Current Status and Future Outlook of Mobile Learning in the Kingdom of Saudi Arabia based on an Innovation Systems Approach

إعداد

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Abstract:

One of the objectives of Vision 2030 of Saudi Arabia is to catalyse sustainable investments in a world-class educational system. Therefore, the education in the Kingdom has experienced a pedagogical transition from a teacher-centred to a learner-centered approach over the years. Since its inception in the year 2000, m-learning has helped to exploit and integrate mobile devices and communication technologies into modern day learning and teaching activities. The concept is now a vital platform for teachers and students to acquire, analyse, and assimilate educational resources through mobile devices. Therefore, the interactions of people, technology, and institutions designate the concept of m-learning as an innovation system (IS). However, there is limited information on the current status and future outlook of m-learning as an IS in the Kingdom. This is critical to identifying and address any challenges impacting on the development and diffusion of the concept. Therefore, this paper seeks to examine the m-learning as an innovation system and to describe the level of developments and relations between actors or stakeholders. It is envisaged that the study will provide the framework for the transformation of the m-learning innovation system in Saudi Arabia. The results showed that although m-learning is not new in Saudi Arabia, its implementation is still considered in its early stages due to its application in only undergraduate teaching and learning curricula at tertiary institutions. However, the findings also revealed that many universities have adopted m-learning along with various social media, educational games, and technologies for teaching and learning. Furthermore, there

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is a synergic relationship between the people (users), technology (m-learning), and institutions (universities, government agencies and national laws) in the m-learning innovation system in Saudi Arabia. In conclusion, the three tenets of the innovation system are well developed due to the presence of a healthy number of organisations, laws and policy guidelines for m-learning.

Keywords: Mobile Technology, m-learning, Saudi Arabia, Innovation Systems, Technology.

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1. Introduction

The concept of m-learning has established in early 2000 to exploit and integrate mobile devices and communication technologies into modern day learning and teaching activities. Over the years, the concept has evolved into an essential platform whereby teachers and students acquire, analyse, and assimilate learning materials and educational resources through the use of personal electronic devices Crompton [2] ,[1]. As such, devices such as MP3 players, personal digital assistants (PDA), mobile phones, tablet, handheld and notebooks computers become integral mediums for the enhancement of learning across multiple contexts, social interactions, and content development [4 ,3].

According to analysts, the success of m-learning has been largely attributed to increased access to the internet across many parts of the globe [6 ,5]. As a result, teaching and learning have eliminated the need for the physical presence of learners in brick and mortar classrooms and increased timely and convenient access to educational materials [7]. Furthermore, m-learning has transformed the traditional notions of teaching and learning through the low-cost, timely, and convenient access to educational tools and resources [8]. These factors have been particularly critical to the development of formal and informal learning in many countries around the globe.

However, there are lingering debates amongst academics and researchers on the current global status or levels of development, adoption, and diffusion of mobile devices for teaching and learning worldwide. Therefore, some analysts posit that m-learning has not attained its full potential as a medium of

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learning and teaching in schools and other educational settings [9 ,7]. To address these gaps, numerous theories and models have been proposed to examine and explain the metamorphosis of the concept of learning across multiple disciplines. The most notable of these models are diffusion of innovation (DOI) [10], theory of reasoned action (TRA) [11], theory of planned behaviour (TPB) [12], technology acceptance model (TAM) [13] and unified theory of acceptance and use of technology (UTAUT) [14]. These models indicated that m-learning is a multidisciplinary area of study which typically spans information and communications technology, sociology and anthropology along with management and information sciences. These notions along with the plethora of definitions of m-learning in the literature suggest that the adoption and implementation of m-learning are multifaceted and as such, significantly influenced by numerous socio-economic, environmental and technological factors [15 ,9].

The comprehensive understanding of these factors can assist governments, policymakers, academics and students in the adoption and implementation of m-learning in the future. Furthermore, it will assist all stakeholders involved in the concept to identify, examine, and highlight the role of people (users), technology (mobile devices and ICT technologies), and institutions (government and institutions of learning) in the adoption of m-learning. According to analysts, the interactions between people, technology, and institutions do not only create innovation systems but also provide the impetus to transform ideas into processes, products, or services. For this reason, m-learning can be considered an innovation system and as such

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is subject to evaluation and assessment based on the three-pronged approach of people, technology, and institutions.

