	1	1	1	1	1	1
Maximum		5	5	5	5	5	5	5
Sum		1499	1500	1496	1446	1469	1494	1460

		SEQ6	SN1	SN2	SN3	SN4	SN5	SN6
N	Valid	396	396	396	396	396	396	396
	Missing	0	0	0	0	0	0	0
Mean		3.53	3.52	3.54	3.73	3.69	3.58	3.57
Std. Deviation		.932	1.202	1.094	1.127	1.159	1.089	1.198
Minimum		1	1	1	1	1	1	1
Maximum		5	5	5	5	5	5	5
Sum		1396	1395	1402	1477	1462	1417	1413

		AT1	AT2	AT3	AT4	IP1	IP2	IP3
N	Valid	396	396	396	396	396	396	396
	Missing	0	0	0	0	0	0	0
Mean		3.71	3.59	3.75	3.80	3.78	3.73	3.74
Std. Deviation		.930	.954	.976	.943	.965	.969	1.004
Minimum		1	1	1	1	1	1	1
Maximum		5	5	5	5	5	5	5
Sum		1468	1421	1485	1505	1496	1479	1481

		IP4	IP5	OS1	OS2	OS3	OS4	OS5
N	Valid	396	396	396	396	396	396	396
	Missing	0	0	0	0	0	0	0
Mean		3.70	3.84	3.68	3.88	3.80	3.71	3.73
Std. Deviation		1.024	.957	.995	.948	1.058	1.032	.989
Minimum		1	1	1	1	1	1	1
Maximum		5	5	5	5	5	5	5
Sum		1467	1522	1459	1538	1503	1471	1476

		TO1	TO2	TO3	TO4	TT1	TT2	TT3
N	Valid	396	396	396	396	396	396	396
	Missing	0	0	0	0	0	0	0
Mean		3.66	3.54	3.61	3.93	3.93	3.66	3.69
Std. Deviation		1.023	1.044	1.081	.966	.948	.928	1.029
Minimum		1	1	1	1	1	1	1
Maximum		5	5	5	5	5	5	5
Sum		1448	1401	1431	1558	1555	1449	1462

		PBC1	PBC2	PBC3	US1	US2	US3	US4
N	Valid	396	396	396	396	396	396	396
	Missing	0	0	0	0	0	0	0
Mean		3.57	3.49	3.45	3.92	3.99	3.91	3.96
Std. Deviation		1.112	1.175	1.120	.897	.915	.956	.928
Minimum		1	1	1	1	1	1	1
Maximum		5	5	5	5	5	5	5
Sum		1414	1382	1365	1554	1579	1548	1569

		U1	U2	U3	U4	U5
N	Valid	396	396	396	396	396
	Missing	0	0	0	0	0
Mean		3.66	3.72	3.68	3.71	3.78
Std. Deviation		1.039	1.051	.931	.964	.990
Minimum		1	1	1	1	1
Maximum		5	5	5	5	5
Sum		1450	1472	1457	1471	1495

		NB1	NB2	NB3	NB4	NB5
N	Valid	396	396	396	396	396
	Missing	0	0	0	0	0
Mean		3.79	3.82	3.60	3.86	3.71
Std. Deviation		1.018	.915	1.010	.890	1.006
Minimum		1	1	1	1	1
Maximum		5	5	5	5	5
Sum		1502	1512	1425	1530	1469

Frequency Table

University

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	KFU	215	54.3	54.3	54.3
	KSU	59	14.9	14.9	69.2
	KAAU	122	30.8	30.8	100.0
	Total	396	100.0	100.0	

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	127	32.1	32.1	32.1
	Female	269	67.9	67.9	100.0
	Total	396	100.0	100.0	

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-22	249	62.9	62.9	62.9
	23-35	138	34.8	34.8	97.7
	=>45	9	2.3	2.3	100.0
	Total	396	100.0	100.0	

Marital_Status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SINGLE	327	82.6	82.6	82.6
	married	67	16.9	16.9	99.5
	Divorced	2	.5	.5	100.0
	Total	396	100.0	100.0	

Education_Level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1st year	80	20.2	20.2	20.2
	2nd year	88	22.2	22.2	42.4
	3rd year	79	19.9	19.9	62.4
	4th year	149	37.6	37.6	100.0
	Total	396	100.0	100.0	

