

HEALTH INFORMATION SYSTEMS (HIS) ADOPTION  
SUCCESS FACTORS IN NIGERIA

BY

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degree of Master of Information Technology

Kulliyyah of Information and Communication Technology  
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## **ABSTRACT**

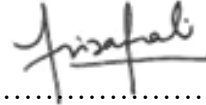
The Health information system is the application of information technology to enable and promote health care services provision, support and delivery. The implementation of this system is directed at assisting medical institutions to store patients' health record in an electronic based method. In order to manage lots of information, the health information system comes in handy to sort data, processes and people. The system which consists of a set of interrelated components gathers, stores, and disseminates health or organizational related information of individuals working in the same health sector. All around the world the applications of digital health technology have become vital tools of modern information technology which has aided in the smooth and efficient delivery of quality healthcare. As much as there have been a lot of derived benefits mostly in the developed countries, studies have shown that the success of the electronic health information system implementation in developing countries is still low, and various reasons have however been identified as the cause of this poor outcome. Therefore this study aims to identify, investigate and analyze the factors that will determine the successful implementation of the health information system in health institutions in Nigeria, being a developing country with an approximate population of 200 million people; and how these factors can be enhanced using an IS success model, in order to achieve a successful implementation that will yield the desired results. Findings from this study show that attention should be on updating and upgrading the Information System quality dimensions (service Quality, Information Quality, and System Quality) as it reveals that there is a high dependence on these dimensions to bridge the research gap; as results show that there is an overall correlation between the analyzed variables. Health practitioners should be trained on how to utilize the system in order to improve their attitudes and perceptions towards it. Doing this will increase the zeal to utilize the system as the users will be motivated to make it habitual to use the system and better goals will be attained. Also the results and findings will be very relevant to health institutions especially in developing countries and other researchers as well, as they can apply the IS success model in similar research and in other settings.

## خلاصة البحث

نظام المعلومات الصحية هو تطبيق لتكنولوجيا المعلومات لتمكين وتعزيز تقديم خدمات الرعاية الصحية ودعمها وإيصالها. يهدف تطبيق هذا النظام إلى مساعدة المؤسسات الطبية على حفظ السجل الصحي للمرضى بطريقة إلكترونية. يعد نظام المعلومات الصحية مفيداً لإدارة الكثير من المعلومات و فرز البيانات والعمليات والأشخاص. هو نظام يتكون من مجموعة من المكونات المترابطة التي تجمع و تحفظ وتنشر المعلومات الصحية أو التنظيمية ذات الصلة للأفراد العاملين في نفس القطاع الصحي. أصبحت تطبيقات تكنولوجيا الصحة الرقمية في جميع أنحاء العالم أدوات حيوية لتقنية المعلومات الحديثة التي تساعد في تقديم رعاية صحية عالية الجودة بشكل سلس وفعال. بقدر ما كان هناك الكثير من الفوائد المشتقة في غالب البلدان المتقدمة، فقد أشارت الأبحاث إلى أن نجاح اعتماد نظام المعلومات الصحية الإلكتروني في الدول النامية لا يزال ضعيفاً ، وقد تم التعرف على أسباب مختلفة لهذه النتيجة السيئة. لذلك تهدف هذه الدراسة الى تحديد واستقصاء و تحليل العوامل التي ستحدد التنفيذ الناجح لنظام المعلومات الصحية في المؤسسات الصحية في نيجيريا -الدولة النامية التي يبلغ عدد سكانها 200 مليون نسمة- و كيف يمكن لهذه العوامل ان تعزز و تحسن باستخدام نموذج نظام المعلومات الناجح لتؤدي الى تحقيق نتائج مرجوه. تظهر نتائج هذه الدراسة أن الاهتمام يجب أن يكون على تحديث وترقية أبعاد جودة نظام المعلومات (جودة الخدمة وجودة المعلومات وجودة النظام) حيث تكشف أن هناك اعتماداً كبيراً على هذه الأبعاد لسد الفجوة البحثية ؛ كما تظهر النتائج أن هناك علاقة عامة بين المتغيرات التي تم تحليلها. يجب تدريب الممارسين الصحيين على كيفية استخدام النظام من أجل تحسين مواقفهم وتصوراتهم تجاهه. سيؤدي القيام بذلك إلى زيادة الحماس لاستخدام النظام حيث سيتم تحفيز المستخدمين لجعل استخدامه معتاداً وسيتم تحقيق أهداف أفضل. كما ستكون البيانات والاستنتاجات مفيدة جداً للمؤسسات الصحية ، لا سيما في الدول النامية، فضلاً عن الباحثين الآخرين في دراسات مماثلة، حيث يمكنهم تطبيق نموذج نظام المعلومات الناجح في أبحاث مماثلة و في مجالات اخرى..

