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Reviews on Electronic Health Readiness Assessment Framework for Iraqi Healthcare Institutions

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Abstract: e-Health readiness relates to preparedness of an organization or community to implement any information and communication technologies based healthcare program. Assessment of e-Health readiness could accomplish the process of modify for organizations and individuals to implement information, communication and technology also to avoid possibilities of failure and relapse. The aim of this study is to evaluate the e-Health readiness frame works in healthcare institutions. The study was performed utilizing a non-experimental study exploratory research design. This exploratory study included an essential investigation about secondary data. The study development and modeling of secondary data in order to highlight the final results of the research. Through reviewing the literature of the existing frame works in e-Health readiness, it is showed that the health section in Iraq needs continued attention to get government support, Iraqi health services have never developed over the latest years in the different levels of health and medical services as well as in measuring the practicality of the existing approach.

Key words: e-Health readiness, healthcare information system, e-Health adoption, e-Health in Iraq, e-Health assessment, approach

INTRODUCTION

Iraqi government is looking forward to develop its system by applying electronic technologies such as e-Government in all its sectors like e-Health (Abdulameer *et al*., 2016). Therefore, this study covers the relevant literature, publishing and hypotheses which specifically focus on the subject of the e-Health readiness assessment, taking into account the objective to give ensuing discussion and analysis. It will be identifying the gap of literature knowledge and attempt to bridge it.

The secondary search of related materials used would identify previous research done in this discipline and to identify and assess the infrastructure of healthcare organizations in Iraq with a view to determine potential opportunities existing for the assessment of e-Health readiness, define target solutions and infrastructure architecture and compare and review road maps for the different initiatives researched to support the implementation of e-Health systems.

e-Health is a solution of Information and Communication Technology (ICT) around the entire range of functions that influence health (Silber, 2003; WHO, 2010). This is a growing field in the area of medical informatics, business and public health (Li *et al*., 2012). The internet and related technological innovations provides a new method for information dissemination as well to obtain the collaboration and interaction among institutions, healthcare providers, health professionals and the public (Rad *et al*., 2012).

Electronic health provides healthcare to get remote population-formerly nor properly serviced using traditional means. Nevertheless, readiness is very essential to all aspects regarding e-Businesses in developing countries (Heeks, 2008) as realized by the WHO and UN through the declarations in last World Health Assembly and the World Sysmposium on Information Society (WSIS) attended by ministers in all countries (Kgasi and Kalema, 2014).

During the past 20 years with huge advances in information technology and particularly in the areas of health, various forms of electronic health have been discussed, designed or implemented (World, 2006). Healthcare services are increasingly needed by people and should be efficiently provided and made fully accessible to all (Li *et al*., 2008). e-Health (healthcare based on the internet technologies) promises to overcome problems in traditional (i.e., study-based) healthcare.

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e-Health is defined as: an application of Information and Communication Technologies (ICT) across the whole range of functions which affect health for example, treat patients, pursue research, educate students, track diseases and monitor public health (Lucas, 2008). e-Health (or e-Healthcare) is becoming a hot research topic due to its wide involvement for patients.

e-Readiness concept is employed in many areas for example e-Business, e-Government, e-Commerce and e-Banking. On the subject of healthcare and medical, e-Readiness is a considerably new concept as well as this is propounded within the subject of electronic healthcare. e-Health readiness relates to the openness of organizations and healthcare institutions pertaining to the expected improvements brought by programs associated with Information and Communication Technologies (lCT) (Mohammed *et al*., 2015).

e-Health readiness assessment is associated with pre-implementation evaluation, it becomes an important requirement before the implementation (Demiris *et al*., 2004; Jennett *et al*., 2003). e-Health readiness assessment, for example is a way of identifying the potential causes of failure to innovate. A lack of readiness shows organizational inability to undergo transformation during the implementation of e-Health (Ajami *et al*., 2011) leading to sheer failure at the end. Failure occurs when the system is completely abandoned. In many other instances, system may not exhibit complete failure straightaway but show signs of system abandonment and user dissatisfaction through lack of active use and lack of management commitment to system maintenance. These intermediate stages are indications of a lack of readiness in the system implementation.