Mobile_Device

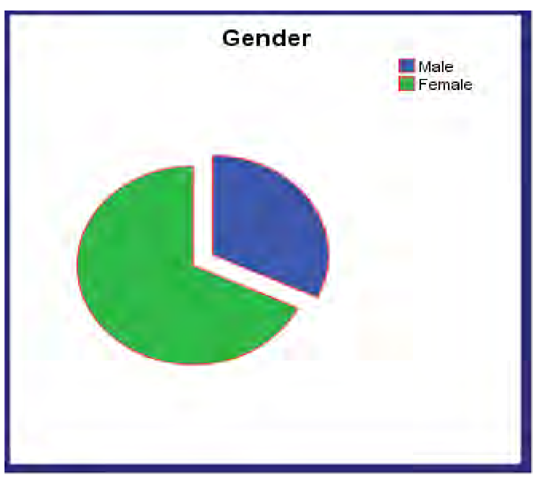
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Hand Phone	79	19.9	19.9	19.9
	Laptop	23	5.8	5.8	25.8
	Smart Phone	256	64.6	64.6	90.4
	Others	38	9.6	9.6	100.0
	Total	396	100.0	100.0	

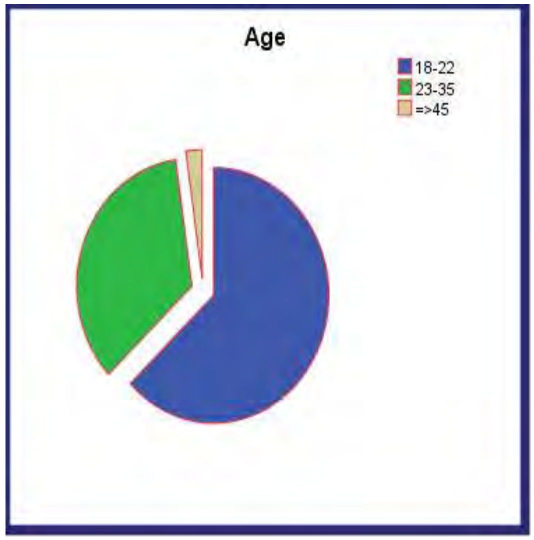
Experince

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Advance	265	66.9	66.9	66.9
	Normal	131	33.1	33.1	100.0
	Total	396	100.0	100.0	

Times_of_Using

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Daily	76	19.2	19.2	19.2
	Weekly	127	32.1	32.1	51.3
	Monthly	71	17.9	17.9	69.2
	Others	122	30.8	30.8	100.0
	Total	396	100.0	100.0	




Age
18-22
23-35
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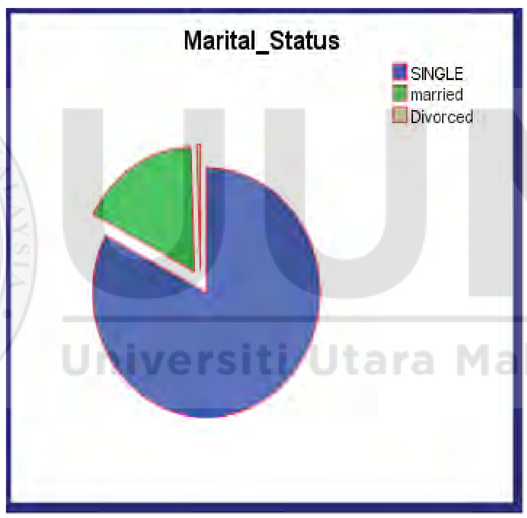
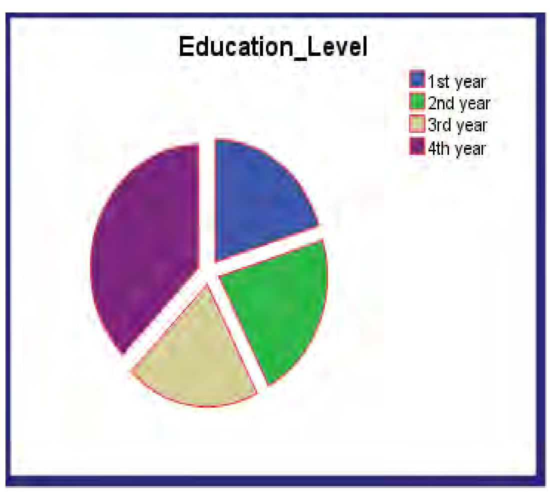