In principle, an innovation system is a policy structure or framework for evaluating and understanding the level of development, adoption, and diffusion of an innovation. The concept of innovations systems was first proposed by the Swedish academic Professor Bengt-Åke Lundvall at Aalborg University in the year 1985. According to Lundvall, the theory of innovation systems aims to describe an innovation and technology development as the product of the complex relationships between actors or stakeholders [16]. Over the years, numerous authors have proposed various definitions for innovation systems in the literature. The study by Freeman [17], defines innovation systems as a network of private or public institutions established to start, introduce, adapt or implement novel technologies through various. In a later study Lundvall [18], redefined innovation systems as essential connections that work together to create, diffuse and utilize a novel, valuable, and financially viable technology or knowledge typically located with the geographical confines of a sovereign state. The work of Edquist [19], aptly summarises the concept as a novel approach to examine technological change and innovations as it relates to growth, productivity and prosperity within any knowledge economy.

Other theories have been aimed at the diffusion of innovations developed by Rogers [10]. First proposed in 1962, the Rogers› Diffusion of Innovation Theory (DIT) is considered one of the most notable theories of technology diffusion adopted to predict the prospects of technology adoption. Furthermore,

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the theory classifies organisations according to their level of adoption of novel technologies [20]. In addition, the theory states that the diffusion of innovation is influenced by four main elements; innovation, communication channels, time and social system [10]. Over the years, the model has been extensively adapted and adopted to describe and understand the diffusion of innovative technologies. Hence, the DIT and the theory of innovation systems will be employed to assess the current status and future outlook of mobile learning in the Kingdom of Saudi Arabia.

Although the concept of m-learning is not new in Saudi Arabia, its implementation is still considered in its infancy. Some universities have reportedly adopted teaching and learning based on the SMS. Other tertiary institutions in Saudi Arabia have already implemented technologies for distance learning activities which demonstrates the nation's commitment to higher education curricula. However, considering the rapidly changing face of technological developments around the globe, it is expedient to identify and rectify any challenges encumbering the successful implementation of m-learning. In addition, the paper will examine the level of development and implementation based on the three-pronged approach of people, technology, and institutions, which represents the users, developers and regulators of technology in Saudi Arabia.

2. Current Status of education in Saudi Arabia

The Kingdom of Saudi Arabia (KSA) is a monarchy and sovereign country in the Arabian Peninsular. It is located on °23.8859 N, °45.0792 E with a land mass that covers an area of 2,150,000 square kilometres inhabited by 32.3 million people. The nation is bordered by other notable Arab nations comprising of Bahrain, Iraq, Jordan, Kuwait, Oman, Qatar, United Arab Emirates and Yemen [22 ,21]. Due to the growing population and the nation›s quest for global leader and recognition, successive governments in the KSA have sought to prioritize education over the years [,23 24]. The long-term objective of the government is to provide abundant educational and training opportunities for its citizens along with healthcare and housing [25]. According to the Saudi Vision 25] 2030], the government aims to invest in building a world-class educational system in line with the global market, and socio-economic standards. It is envisaged that the government›s investments will stimulate social, cultural, volunteerism, healthy, sporty and entrepreneurial developments along with systems and institutions for health and social care [25]. Furthermore, one of the core tenets of the vision is to train and develop teachers who will, in turn, nurture the holistic development of the kingdoms future generation through character building, high quality and multi-faceted education. To ensure this, the government launched the National Labour Gateway (TAQAT) [26], supervised by regional councils, to identify and nurture the requisite skills, expertise, and talents for the socio-economic section and job creation in Saudi Arabia [27]. One of the core skill areas the government is targeting is information and communications

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technology (IT and ICT). This is based on the premise that IT and ICT have the potential to create competitive job opportunities that can stimulate the future economic outlook of the kingdom [25 ,23]. Hence, the government plans to invest funds and garner private sector participation in the development of ICT infrastructure such as high-speed broadband across the kingdom. The improved facilities will not only the boost the economy but also learning and teaching in the nation's educational systems such as e-learning, m-learning and other IT/ ICT based curricula.