## APPROVAL PAGE

I certify that I have supervised and read this study and that in my opinion, it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Master of Information Technology.



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## DECLARATION

I hereby declare that this dissertation is the result of my own investigations, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at IIUM or other institutions.

Musa Hanifah Aileakhue



Signature .....

Date 9/2/2021

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# **CHAPTER ONE**

## **INTRODUCTION**

### **1.1 BACKGROUND OF THE STUDY**

Health information system is introduced to move from the paper-based method of data collection to a more systemic way of organizing and sharing of the data. The implementation of the HIS is aimed at aiding health practitioners as well as administrative staff to secure patients' health record in an electronic based manner. To manage a lot of information, the health information system is needed to sort and arrange data, processes and people. The information system collect, stores, and shares health information or organizational activities of individuals working in the same health sphere (Mohamadali & Aziz, 2017). Electronic health improves healthcare quality by making patients health information easily accessible, improving efficiency and reducing the cost of health service delivery (Okoh & Awad, 2015). Online networks enable patients to share, compare and contrast different diagnoses and treatments with people who have the same conditions anywhere in the world. Members of the online community can ask for advice, learn from each other, discuss test results, compare different medications, and etc. This act of information sharing empowers the patients and can lead to a thorough restructure of the patient/care team relationship (Wicks et al., 2014). Technology is being adopted worldwide to provide and deliver healthcare and E-health is deemed as essential for solving problems facing healthcare systems of increasing demand due to an ageing population and improved treatments as well as limited resources (Ross et al., 2016).

Electronic health applications refer to the set of software applications that deliver tools, processes and communication systems to support electronic healthcare

practices. These applications enable the transmission and management of healthcare related information and hence contribute towards patient's health improvement and the medical practitioners' performance (Chauhan & Jaiswal, 2017). The HIS applications are developed to provide a channel for the various vital departments in a hospital such as human resource finance and etc. to communicate with one another (Mohamadali & Zahari, 2017).

E-health is the cost effective and secure use of information and communication technologies in support of the health and health related fields including healthcare, health surveillance and health education, knowledge, and research (world health organization definition). It can also be referred to as forms of prevention and education, diagnostics, therapy and care delivered through digital technology regardless of time and place (Ossebaard & Van Gemert-Pijnen 2016). (Hage et al., 2013) defines E-health services as any interactive communication and information technology directed at improved community quality of life and health outcomes. The idea the aforementioned definitions have in common is the “use of information and communication technology” to provide and improve healthcare which is the core essence of the term 'E-health'. The need to integrate various electronic health information from various domains such as medical research laboratories, hospitals and health insurance firms has led to the evolution of a concept called e-health, otherwise known as electronic health (Azeez & der Vyver, 2019). To emphasize on this, (Barello et al., 2016) states that a wide variety of definitions of the term are available in different literatures with most of them highlighting the importance of internet-related technologies to support, enable, promote and enhance health and also augment the efficiency of the process of healthcare.

Although, according to what studies have shown, the adoption of e-health technologies has been inconsistent within the healthcare practice and has been sluggish. Summarily, the outcome of e-health technology does not correspond with the proposed benefits (de Grood et al., 2016). The implementation of ICT in the healthcare division is considered as the pushing force in the unravelling healthcare reforms in developing and developed countries. There is an assumption behind the developmental policies that investing in ICT is the pavement towards social and economic development (Boore et al., 2017).