Marital_Status
SINGLE
married
Divorced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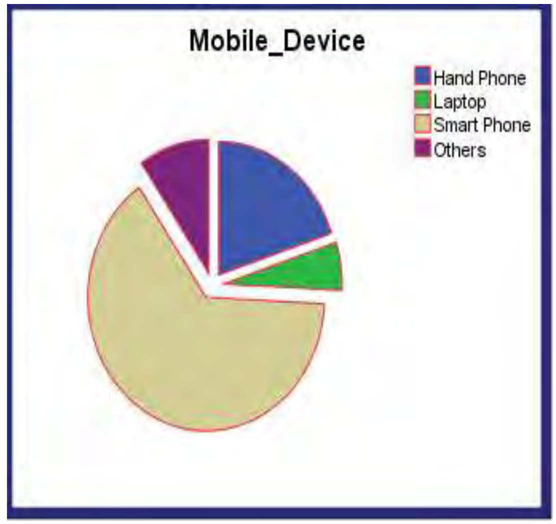
1st year
2nd year
3rd year
4th year


Mobile_Device
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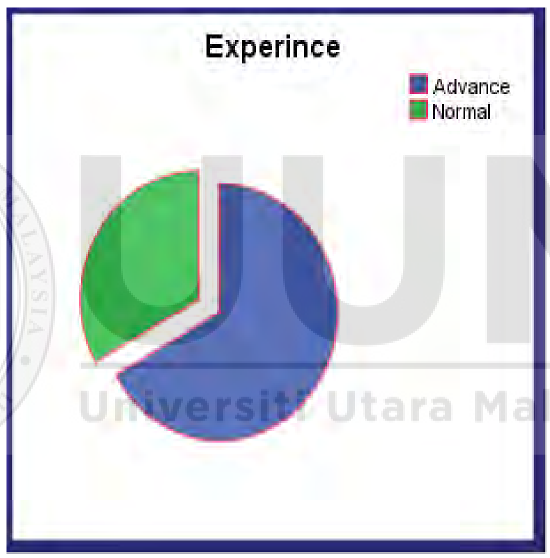
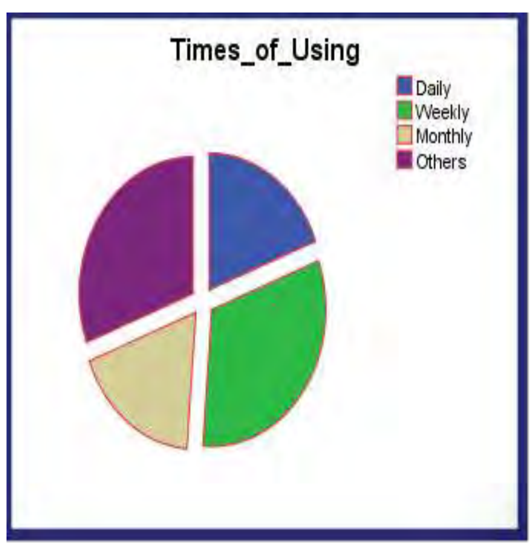
Laptop
Smart Phone
Others


Experince
Advance
Normal


Times_of_Using
Daily
Weekly
Monthly
Others

Appendix D

The Results of Normality Test

Descriptive

			Statistic	Std. Error
MIQ	Mean		3.6500	.04002
	95% Confidence Interval for Mean	Lower Bound	3.5713	
		Upper Bound	3.7287	
	5% Trimmed Mean		3.6957	
	Median		3.8000	
	Variance		.634	
	Std. Deviation		.79646	
	Minimum		1.00	
	Maximum		5.00	
	Range		4.00	
	Interquartile Range		1.00	
	Skewness		-.818	.123
	Kurtosis		.523	.245
MSQ	Mean		3.7413	.03643
	95% Confidence Interval for Mean	Lower Bound	3.6697	
		Upper Bound	3.8129	
	5% Trimmed Mean		3.7783	
	Median		3.7500	
	Variance		.525	
	Std. Deviation		.72486	