3.M-learning in Saudi Arabia: Current Status & Developments

Over the years, the rapid economic growth witnessed in the kingdom of Saudi Arabia has stimulated massive investments in many sectors such as education and ICT. According to Al-Shehri [28], the Kingdom is experiencing a pedagogical transition from a teacher-centred to a learner-centred approach to teaching and learning. The study examined the future outlook of m-learning in Saudi Arabia and found that distance and mobile learning (m-learning) practices are increasingly being adopted and integrated into the country's educational system. This is largely ascribed to the advanced technologies, massive investments, policy commitment, and social acceptance of m-learning over the years. The study further emphasized that the outlined dynamics have significantly influenced the penetration of m-learning and associated technologies among students thereby helping them adapt to the learning in the digital age. Lastly, the study identified and highlighted the challenges currently hampering

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m-learning adoption and diffusion in the Kingdom of Saudi. The most notable were growing demand for education, high capital and labour costs, geographical distance and traditional cultural norms [28].

Similarly, Chanchary and Islam [29] examined the prospects and challenges of m-learning in Saudi Arabia. The authors opined that the rapid expansion of ICT technologies such as broadband wireless networks and mobile phones are important tools for teaching, learning, and research both in education and future workplaces. Furthermore, the study proposed a holistic framework of m-learning in Saudi Arabia. The findings revealed the opinions of 131 students regarding effective learning through mobile technologies and its influence on performance and acceptance of teaching technology by students. Lastly, the study reviewed the technological prospects and challenges of mobile-learning in Saudi Arabia. The findings revealed that over %75 of the students surveyed demonstrated positive attitudes to m-learning. This was ascribed to the tractability of methods, timings along with enhanced communications provided by m-learning technologies during teaching and learning. However, the study noted that m-learning in KSA is currently limited by technological problems such as the memory size, processing efficiency, battery lifespan, and graphical user interface (GUI). Other notable factors include the diverse platforms linked to the acceptance and application of m-learning in Saudi Arabia. Specifically, some students ranked the flexibility and enhanced communication selections of mobile devices positively, whereas others expressed reservations about technical issues which can result in the poor adoption of m-learning. These include poor

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visibility due to small sized screen and mobile operating systems (OS) incompatibility in learning perceptions through mobile phones [29].

Similarly, Yusuf and Al-Banawi [30] examined the impact of changing technologies such as e-learning in the educational system in Saudi Arabia. The study reported that the principal e-learning institution in Saudi Arabia is the King Fahd University for Petroleum and Minerals (KFUPM). According to the study, KFUPM introduced -learning programs as far back as 2003 to complement conventional pedagogical approach to teaching and learning in higher education. In addition, the study presented an in-depth summary of the merits and limits of e-learning vis-à-vis the cost implications. The authors opined that the adoption of technology enhanced learning can catalyse a revolution in learning; thereby increasing learners' timely access to high-quality and cost-effective education. However, the authors noted that complete prospects of e-learning can only be realised through synergised systems aimed at efficient content and services delivery. Furthermore, the study noted that the successful implementation of e-learning will empower students with the information, skills and platform for independent learning [30].

The study by Al-Barhamtoshy and Himdi [31], embarked on the design, development, and implementation of a model for m-learning in Saudi Arabia. The mobility model was aimed at providing a novel paradigm for the two-way flow between e-Learning and m-Learning. The authors further proposed and developed an m-system based on web service conveyed to mobile clients through XML layer. The system was designed to ensure the flexible integration of mobile clients so as to