This study would be delimited within the confines of exploratory design with secondary data. The source of secondary data gathered for this research is the literature search; hence, the goal of this literature search would be to review past works in line with the subject matter. This will fulfill the study objective which is to evaluate the factors leading to develop an e-Health readiness evaluation framework for both private and public healthcare institutions.

This review would incorporate evolved search of internet sites, conference papers, gathering and published information. A variety of searches were performed on article and journals reviews, daily newspapers. Focused online search was done by using such relevant keywords such as “e-Health”, “e-Health readiness”, “healthcare information system”, “e-Health adoption”, “e-Health in Iraq” and “e-Assessment”.

Research background: The background information provided the challenges with implementation e-Health systems. e-Health is identified as a innovative new paradigm with regard to health care which has developed due to advances in information, network technologies, telecommunications and information management. All these technologies have changed the method that health care is provided (Tan, 2005). Today’s technology provides the capability to assist people in controlling almost all aspects to get their health care, through seeking general medical information to physicians consults without actually need to leave the homes; however even the most fundamental personal health information such as certain results of tests, included in health charts is not presently readily available by existing technologies to most customers of health care (Leonard and Wiljer, 2007). This inaccessibility can make it difficult for customers of health care in order to be active members in their own wellness and health.

Readiness is an earlier aspect of change (Lewin, 1951) is described as the intellectual precursor for the behavior of whether resistance to or even support for a modify effort (Armenakis *et al*., 1993). Readiness within this context requires organizational readiness together with health workers preparedness. Organizational readiness pertains to organizational resources for instance finance, ICT infrastructure and ICT department essential for e-Health implementation. The assessment of health readiness also associates to e-Health record techniques in the hospital (such as challenges, access to compute and knowledge in).

Readiness assessment is mainly related to implementing e-Health for healthcare institutions. The assessment of readiness is one of the methods of decreasing the failures risk in organizational projects just like EHR (Demiris *et al*., 2004). This is essential to examine the accessibility, provided the local context associated with crucial factors that might promote quick adoption and use of e-Health. The necessary technical and social readiness assessments tend to be of much relevance for e-Health of which is generally capital intensive in addition to whose failures symbolize an important financial loss to the employing organizations. Readiness assessment gives a method to know customers profile and preparedness together with organizational weakness and strengths (Weiner *et al*., 2008).

Nevertheless, readiness assessment toward the ICT projects implementation in health sector can be often neglected for political and other socio-cultural reasons (Toure *et al*., 2012). In many Africa countries which are health-related ICT projects are already implemented, preparedness assessment studies that are not carried out and even where this kind of studies are performed they are not revealed to serve like a guide to potential implementations.

A variety of developing countries lack specific basic infrastructures as well as policies for countrywide health-related projects. This therefore becomes mainly pertinent that several health care institutions within developing countries maintaining adopt e-Health ought to carry out readiness assessment studies for determining the local along with organizational factors available and required for such initiative thus as to accomplish its utility, acceptance and sustainability (Adjorlolo and Ellingsen, 2013).

These background of studies provided empirical evidence from studies conducted in the assessment of e-Health readiness. The studies previously conducted will provide information on current trends in communication and systems implementation on a national and global level. The literature review section will be presented a history of e-Health systems as well as the assessment of e-Health readiness.

Literature review and related work: A review of the academic and professional literature the aim of the review was to consider the history of the improvement and use of e-Health systems, underlying theoretical frameworks, existing literature regarding the level of e-Health readiness, potential obstacles and solutions to the issues for the implementation of e-Health and current initiatives to encourage better use of e-Health services. The aim of reviewing this literature is to provide background regarding the spossible difficulties to the assessment of e-Health readiness. The literature review provided empirical evidence from studies conducted in this area. The studies previously conducted will provide information on current trends in these new systems on a national and global level.

e-Health readiness assessment assists the decision maker in a health care institution to become well-informed of lacking areas in readiness and consequently serve as a instruction for preventive actions to combat the innovate failure (Li *et al*., 2012). A few studies have been identified in the literature about the improvement of a framework regarding e-Health readiness assessment (Coleman *et al*., 2011; Justice, 2012) Most of these frameworks were designed from different perspectives.