	Minimum		1.00	
	Maximum		5.00	
	Range		4.00	
	Interquartile Range		1.00	
	Skewness		-.789	.123
	Kurtosis		1.316	.245
MSEQ	Mean		3.6873	.03927
	95% Confidence Interval for Mean	Lower Bound	3.6101	
		Upper Bound	3.7645	
	5% Trimmed Mean		3.7236	
	Median		3.8333	
	Variance		.611	
	Std. Deviation		.78139	
	Minimum		1.00	
	Maximum		5.00	
	Range		4.00	
	Interquartile Range		1.00	
	Skewness		-.641	.123
	Kurtosis		.382	.245
MSN	Mean		3.6052	.04021
	95% Confidence Interval for Mean	Lower Bound	3.5262	
		Upper Bound	3.6843	
	5% Trimmed Mean		3.6429	
	Median		3.8333	
	Variance		.640	
	Std. Deviation		.80024	
	Minimum		1.33	

	Maximum		5.00	
	Range		3.67	
	Interquartile Range		1.00	
	Skewness		-.705	.123
	Kurtosis		-.015	.245
MAT	Mean		3.7110	.03779
	95% Confidence Interval for Mean	Lower Bound	3.6367	
		Upper Bound	3.7853	
	5% Trimmed Mean		3.7505	
	Median		3.7500	
	Variance		.565	
	Std. Deviation		.75195	
	Minimum		1.00	
	Maximum		5.00	
	Range		4.00	
	Interquartile Range		1.00	
	Skewness		-.794	.123
	Kurtosis		1.228	.245
MIP	Mean		3.7601	.03865
	95% Confidence Interval for Mean	Lower Bound	3.6841	
		Upper Bound	3.8361	
	5% Trimmed Mean		3.8043	
	Median		3.9792	
	Variance		.592	
	Std. Deviation		.76915	
	Minimum		1.00	
	Maximum		5.00	

	Range		4.00	
	Interquartile Range		.96	
	Skewness		-.905	.123
	Kurtosis		1.201	.245
MOS	Mean		3.7610	.03875
	95% Confidence Interval for Mean	Lower Bound	3.6848	
		Upper Bound	3.8371	
	5% Trimmed Mean		3.7914	
	Median		3.8000	
	Variance		.595	
	Std. Deviation		.77114	
	Minimum		1.00	
	Maximum		5.00	
	Range		4.00	
	Interquartile Range		1.20	
	Skewness		-.491	.123
	Kurtosis		.312	.245
MTO	Mean		3.6856	.04060
	95% Confidence Interval for Mean	Lower Bound	3.6058	
		Upper Bound	3.7654	
	5% Trimmed Mean		3.7232	
	Median		3.7500	
	Variance		.653	
	Std. Deviation		.80796	
	Minimum		1.25	
	Maximum		5.00	
	Range		3.75	

	Interquartile Range		1.00	
	Skewness		-.686	.123
	Kurtosis		.236	.245
MTT	Mean		3.7591	.03854
	95% Confidence Interval for Mean	Lower Bound	3.6834	
		Upper Bound	3.8349	
	5% Trimmed Mean		3.7918	
	Median		4.0000	
	Variance		.588	
	Std. Deviation		.76688	
	Minimum		1.00	
	Maximum		5.00	
	Range		4.00	
	Interquartile Range		1.00	
	Skewness		-.647	.123
	Kurtosis		.090	.245
MPBC	Mean		3.5028	.04962
	95% Confidence Interval for Mean	Lower Bound	3.4052	
		Upper Bound	3.6003	
	5% Trimmed Mean		3.5468	
	Median		3.6667	
	Variance		.975	
	Std. Deviation		.98733	
	Minimum		1.00	
	Maximum		5.00	
	Range		4.00	
	Interquartile Range		1.00	

	Skewness		-.707	.123
	Kurtosis		-.173	.245
MUS	Mean		3.9457	.04067
	95% Confidence Interval for Mean	Lower Bound	3.8658	
		Upper Bound	4.0257	
	5% Trimmed Mean		4.0102	
	Median		4.0000	
	Variance		.655	
	Std. Deviation		.80929	
	Minimum		1.00	
	Maximum		5.00	
	Range		4.00	
	Interquartile Range		1.00	
	Skewness		-.893	.123
	Kurtosis		1.191	.245
MU	Mean		3.7094	.04112
	95% Confidence Interval for Mean	Lower Bound	3.6286	
		Upper Bound	3.7902	
	5% Trimmed Mean		3.7489	
	Median		4.0000	
	Variance		.670	
	Std. Deviation		.81834	
	Minimum		1.00	
	Maximum		5.00	
	Range		4.00	
	Interquartile Range		.80	
	Skewness		-.844	.123