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enable content creation, knowledge base admission, and easy interaction and communication with the m-servers developed by the authors [31]. However, the strategic technology employed by the researchers requires reviews to provide for present-day advances in web technologies. Specifically, web service and XML-based delivery need to be complemented or interchanged entirely by applications compatible with the cloud, mobile m-learning, and associated tools that control other available computing systems. To address these, the authors proposed three strategies for m-learning delivery. The first approach is to consider m-learning and e-learning as one single entity or platform whereas the second and third strategies are communication and performance support. In addition, the study showed that m-learning consists of five main elements namely; the mobile technology, mobile devices, and the wireless-based protocols, language, and applications. The authors suggested other probable restrictions of m-learning including the distraction of mobile learners, disjointed experiences, extra costs, and security risks are limiting factors. Previously, several attempts have been made in Saudi Arabia to introduce and implement m-learning systems and to assess the reactions, response, feedback and experiences of user-based learners. In a similar development, Razek and Bardesi [32] designed a robust m-learning framework that integrates numerous personalised techniques for learning termed the adaptive mobile learning system (AMLS). At the time of development, the AMLS was described as a brilliant advancement in the field of m-learning due to its capability of supporting tailored delivery of educational course materials and learning resources. Furthermore, the AMLS enhances the

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techniques, styles, and assigned interactions according to e-profile analyses of students which typically involves questionnaires or algorithms for machine learning [32].

Many other studies have also been undertaken to examine the current status, prospects and challenges hampering m-learning development, adoption and diffusion in the Kingdom of Saudi Arabia. Jaradat [33] surveyed the opinions of 39 students of French language at Princess Nora University in Saudi Arabia. The results demonstrated that on average, the use of mobile phones enriched undergraduate student performance in the French language courses. This was facilitated by the distribution of assignments, exercise repositories, and other learning materials through the mobile-based medium. Furthermore, the delivery of mobile-based tools for reading, vocabulary acquisition, email-based learning, direct messaging along with and VoIP applications improved the collaboration and delivery of instruction [33].

The study by Alfarani [34], examined the various factors that influence the adoption of m-learning female teachers in higher education in Saudi Arabia. The author identified resistance to change and perceived social culture as the two main factors or significant determinants of the current use of and the intention to use m-learning [34]. Similarly, Al-Said [35] examined the perceptions of students towards the use of the Edmodo application and m-learning in Taibah University in Saudi Arabia. The findings showed that students exhibited a positive perception towards Edmodo and m-learning which was ascribed to their belief that both help to facilitate effective communication and time-saving skills. However, technical problems such as low mobile phone battery, poor storage capacity, and small screen

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size posed problems for a number of the respondents polled in the study. In conclusion, the study recommended the inclusion of m-learning in the curricula of the university to facilitate teaching and learning [35].

In a separate study, Alrazeeni [36] examined the effectiveness of m-learning as an alternative teaching and learning methodology using SMS interface and student feedback in Saudi Arabia. The findings revealed that the use of SMS and social websites such as Facebook and YouTube is an effective approach for disseminating assignments, along with teaching and learning materials. In conclusion, the author observed that m-learning along with blended learning methodologies can effectively enhance students' knowledge and confidence during examinations. More recently, the study by Naveed et al., [37], examined critical success factors (CSF) of e-learning in Saudi Arabian universities using a mixed study methodology. However, Alowayr and McCrindle [38] examined students› readiness to use m-learning in Saudi Arabia through a case study. In a separate study, Al Masarweh [39] proposed a concerns-based adoption framework model to evaluate m-Learning in universities in Saudi Arabia.

As outlined, extensively research on m-learning development, adoption, and diffusion of m-learning in the Kingdom of Saudi Arabia. Overall, the results have showed significant intentions and positive perceptions towards m-learning in education. Furthermore, the findings have highlighted the performance and satisfaction of students using m-learning technologies in colleges and universities in Saudi Arabia. Most important, the various studies demonstrate that m-learning is a well-established concept in the context of teaching and learning in Saudi Arabia.

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In addition, the studies highlight the significant efforts and progress made by Saudi Arabia in integrating m-learning into its university curriculum. The government has gone further to establish various strategic projects to inspire the execution of distance learning and m-learning in the country.

4. M-Learning Innovation System

Based on the definitions of m-learning in literature, the concept is considered a technological innovation designed to ensure timely, borderless, and convenient acquisition, analysis, and assimilation of educational materials and learning resources by students and teachers who make up the users. The concept typically employs the use of personal electronic or mobile technological devices such as mobile phones, tablets, MP3 players, personal digital assistants (PDA), handheld and notebooks computers. Therefore, the technology aspect of m-learning is comprised of the mobile technology, mobile devices, wireless protocols, wireless language, and wireless applications [31]. Lastly, the network of institutions such as universities, government agencies and the laws and policies that govern education and serve as mediums for the enhancement of learning across multiple contexts, social interactions, and content development make up the last core tenet of an innovation system.