Recently, an involved e-Health readiness framework (Li *et al*., 2012) was created from the perspectives of the healthcare providers. After that the authors confirmed it through contextual interviews using 20 domain experts: ten with e-Health implementation practitioners and the others with public and medical health practitioners and there were no changes have been made about the constructs. Nevertheless, this framework provides not yet been employed in real health settings. This case study is applied in many cases to contribute to the knowledge of group, individual, organizational, political, social and related phenomena. This allows investigators to keep the meaningful and holistic characteristics of real-life functions.

In their study Li *et al*. (2012) mentioned that, readiness assessment need to be performed so as to realize and mitigate the difficulties that are probably provided by e-Health adoption. They declared that when these types of impediments are understood, more action can be obtained to addresses areas which can lead to unsatisfactory preparedness. In addition, they placed it that subsequent apposite framework can yield significant readiness assessment. Therefore, this will decrease the failure chances and increase the hope among healthcare experts of attaining the desired aims.

The successful support of digital technologies in this domain requires, therefore, the examination of multifarious political, infrastructural and organizational factors, involves a readiness factor (Coleman *et al*., 2011). In their recent e-Health readiness assessment of urban and rural hospitals within the North West Province, Coleman *et al*. (2011) confirm the many integration challenges inherent to most of the country. In this sense, South Africa does not indicate an extensive readiness toward ehealth adoption and has not performed well on the maturity curve (which indicates the level of service integration).

People are interested to use ICT for their daily lives, but they have a number of obstacles such as slow internet access, lack of awareness to the bene-fits of ICTs and lack of infrastructure in Iran. Health services are not spread in all region of Iran. Inequity in health care services in Iran depends on national health policies such as developing family medicine and rural insurance programme. More technical readiness is one of the main agenda to develop e-Health in Iran (Rad *et al*., 2012). The researchers (Rad *et al*., 2012) suggested that, significantly as the extended frameworks of Technology Readiness Index (TRI) have been establishe good predictors of preparedness assessment frameworks need to be analogous and applicable to the continuing business functions. They also placed it such frameworks must be properly complex to incorporate the multitude busines's characteristics, changing requirements and the structural arrangement of the institution. This point has therefore triggered many e-Health readiness evaluation studies each concentrating on a particular dimension within the healthcare environment.

Ford *et al*. (2006) recommended that, an institution that is implementing for technology readiness need to recognize all those factors which may prevent its success. They obtain such factors will need to be addressed in an

earlier stage to avoid any problem. Oio *et al.* (2007), Kgasi and Kalema (2014) determined these factors as strong telecommunication network, physical infrastructure, ICT policies, general integration of ICT along with the assessment needs. Moreover, Khoja *et al.* (2007) who indicated that there are different factors that affect the level of readiness. Therefore, clear understanding of all these factors is paramount pertaining to success. Through this perspective, institutions planning to apply e-Health must conceptualized this research's framework to be able to have a clear understanding of what is estimated when they are employing e-Health. The lack of knowledge of readiness is a crucial factor that leads to for the failure associated with most e-Health programs. This particular factor has been recognized in the their research and is outlined by many as the first concern to be implemented by the institution prior to the implementing for any new system (Khoja *et al.*, 2007).

A BRIEF HISTORY OF ELECTRONIC HEALTH

Historically, health care has trailed behind other industries in adopting and implementing electronic systems and technologies (Classen *et al.*, 2011). Weed (1968) published a study in the New England Journal of Medicine discussing how computers need to be used for e-Health records because the current state of records was unorganized and not complete (Weed, 1968). He explained how he had implemented computer programs in his own practice and that by having a database with many patients, later one could review it and revise it as needed for efficiency. Weed has been called an "innovator" by Himmelstein and Woolhandler (2005) in their manuscript discussing history and Electronic Medical Record (EMR) systems.