In response to countries emerging e-health initiatives, organizations such as the world health organization, international telecommunication union and the organization for standardization embraced the role of disseminating knowledge, sponsoring discussion forums, facilitating collaboration, and developing tools and other guiding documents that would enable policy makers and public servants understand the power of e-health and its complexity. Countries and stakeholders were urged to direct their efforts towards i) creating a consistent e-health vision that would adhere to the country's needs and resources ii) developing an action plan to deliver the proposed vision and iii) creating a framework for monitoring and evaluating e-health implementation and progress (World Health Organization, 2019). According to IMTinnovation, e-health encompasses a wide variety of sub-domains of digital health and they include.

- Electronic health records (EHR): “This is a systematic collection of electronic health information for a patient generated by one or more interactions in any care setting. Information that can be found in an EHR includes; medical history, laboratory test results, radiology images, progress notes and problem details, medications and allergies, and many more”.

- Electronic medical records (EMR): “This is a system that contains notes and information collected by and for the clinicians in specific offices, clinics or hospital and is mostly used by providers for diagnosis and treatment”.
- Virtual healthcare
- Mobile health (mHealth)
- Telehealth and Telemedicine
- Health IT systems

The benefits of E-health are numerous but to mention a few and according to government.nl, they include:

- It is time saving as patients can schedule their appointments with their care provider online, and do not have to leave their homes if they can fix online consultations by video link for example.

A personal digital healthcare environment gives people more insight into their health hence, patients gain more control over their own health due to a greater understanding of their health situation. They can choose to share all or part of their data with a healthcare provider so that they do not have to repeatedly relate their entire medical history, which in turn enables the healthcare provider to determine the right treatment more quickly and avoid errors.

- Doctors have lesser paperwork (which saves paper) and can share information securely and easily with colleagues.

Mohamadali, (2017) adds to the benefits:

- The waiting time for patients to receive treatment will be minimal.
- Retrieval of patient health information for use within the hospital will be efficient.
- Administrative staff attending to patients can take place with less time.

- Health treatment is faster.
- Direct access to and update of patients' medical information and history.

Electronic health comprises of different applications that support the care and management of patients, and they include: Health Knowledge Management, Consumer Health Informatics, electronic Medical Records, M-Health, Healthcare Information Systems and Telemedicine (Boore et al., 2017).

## **1.2 PROBLEM STATEMENT**

Previous studies have stated that the implementation of electronic health information systems in the developing countries have yielded negative success outcomes due to some factors that are not taken into consideration prior to implementation (Muhaise & Kareeyo, 2017). To adopt a new technological innovation like e-health, there is a need to carry out a readiness assessment of medical care institutions by medical staff and managers at the beginning stage of development and at intervals after implementation to produce guidelines that can address the likely obstacles after implementation and assess the successes of the system. However, there is a gap between planning to adopt e-health technology and the sustainable adoption of the technology to achieve the expected goals. However, a developing country like Nigeria is yet to bridge this gap (Zayyad & Toycan, 2018). According to (Ross et al., 2016), despite the numerous potential benefits of e-health, the implementation of these systems is often reported as problematic. Social, ethical, financial and legal barriers to implementation, arising at the organizational and individual level, including users' lack of awareness of the benefits, low e-health literacy, a shortage of evidence of cost-effectiveness and interoperability (i.e. the ability of different information technology systems and software applications to communicate, exchange data and use the information that has



been exchanged) as well as security concerns have been described by studies carried out. In some developed countries, over half of primary care physicians utilize EHR (electronic health records). Netherlands, Sweden and Australia have 90%, 62% and 55% usage respectively while in other developed nations despite the economical state and the diffusion of technology being stable, the adoption of e-health is significantly lower. Just a 1.2% of all hospitals and 2.6% of all clinics adopted the use of EHR in japan.

According to the National Electronic Health Records Survey National Centre for Health Statistics; in the United States the percentage of physicians using any EHR system varied depending on the state. For example, it ranged from 54% in New Jersey to 89% in Massachusetts. The adoption of e-health systems and the success of e-health adoption have been low in both developed and developing countries respectively. The developing countries are faced with the challenges of lack of technical expertise, insufficient e-health infrastructure and computer skills of staff. Therefore, it should be notable that the global state of e-health is not reliant on the availability of technology alone but other factors as well (Furusa, S. S., & Coleman, A. 2018). Even though there is a widespread agreement about the relevance and potential benefits of e-health, the actualization of these benefits has been slower than expected, often due to struggles with implementation. High profile implementation failures continue to be reported; like the failure of implementation of an e-health system in a major UK teaching hospital, leading to reduced performance, demoralized staff, costs of 200 million pounds and the trust being put into special measures. This draws to attention the need for those venturing into the implementation of e-health to understand the factors that influence this implementation and be well furnished to develop approaches and interventions to improve the effective use of e-health and address obstructions to a