As a result of the interactions between people (users), technology (m-learning), and institutions (universities, government agencies and national laws) serve as the m-learning innovation systems and provide the framework for the transformation of ideas. The synergy between the three core tenets is an essential network

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which aims to create, diffuse and utilize original, prized, and or potentially commercial idea, technology or knowledge into a valuable process, product, or service. According to the Rogers› Diffusion of Innovation Theory (DIT) the diffusion of innovation is influenced by four key elements namely; innovation, communication channels, time and social system [10]. Therefore, the three core tenets of the m-learning innovation system in Saudi Arabia will be highlighted.

i. People (Users)

This comprises all the users of the technology within the innovation system in Saudi Arabia. According to various studies review in literature, m-learning users in Saudi Arabia comprise largely of university teachers and students who have over the years adopted and implemented the technology in teaching and learning. This part of the innovation is considered crucial to the growth and development of the innovation systems as users are instrumental in the development, adoption and diffusion of the process. Furthermore, the users provide useful feedback for improvement through prototype and production testing and evaluation after design and manufacturing stage. In Saudi Arabia, the core of the technology users are universities and institutions of higher education. Table 1 presents an overview of the universities that have adopted m-learning in their curricula and the progress recorded so far. The list is by no means exhaustive but only an indication of the level of development of the innovation.

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Table 1: Overview of users of m-learning in Saudi Arabia

University	Department	Respondents	Findings	Reference
King Saud University	Bachelor of Art and Medicine	186	Mobile learning improved retention of B.A and M.D. students by enhancing their teaching and learning. Mobile learning systems improved timely, convenient use of mobile learning systems	[40]
Najran University	Department of Computer Science	131	Over %75 of students showed positive attitudes towards m-learning. Based on the flexibility of learning methods, timings. Process improved communications among users.	[29]
Jazan University	College of Computer Science & Information Systems,	300	Results showed students have adequate knowledge and awareness in m-learning. Results provide a strong basis on the readiness of students to adopt mobile technologies for learning.	[41]
Princess Nora University	Department of French Studies	39	The results demonstrated that on average, the use of mobile phones enriched undergraduate student performance in the French language courses	[33]
Taibah University	Department of Educational Technology, College of Education	27	Findings indicated that the perception of students to Edmodo and m-learning was positive perceptions. M-learning was considered an effective and timely means to communicate, teach and learning.	[36]
King Saud University	Prince Sultan Bin Abdulaziz College	42	About %94 used SMS to send deadline reminders and to receive questions from faculty while %57 Students scored 12 ,20/20 28) %) scored 20/18 after BLM implementation	[36]

As can be observed, the users of m-learning are predominantly undergraduate students at higher educational institutions in

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Saudi Arabia. This suggests that the content, materials, and resources for m-learning currently available in Saudi Arabia is limited to teaching and learning undergraduates. Hence, institutions need to upgrade the current curricula so as to cater for graduate and postgraduate students followed by content testing and evaluation to improve overall delivery. In spite of the shortcoming, the literature reviewed indicates that m-learning content cuts across various disciplines of medicine, computer science, arts and information systems.

ii. Technology

The key technologies employed in the delivery of m-learning are the mobile technology and mobile devices. However, other infrastructure such as broadband internet, wireless protocols, language, and applications have also been highlighted in the various literature. Over the years, various academics have also devised models such as the are diffusion of innovation (DOI) [10], theory of reasoned action (TRA) [11], theory of planned behaviour (TPB) [12], technology acceptance model (TAM) [13] and unified theory of acceptance and use of technology (UTAUT) [14] to examine the status and future outlook of m-learning. Other researchers have developed algorithms and tailor programmes to enable the design, development, and distribution of m-learning content, educational materials and learning resources. Table 2 presents an overview of the key developmental technologies of m-learning in Saudi Arabia over the years.