Himmelstein and Woolhandler (2005) also remark that Weed's innovation as well as other systems created in the 1960 and 1970 are "optimistic" but not practical with regard to cost. Hospital administrators believed that they had spent a lot of money on the electronic systemsv but did not receive enough in return for them to keep the systems running. This was in part due to the systems being incomplete and creating problems such as medication errors (Himmelstein and Woolhandler, 2005).

Following in the footsteps of doctors such as weed, a group of physicians and informatics scientists from Indianapolis, Indiana, hospitals and the Regenstrief Institute in Indianapolis began developing an electronic medical system in 1972. The goal of the Regenstrief Medical Record System (RMRS) developers was to simplify records by eliminating paper and reducing paper work as well as making information more accessible to those who need it (McDonald *et al.*, 1999). The regenstrief institute had success with their electronic programs and is still working to develop improved reporting methods and evaluating these methods (Overhage *et al.*, 2008).

Another evaluation of the use of technology in laboratory reporting, McLure and Barnett (1994) made the case that study and phone reports were inferior to facsimile (fax) machines and personal computers. They state that the technology would produce faster and more complete reports. One comment from McLure and Barnett (1994) study notes a challenge that is still present: "true EDI (Electronic Data Interchange) requires a standardized electronic format" (Lucas, 2012).

THE BENEFITS OF THE ELECTRONIC HEALTH

The ultimate aim of e-Health is to provide benefits by proposing aplatform designed for better medical care to the end-users. Gherkin (2009) has described e-Health as a double-edged sword to the physicians as it reduces the cost, time and improves overall healthcare quality. Akematsu and Tsuji (2009) in a study in Japan have observed that e-Health reduces medical expenditure of the end users substantially. The Butler project attempted to study the acceptance and satisfaction of e-Health by connecting end users (elderly patients) to various types of e-Health applications such as real-time monitoring of mood, alarm system, providing online entertainment, e.g., chat, music, movies, etc. (Jaber *et al.*, 2015). Moreover, it can share their health reports between the health institutes easily (Mohammed *et al.*, 2015). Eventually, the results showed that patients reflected the positive mood change and marked improvement in their daily activities (Botella *et al.*, 2009). There are similar studies on the benefits of e-Health such as that by Marziali (2009) who observed positive outcomes from applications of e-Health in chronic disease management. Pinto *et al.* (2008) noted professional information gain among radiologists through e-Learning; Cornish *et al.* (2003) reported that e-Health could be a useful platform to provide networked care to mental patients and expedite collaborative management. Therefore; the benefits of e-Health are manifold. It is important to note that for deriving benefits of e-Health, it has to be successfully implemented, widely accepted and effectively adopted by the stakeholders and the organizations. However, these are complex issues due to differences in individual perceptions, organizational policies, culture, language, personal skills, etc. (Lee *et al.*, 2009).

e-Health readiness: e-Health readiness defines as "the preparedness of the health care institutions or communities for the anticipated change by the programs related to the Information and Communications Technology". It also has stated as "the degree to which the users, health care institutions and the health care system itself are prepared to participate and succeed with e-Health implementation".

From these definitions of e-Health readiness this is clear that organizational, technological and individual readiness are involved with regard to the assessment of ICT adoption as well as the lack of knowledge and understanding of readiness is a significant factor that continues to be the reason behind the failing of most e-Health solutions. This particular factor has been recognized in all studies during recent years and it is outlined by some researchers as the first concern to be undertaken by the organization before the adoption associated with any new system (Chattopadhyay *et al*., 2008). The main purpose of assessing e-Health preparedness is to avoid broadening the digital divide among healthcare institutions and users and to make use of ICT to promote 'health for all. The concept is involved the early particulars of change; the aspect to consider of the changes; the overcoming of level of resistance to change; the further advancement of a social, clinical and technical environment approving to the infusion and diffusion of e-Health technology. Therefore, Readiness is the level of which a community will be ready to be involved and succeed with e-Health implementation (Justice, 2012).