	Kurtosis		.584	.245
MNB	Mean		3.7562	.03608
	95% Confidence Interval for Mean	Lower Bound	3.6853	
		Upper Bound	3.8271	
	5% Trimmed Mean		3.8018	
	Median		3.8000	
	Variance		.515	
	Std. Deviation		.71798	
	Minimum		1.20	
	Maximum		5.00	
	Range		3.80	
	Interquartile Range		.60	
	Skewness		-1.100	.123
	Kurtosis		1.220	.245

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
MIQ	.123	396	.000	.949	396	.000
MSQ	.104	396	.000	.952	396	.000
MSEQ	.113	396	.000	.966	396	.000
MSN	.125	396	.000	.952	396	.000
MAT	.109	396	.000	.951	396	.000
MIP	.122	396	.000	.945	396	.000
MOS	.083	396	.000	.968	396	.000

MTO	.134	396	.000	.953	396	.000
MTT	.143	396	.000	.950	396	.000
MPBC	.162	396	.000	.932	396	.000
MUS	.156	396	.000	.913	396	.000
MU	.146	396	.000	.936	396	.000
MNB	.166	396	.000	.914	396	.000

a. Lilliefors Significance Correction

Appendix E

Questionnaire Translation Certificate

PROFESSIONAL TRANSLATION
Proprietor: Khalid Hadaidi

License No. 408
J.C.C. No. 226726
C.R. No. 4030283743

مكتب المحترف للترجمة
لصاحبه/ خالد بن حسن حدايدي

رقم الترخيص ٤٠٨
رقم العضوية ٢٢٦٧٢٦
رقم السجل التجاري ٤٠٣٠٢٨٣٧٤٣

إقرار

يقر مكتب المحترف للترجمة بأن النص المرفق باللغة الإنجليزية هو ترجمة للوثيقة المرفقة باللغة العربية أو العكس

ACKNOWLEDGMENT

This is to certify that the enclosed English text is a translation of the enclosed Arabic document or vice versa

مدير المكتب
Office Manager

/ /20
خالد بن حسن حدايدي
Khalid .H. Hadaidi

المرجع: 3/

Appendix F

Table of Definitions Based on the Original Authors Construct

CONSTRUCT	MODEL(S)	SOURCE (S)
	Updated Delone and Mclean model (2003)	
Net Benefits	It is group all the "impact" measures into a single impact or benefit category.	Delone and Mclean (2003)
User Satisfaction	It is subjective assessment of the various consequences, evaluated on a pleasant and unpleasant continuum.	Delone and Mclean (2003)
Intention/ Use	"Intention to use" is an attitude, whereas "use" is a behavior.	Delone and Mclean (2003)
Information Quality	Refers to the quality of personalization, currency, relevance, reliability, completeness, easy to understand and secured for (to gain user's trust when conducting a transactions via the internet).	Delone and Mclean (2003)
System Quality	Refers to the quality of (usability, availability, reliability, adaptability, and response time)	Delone and Mclean (2003)
Service Quality	The overall support delivered by the service provider, applies regardless of whether this support is delivered by the IS department, a new organizational unit, or outsourced to an Internet service provider (ISP).	Delone and Mclean (2003)
	Theory of Planning Behaviour	
Attitude	It is a component of an individual's belief towards certain behaviour and the outcome assessment that results from the specific act.	Ajzen (1991)
Subjective Norms	It refers to the perceived social pressure to perform or not to perform the behaviour.	Ajzen (1991)
Behavioral Control	It refers to a specific behavioral context and not to a generalized predisposition.	Ajzen (1991)
	Trustworthiness	
Trust of internet (or Technology)	An individual's trust in the technology through which electronic transactions and information exchange are executed, the internet	Lee and Turban (2001)
Trust of organization	An individual's trust in the government agency providing an online service to protect privacy and ensure security	Lee and Turban (2001)
	Additional Factors	
Organizational support	Refers to the degree to which an individual believes that an organizational infrastructure supports the use of PCs.	Thompson, Higgins and Howell (1991)
Institutional policy	Policy is taken here to be any course of action (or inaction) relating to the selection of goals, the definition of values or the allocation of resources.	Codd (1988)