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Table 2: Technologies, Models, and Programmes in the m-learning innovation system in Saudi Arabia

Model/ Technology	Abbreviation	Features	Findings	References
Adaptive Mobile Learning System	AMLS	M-learning framework with personalized learning techniques	Learning due to its capability of supporting tailored delivery of educational course materials and learning resources. AMLS enhances the techniques, styles, and assigned interactions according to e-profile analyses.	[32]
Technology Acceptance Model	TAM	TAM describes technology acceptance factors.	TAM analyzes the adoption of mobile devices and smartphones for accessing course materials and web searches for information related to their discipline, sharing knowledge, conducting assignments.	[42]
Mobility M-learning Model	MMM	M-system based on web service, which providing novel paradigm for two-way flow for e- and m-Learning.	The system was designed to ensure flexible integration of mobile clients, permit content creation, knowledge base entry, easy interaction and communication with m-servers.	[31]
Unified Theory Of Acceptance And Use Of Technology	UTAUT	Unified Theory that describes the Acceptance and Use of Technology	A theoretical framework based on the Unified Theory of Acceptance and Use of Technology (UTAUT) model was proposed. Used major UTAUT constructs moderated by 3 factors: age, gender and education. The questionnaire was devised for 442 Saudis to measure M-Tadawul acceptance and use facilitators.	[43]

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Model/ Technology	Abbreviation	Features	Findings	References
Unified Theory Of Acceptance And Use Of Technology	UTAUT	Unified Theory that describes Acceptance and Use of Technology	Mobile Learning (M-Learning) on the basis of the Unified Theory of Acceptance and Use of Technology (UTAUT) significantly influences Information Systems (IS). Performance Expectancy is a critical factor impacting the student's intention to use m-learning as well as effort expectancy and social influences. The model explains approximately %62 of the variance in the intention to adopt and use m-learning.	[44]
Technology Acceptance Model	TAM	TAM describes factors that influence technology approval.	TAM developed to measure the perceived usefulness and ease-of-use of technology handlers. Also, it explains a persons' usage of a particular system in an organizational environment.	[45]
SMS interface Software	SMS	SMS interface Software with a Virtual Number that uses social media such as Facebook and YouTube.	The findings discovered that the use of SMS and social websites is an effective method for distributing assignments, along with teaching and learning material.	[36]

Based on Table 2, it can be inferred that the various technologies successfully described the development, adoption and implementation of m-learning as an innovative technology in teaching and learning in Saudi Arabia. Furthermore, the models particularly the UTAUT derived from various known models in literature was effective in describing user's intention to adopt and use m-learning in Saudi Arabian higher education institutions.

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More importantly, the government has established various initiatives to promote e-learning and m-learning in the country. The most notable of these are; The National Centre for E-Learning and Distance Education, JUSUR (a Learning Management System), Saudi Digital Library, and the Saudi Electronic University. Likewise, the government and the National Centre for E-Learning and Distance Education of Saudi Arabia have championed e-learning and m-learning expansion through numerous project financing and implementation programs.

The notable projects include initiatives such as the Tajsir e-Learning, Educational Portal, and Jusur System for the Administration of Electronic Learning. Others include the Qualification and Training Project (e-learning and m-learning staff training programme for universities) and Saudi Repository for Learning Objects [30].

iii.Institutions

The third and final part of any innovation systems is the institutions. These typically comprised of all the organisations, laws, policies and regulations established to oversee the successful implementation of the innovation systems (IS). In the context of m-learning in KSA, the institutions consist of the national laws, policies and guidelines on education along with the universities, colleges, and finally the government agencies. In KSA, the central authority for the administration of tertiary education is the Ministry of Education, Higher Education (MoEHE). The ministry carries out its duties in accordance with the government policy on the establishment, development and coordination of universities in KSA. In addition, its role is to

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promote research activities, formulate rules, regulations and guidelines for all higher institutions of learning to comply [46]. According to Alamri [46], the higher education system in Saudi Arabia is comprised of over 56 government universities and private universities or colleges; 98 primary teacher›s colleges for men and women; 49 institutes for health and technical colleges. However, other organisations, institutions and laws have been established over the years to assist the MoHE in its duties to ensure high-quality education in the kingdom. Table 3 presents an overview of the key stakeholders in the m-learning innovation system in Saudi Arabia.