The status of health in iraq: Health development has become a pre-requisite with regards to the Iraqi sustainable development. Now, it is a crucial to study important element of the process of reconstruction. This study focus in the healthcare of the population along with the values of health services in the last two decades. This explains the issues now faces the country in enhancing health and rebuilding it has the health services as well as it determines priorities for development and investment over the following few years.

The Iraq population has more than bending in the latest 25 years. It reached to 27.1 million and it is increasing about 3% every year. The health concerning the population was continuously increasing between the year's 1960 and 1990. During this time, infant mortality fell just by around two-thirds (from 117 to be 40 deaths for every 1000 births) in addition to child mortality dropped by 70% (from 171 to be 50 deaths for every 1000 births). However, since about 1990, it has been a disastrous decrease in people's health. During a period when children's health had been improving in the majority of countries, maternal mortality, child and infant rates in Iraq greater than doubled. Adult mortality improved and life expectancy dropped to under age 60 for women and men by 2000. Currently, according to WHO the rate in Iraq as a country with higher child and adult mortality alongside considerably poorer countries such as Djibouti, Afghanistan, Yemen and Sudan.

Electronic health in Iraq: Before 2003, Iraq seemed to be totally isolated out of the world. All private and public sectors were suffering because of deficiency in the development and communication programs and systems. The information systems of health were entirely study-based along with manually processed due to the lack of personnel capacity, computers and network systems. Considering that 2004, Ministry of Health in Iraq (MOH) recognized the value of information technology in processing and collecting health information. Thus, the MOH started the employ of modern technology within its health services at the provincial and central levels.

In the first phase of strengthening main health care project, numerous statistical and Information Technology staff performing in MOH has prepared on how to apply design with computers together with special programs which would lead to strengthening the information system of health. Also, several servers and computers were supplied to health directorate in governorates in the capital city Baghdad and some other governorates. The center of information technology designed a lot of computer programs for getting into data from unique health programs (family medicine, health visitor), connecting electronically main health centers with health directorate in governorates. This program is currently utilized in around 300 electronically main health centers in Iraq as well as notably returned in Maysan health directorate in governorates.

A number of public hospitals created patient management programs which follows patients through their access to the hospitals record system until obtaining medicine right from the pharmacy. The Mental Hospital of Ibn AL-Rushed in Baghdad and AL-Rusafa health directorate in governorates are obtaining the such a system of health facilities. There are fragmented application programs that manage some health relevant data management such as maintenance and management of medical devices inside three hospitals within different governorates. However, these programs need to be improved as a part of the Ministry of Health.

The MOH intended to carry out evaluation of the present situation of health information systems in Iraq, determine priority areas regarding intervention in the six

health information systems components in addition to fill the gaps. The process is also expected to lead to improvement of health information systems strategic plan intended for Iraq to strengthen health information systems that will ultimately result into evidence and improved based decision making method. One of the aims of this strategic plan is to be linked the majority of health facilities inside the country by a network to be able to capture time and accurate health information.

Iraqi hospitals are going to adopt ICT to provide electronic services to their patients. Strategy and roadmap for Iraqi e-Health vision has formulated as follows: "Provide excellent health services, efficient and effective for all through the integration of primary health care via the applications and information technology standards and telecommunications developed that can be easily accessed and which focuses on the citizen" (Mohammed *et al.,* 2015).

Multimedia for government: Multimedia is defined as the combining of different media types such as sound, animation, text, graphics and video for the presentation of information by making use of computers (Bornman and Von Solms, 1993). For example, citizen understand better by using the words with pictures rather than words alone. However, multimedia can use the audio, drawing, image, video and text. Iraqi government has been used multimedia in many sectors such as Ministry of Municipals and Ministry of Health (Mohammed *et al*., 2015).