Appendix G

Consent Letter Regarding Data Collection from UUM

AWANG HAD SALLEH
GRADUATE SCHOOL OF ARTS AND SCIENCES
UUM College of Arts and Sciences
Universiti Utara Malaysia
06010 UUM SINTOK
KEDAH DARUL AMAN
MALAYSIA

UUM
Universiti Utara Malaysia

Tel: 604-928 5299/5266/5251
Faks (Fax): 604-928 5297/5298
Laman Web (Web): http://ahsgs.uum.edu.my

KEDAH AMAN MAKMUR • BERSAMA MEMACU TRANSFORMASI

UUM/CAS/ AHSGS/95309

25 April 2016

TO WHOM IT MAY CONCERN

Dear Sir/Madam

DATA COLLECTION FOR PROJECT PAPER/ THESIS

This is to certify that **Mr. Alorfi, Almuhannad Sulaiman M (matric number:** 95309) is a full time postgraduate student in Doctor of Philosophy (Information Technology) at UUM College of Arts and Sciences.

He needs to do his field study and data collection for his project paper/thesis in order to fulfill the partial requirements of his graduate studies.

We sincerely hope that your organization will be able to assist him in the data collection and the distribution of the questionnaires for his research.

Thank you.

"KNOWLEDGE, VIRTUE, SERVICE"

Yours faithfully

WAN NORHASHIMA BINTI WAN MIN
Assistant Registrar
for Dean
Awang Had Salleh Graduate School of Arts and Sciences
UUM College of Arts and Sciences

Universiti di Rimba Hijau - *The University in a Green Forest*

PUSAT PENGAJIAN PERKOMPUTERAN
SCHOOL OF COMPUTING
College of Arts and Sciences
Universiti Utara Malaysia
06010 UUM SINTOK
KEDAH DARUL AMAN
MALAYSIA

UUM
Universiti Utara Malaysia

Tel: 604-928 5056/5058/5060
Faks (Fax): 604-928 5067
Laman Web (Web): www.soc.uum.edu.my

31 March 2016

TO WHOM IT MAY CONCERN

Dear Sir

Aplication to Go for Data Collection

With reference to the matter above, I would like to inform you that **Mr. Alorfi, Almuhannad Sulaiman M (95309)** will have to travel to Saudi Arabia to collect data for his thesis.

Mr. Almuhannad has to collect data for a pilot study during the month of April to July 2016 that will involve travelling to different geographical areas where the Riyadh College of Technology has branches in Saudi Arabia. There will be at least a few trips where the first trip will be for the pilot study. Therefore, during this period of time, Mr **Almuhannad** will travel regularly between Saudi Arabia and Malaysia for the purposes of presenting the results of the pilot study and data collection, proposal discussion and attending collection in Saudi Arabia. I will be grateful if you can provide all the necessary help for him. Your kind cooperation and assistance in allowing him to collect the data for his PhD research is vital and highly appreciated.

Should you have any further enquiries regarding this matter, please do not hesitate to contact me. Thank you.

Sincerely

Rozaini

(Associate Professor Dr. Wan Rozaini Bt Sheik Osman)
School of Computing
College of Arts and Sciences
Universiti Utara Malaysia
06010 UUM Sintok
Kedah Darul Aman, Malaysia
Tel: +604-9285209
Fax: +604-9285067
Email: rozai174@uum.edu.my

DR. WAN ROZAINI SHEIK OSMAN
Assoc. Prof
School of Computing
UUM College of Arts & Sciences
Universiti Utara Malaysia

Universiti Pengurusan Terkemuka
The Eminent Management University

Appendix H

Approval Letter from Embassy of Saudi Arabia for Data Collection

ROYAL EMBASSY OF SAUDI ARABIA
CULTURAL MISSION
KUALA LUMPUR
الشؤون الدراسية

سفارة المملكة العربية السعودية
الملحقية الثقافية
١٤٣٧/٠٧/٢٧هـ كوالالمبور

سعادة عميد الدراسات العليا بجامعة الملك عبدالعزيز سلمه الله

السلام عليكم ورحمة الله وبركاته ...

تفيد الملحقية الثقافية في ماليزيا بأن الطالب/ المهند سليمان مسعد العريفي، سجل مدني رقم (١٠٠٥٢٨٢٣٦٠٤) مبتعث من وزارة التعليم العالي لدراسة مرحلة الدكتوراه تخصص (تقنية المعلومات) في جامعة اوتارا (UUM). ويرغب في الحصول على موافقة لجمع بعض المعلومات و البيانات العامة التي تساعده في رسالة الدكتوراه .