Based on the data in Table 3, the institutional aspect of the m-learning innovation system in Saudi Arabia consists of numerous organisations, MoHE and over 200 institutions of higher education tasked with the development and promotion of higher education in KSA. As such, this aspect is considered healthy based on the number of institutions, the roles and responsibilities and the laws and guidelines under which they operate.

In summary, the m-learning innovation system in KSA is well established with potential for improvement. The notable areas for improvement include the development of materials, resources and content for graduate and postgraduate students in the future. Furthermore, the use of tablets, PDAs and portable computers need to be explored to address problems associated with distractions from phones. Lastly, the m-learning innovation system could benefit for more government invests for research into further research and development of programmes and software for more efficient delivery of learning and teaching

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materials.

Table 3: Institutions Responsible for m-learning in KSA

Institution	Designation	Function	References
National Centre for E-Learning and Distance Education	NCeL	Its role is to embrace e-learning and distance learning at KSA universities. To establish a centre for the provision of technical support, tools and programs in KSA. To assist in the development of digital content for educational purposes. Most importantly to support the spread of e-learning and m-learning through project financing and implementation programs.	[47]
Saudi Digital Library	SDL	SDL is one of the prominent Models that support scientific consortium on the National level. SDL provides advanced information services as well as the accessible to electronic information resources with various forms which will be available to faculty members, researchers, and students on either graduate or post-graduate studies in all Saudi Arabia Higher Education Institutions.	[48]
National Labour Gateway	TAQAT	Its role is to identify and nurture the necessary skills, expertise, and talents for socio-economic growth and development. To deliver a complete for a platform for private, public sectors and service providers in job creation and labour market. Lastly, to establish an avenue for job seekers and employers who propose efficient services for employment and training. To ensure stability, training and equal opportunities for Saudis citizens.	[49]

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Institution	Designation	Function	References
General Education Evaluation Commission	GEEC	To engender the development of human capital and create a knowledge society. To involve and support a good environment for education which helps learners excel. Promote general education as a foundation for the developmental progress of Saudi Arabia.	[50]
Higher Education Statistical Center	HESC	To collate and protect statistical information and data on the nation's higher education. Ensure the reliability of statistical data and information provided to higher education, researchers and stakeholders. To conduct statistical studies and spread awareness about higher education, data and statistics. Forster collaboration with comparable hubs and organizations in and around Saudi Arabia.	[51]
National Center for Assessment	QIYAS	To perform tests for university admissions and to establish an administrative, financial and autonomous centre for the assessment of higher education in the kingdom.	[52]
National Commission for Academic Accreditation and Assessment	NCAA	To establish centres in educational institutions has started. It is an important process and a basic requirement by quality accreditation organizations from any Higher Education Institution seeking to implement Academic Accreditation and Quality Assurance.	[53

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5.Conclusion

The paper examined the current status and future outlook of mobile learning (m-learning) in the Kingdom of Saudi Arabia based on the Innovation Systems Approach. The assessment of m-learning in KSA was based on the three-pronged approach of people (users), technology, and institutions, which represents the users, developers and regulators of technology in Saudi Arabia. Based on the finds, the authors observed that the concept of m-learning is not new in Saudi Arabia, although its implementation is still considered in its infancy. This is based on the findings that numerous universities have previously adopted m-learning for teaching and learning through the implementation of various technologies such as SMS, social media websites such as Facebook, YouTube. Other tertiary institutions in Saudi Arabia have devised algorithms and programmes such as Edmodo. However, the author also observed that m-learning is restricted to undergraduate teaching curricula leaving behind graduate and postgraduate students out of the innovation system. This indicates that the user aspect of the innovation system in KSA requires further examination to ensure expansion and improved content delivery. Lastly, the institutional aspect is well established and developed due to the presence of a healthy number of organisations, laws and policy guidelines for m-learning and education in the Kingdom of Saudi Arabia.

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