CURRENT E-READINESS ASSESSMENT MODELS IN DIFFERENT FIELDS AND IN THE HEALTHCARE ENVIRONMENT

Different e-Readiness assessment models have been developed in aspects f or example e-Commerce, e- Business, e-Government and e-Learning (Aboelmaged, 2014; Pathiratne, 2014). Most of these models and tools declare to be beneficial for current situations when considering organization's or communitie's readiness to the implementation of ICT and also with orienting steps to limit the digital divide. Among the various tools available, the Center of International Development's (CID) instrument has been most responsive to the challenges in developing countries. This tool was created at Harvard University in 2000. The goal of this tool is to systematically organize the assessment of factors determining the readiness of communities in developing countries. Although, this instrument does not focus on healthcare, it covers a number of areas relevant to the healthcare environment such as: speed; availability; quality of networking; employ of ICT in workplace, economy, schools, ICT training programs and ICT policies. Another study from Nicaragua described the principles of assessing readiness for change in rural communities which must be considered for any readiness assessment tool developed for other developing countries. The principles were: (targeting primary community needs, concentrating on concrete outcomes, having committed and trusted community leadership, ensuring adequate and local human resource capacity, focusing on demonstrating relevance to the community and) taking a cooperative regional approach (Robison and Crenshaw, 2004). Efforts are underway to develop preparedness assessment framework for e-Health systems. The Health Telematics Unit at the University of Calgary, Alberta has taken a lead in developing 'telehealth readiness assessment tools' for organizations and practitioners in the developed world. The north network in Ontario has also developed a tool to test e-Health readiness in institutions over central and Northern Ontario and Manitoba. These tools measure readiness in health providers and institutions in the areas of: core-readiness, engagement and planning readiness and workplace environment readiness. Each of these tools is at a different stage of testing of validity and no data have yet been published. In spite of being very comprehensive, many of these tools do not discuss the determinants of decreased ICT accessibility by developing countries. This is therefore essential to create approaches that are more certain to the difficulties that faced in developing countries.

CONCLUSION

In this study, the existing of assessment e-health readiness frameworks for both private and public healthcare organizations in developing countries and Iraq have been discussed briefly. A review of these studies showed that the health section in Iraq needs continued attention to get government support, Iraqi health services have never developed over the latest years in the different levels of health and medical services: tertiary, secondary and even the primary level as well as in measuring the practicality of the existing approach. Since, the organization was moving from paper to electronic based patient charts and implementing e-health system it was an ideal choice for this research to assess and prepare them for the changes before adopting programs that need of use ICT just like e-Health systems and provides as preventive actions to proactively seek as well as address failure towards innovate.

LIMITATIONS

The limitations of this study includes that there was single-source bias as the collection of information was from secondary sources only. Also the study has more of a judgmental conclusion as there is no post data assessment. Healthcare organizations should figure out how to rationalize their organization needs and priorities, applications and their own premise information and after that merge their framework accordingly. Therefore, it is recommended for future researchers to conduct a field survey by collecting primary data and conducting statistical tests on the study variables test the variables implicated in the findings of this study.

SAGGESTIONS

Contribution and significance of the study: Health care professionals have the responsibility to ensure consumers are knowledgeable of the changes implemented for the use of e-Health, access to personal health information and consumer rights for privacy and security (Tang and Lansky, 2005). The data collected from this study could be beneficial for government agencies and e-health stakeholders. The government has taken advantage of technology by providing information on policy and services offered by governmental agencies. Government agencies such as public health agencies, ministries of health, health care providers, international organizations, donor countries, aid agencies have taken on new roles of providing leadership in terms of providing strategic direction as it affects the entire nation and health care (ABD Ghani *et al*., 2008). Moreover, it also could be beneficial for researchers, health planners, academics, students and other e-Health stakeholders who may need to know a country's e-Health readiness level. The availability of an evidence-based and practical tool for assessing of e-Health readiness of a country would provide a valuable means to assess the feasibility of e-Health implementation in a country and there by facilitate investment in and growth and global integration of e-Health.

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