وتقبلوا أطيب تحياتي....

الملحق الثقافي في ماليزيا

أ. د. زايد بن عجير الحارثي

No. 17, Jalan Kerani 2, Off Jalan Kedondong, Ampang Hilir, 55000 Kuala Lumpur. Tel: +603-4251 2001 Fax: +603-4251 2281
http://my.mohe.gov.sa

Appendix I

Approval Letter from King Faisal University for Data Collection

King Faisal University
Deanship of Scientific Research
Research Ethics Committee (REC)

جامعة الملك فيصل
عمادة البحث العلمي
لجنة أخلاقيات البحث العلمي

Memorandum

Research Proposal Review

REC REF NUMBER	KFU-REC/2017 - 01 - 06	
INSTITUTION	Universiti Utara Malaysia	
PROJECT TITLE	A MODEL FOR MEASURING MOBILE LEARNING SUCCESS AMONG STUDENTS IN SAUDI ARABIA UNIVERSITIES	
PRINCIBAL INVESTIGATOR	Mr. Alorfi, Almuhannad Sulaiman	
SUPERVISOR	Dr. Wan Rozaini Bt Sheik Osman	
APPROVAL DATE	G 01/25/2017	H 04/27/1438

Dear Mr. Alorfi, Almuhannad Sulaiman

You are hereby informed that the Research Ethics Committee (REC) at King Faisal University has approved your subject proposal. Following a thorough review by the REC of the ethical aspects of the proposal, your research has been approved for one year from the approval date, under the following conditions:

1. **Approval Duration:** Twelve (12) months from the approval date.
2. **Amendments to the approved project:** Changes to any aspect of the project require resubmission of Request for Amendment to the Research Ethics Committee (REC).
3. **Future Correspondence:** Please quote reference number and project title above in any further correspondence.
4. **Safety:** the safety and well-being of all participants must be protected in accordance with the relevant research ethics guidelines of King Faisal University and the National Committee of Medical & Bioethics. Where required, **signed consent form** must be obtained from all participants.
5. **Monitoring:** Projects may be subject to an audit or any other form of monitoring by the Research Ethics Committee (REC) at any time.
6. **Retention and storage of data:** The Principal Investigator is responsible for the storage, retention, and security of original data pertaining to the project for a minimum period of five years.

Please be aware that **this memorandum constitutes ethical approval only**. If the research project is to be conducted at another site or under auspices of another organization, approval must be obtained from the appropriate respective authorities before the project may commence.

Dr. Abdullah M Alzahrani

Dean Scientific Research
Vice Chair of Research Ethics Committee (REC)

Appendix J

Approval Letter from **King Abdul-Aziz University for Data Collection**

KINGDOM OF SAUDI ARABIA
Ministry of Education
KING ABDULAZIZ UNIVERSITY
(035)

: 80200 Jaddah 21589
: +966 12 6952015
Fax.: +966 12 6952441
http://gssr.kau.edu.sa

مكتب وكيل الجامعة للدراسات العليا والبحث العلمي
Office of the Vice President for Graduate Studies and Research

المملكة العربية السعودية
وزارة التعليم
جامعة الملك عبد العزيز
(٠٣٥)

: ٨٠٢٠٠ جدة : ٢١٥٨٩
: (+٩٦٦) ١٢ ٦٩٥٢٠١٥
فاكس : (+٩٦٦) ١٢ ٦٩٥٢٤٤١
E-mail: research@kau.edu.sa

سعادة الملحق الثقافي بسفارة المملكة العربية السعودية في ماليزيا حفظه الله

السلام عليكم ورحمة الله وبركاته:

جامعة الملك عبد العزيز تهدي سعادتكم تحياتها، ونشير إلى الطلب المقدم من المواطن/ المهند بن سليمان مسعد العرفي، طالب الدكتوراه بجامعة أوتارا، يرغب في القيام برحلة علمية للمملكة، لجمع معلومات تتعلق بموضوع أطروحته للدكتورة وتطبيقها في جامعة الملك عبد العزيز.

في هذا السياق نفيد سعادتكم بأن الجامعة لا تمانع من قيام المبتعث بتطبيق دراسته لديها، علماً بأن ضوابط توزيع الاستبانات بجامعة الملك عبد العزيز مرفوعة على الرابط التالي:

http://graduatestudies.kau.edu.sa/content.aspx?Site_ID=306&lng=AR&cid=241579&URL=www.kau.edu.sa

ويمكن للطالب التواصل مع عمادة الدارسات العليا لطلب المساعدة عن طريق وحدة الخدمات البحثية، وذلك من خلال الإيميل التالي: dgsg.rsu@kau.edu.sa

وتقبلوا خالص تحياتي وتقديري...

وكيـــــل الجامعـة

للدراسات العليا والبحث العلمي المكلف

أ.د. عبدالله بن عمر عبدالله بافيل

Encl.: [illegible] المرفقات   Date: ٦/٤/١٤٣٦ التاريخ   Ref.: [illegible] الرقم

Appendix K

Approval Letter from King Saud University for Data Collection

رقم القيد ١٤٠٨٨
التاريخ ١٤٣٨/٠٤/١٩
المرفقات

سعادة وكيل جامعة الملك سعود للدراسات العليا والبحث العلمي　　　　حفظه الله

السلام عليكم ورحمة الله وبركاته ..

أفيد سعادتكم بأني طالب مبتعث من وزارة التعليم العالي الى جامعة (UUM) في ماليزيا للحصول على درجة الدكتوراه تخصص (تقنية معلومات) وأحتاج الى توزيع استبانة من ضمن متطلبات رسالة الدكتوراه . وعليه آمل من سعادتكم التكرم بالموافقة على توزيع الإستبيان للطلاب.

شاكر تعاونكم معنا ...

مقدم الطلب

المهند سليمان العرفي

٩٥٣٠٩

٠٥٦١٥٠١٧٨٠

smart_sa@windowslive.com

King Saud University

٠٥٦١٠١٨٢١

Appendix L

List of Experts

No	Name	Designation	University	Email
1	Zulkhairi Dahalin	Professor	University Utara University / Malaysia	zul@uum.edu.my
2	Shafiz Affendi Mohd Yusof	Associate Professor	University of Wollongong / UAE	shafizMohdYusof@uowdubai.ac.ae
3	Zahayu binti Md Yusof	Associate Professor	University Utara University / Malaysia	scsqs@uum.edu.my
4	Hashed Ahmad Mabkhot	Assistant Professor	King Faisal University / KSA	hashed@kfu.edu.sa
5	Jamal Mohammad Alekam	Assistant Professor	University Utara University / Malaysia	jamalalekam@uum.edu.my
6	Ebrahim Mohammd Almatari	Assistant Professor	Al-Jouf University / KSA	emalmatri@Ju.edu.sa

File No: ________

UUM
Universiti Utara Malaysia

SQS STATISTICAL CONSULTING
SCHOOL OF QUANTITATIVE SCIENCES
UUM COLLEGE OF ARTS AND SCIENCES
www.sqs.uum.edu.my
Email: scsqs@uum.edu.my

Consultation Appointment Form

Name: A lo RFi, Al Muhammad Sulaiman

Staff/Matric no: 95309 School/Department: SOC

Institution: CAS Email: smart_sc@windowslive.com

Tel no (Office): ________ Mobile: 0123286695

Type of consultation (please tick):

- [ ] Research project
- [ ] Journal article/Conference presentation
- [x] Dissertation/Thesis (Msc/PhD)
- [ ] Final year project (Undergraduate)

Title of project: A model for measuring Mobile Learning ~~services~~ success Among student in Saudi Arabia university

Analysis/software applications plan to use: He would like an advice on his analysis. He was using PLS to construct his model. He is proposing few new factors to the m-learning usage among students

Signature of client:

Date:
29-11-2017

Consultation Bill

Date	Time	Duration	Charge	Consultant's, signature and stamp
29/11/17	2.20 pm	3.10 pm	RM25	DR. ZAHAYU MD YUSOF Associate Professor School of Quantitative Sciences UUM College of Arts and Science Universiti Utara Malaysia

Fees rate (per hour) - * Please bring exact amount

Student	RM 25
UUM Staff/ Others	RM 50

Note for consultant:
Submit this form to treasurer of SQS Statistical Consulting:
Dr. Muhammad Mat Yusof (Tel no: 049286316, mmy@uum.edu.my)