successful implementation (Ross et al., 2015). (Omotosho & Ayegba, 2019) stated that despite the fact that electronic mode of healthcare delivery is progressively known and utilized even in developing nations; they are still faced with a bulk of challenges during implementation and utilization of e-health services in small and large measures. (Yosser, 2020) affirms that there is plentiful evidence among the developing nations that several pilot e-health projects couldn't transition to implementation in full scale.

Furusa & Coleman, (2018) agree that the implementation of e-health has been low in a lot of developing countries because they are faced with barriers ranging from a lack of resources to equip their health institutions with new technologies to limited budgets allocated to the health sector, poor policies that fail to address short term and long term needs as well as a lack of information communication technology knowledge and skills. The state of e-health system globally is not the same as there is no general approach in its implementation; countries use various approaches towards e-health implementation.

Even though the progression to mobile learning in the medical education sphere for example, is on the increase in the developing countries, they may encounter notable challenges in adopting this new structure, particularly in Sub-Saharan Africa (Mbada, 2020).

It should be noteworthy that e-health requires a large investment on ICT and a failure in its successful implementation could result in huge losses with respects to money, time, and effort. These failures, however, do not normally mean technological issues but instead human and organizational factors in relation to the adoption and implementation. Therefore, as an end result, the successful merging of IT solutions into the healthcare roadmap is significantly dependent on the engagement of health

practitioners starting from the jump of the development and proceeding evaluation of these applications (Beebeejaun & Chitto, 2017).

### **1.3 RESEARCH QUESTIONS**

The following are the research questions to be answered in the course of this research work. The questions are outlined as follows:

1. What is the relationship between the system quality, information quality and service quality with the intention to use and actual use of the health information systems in Nigerian hospitals?
2. Does self-efficacy and perceived ease of use positively affect the intention to use and actual use of the health information system in Nigerian hospitals?
3. What is the relationship between the system quality, information quality and service quality with the net benefits and users' satisfaction in using the health information systems in Nigerian hospitals?

### **1.4 RESEARCH OBJECTIVE**

This study will be primarily focused on evaluating the factors that will determine the successful adoption of the electronic health information systems in Nigerian health institutions by assessing the relationships between variables in an information system success model.

### **1.5 SIGNIFICANCE OF THE STUDY**

The significance of this research is that it will accord the opportunity to know the rate at which the ICT sector has grown in Nigeria and the level of computer literacy

among the populace. The proposed model could serve as a useful tool for the decision makers in the health sector to assess the success factors for the health information system adoption. Furthermore, it will be an addition to other existing research and literatures centred on the health information system.

## **1.6 CHAPTER SUMMARY**

This chapter discussed the background of the study. It defined and explained the importance of the health information system and what it is used for. Furthermore, the statement of the problem was explained in detail to pinpoint the research gap. This study is aimed at evaluating health institutions in Nigeria to find out how the successful implementation of the health information system can be realized and to achieve this, a number of research questions and objectives have been listed. The significance of the study highlights the need for the research and how carrying it out and getting the necessary results can be useful to the health systems in Nigeria.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 INTRODUCTION**

This section of this study reviews related literature where existing theories will be identified and analysed. Also, related work with similar research questions and objectives as well as recommended frameworks will be highlighted and discussed. Hypothesis will be derived from supporting literature with evidence and lastly, the research model will be discussed.

#### **2.2 REVIEW OF OTHER LITERATURES**

The field of medicine practice necessitates the use of ICT to support record keeping, decision making and the processing of information (Taiwo Adeleke et al. 2015). The implementation of e-health in Nigeria is still at the preliminary stage and while the government has made attempts to develop and exploit the application of e-health technology in hospitals to enhance the quality of healthcare, the healthcare staff complained that they were not kept abreast during the planning stage (Zayyad & Toycan, 2018). Currently, Nigeria has a population of about 200 million with most of the populace residing in the remote low-grade areas which lack access to quality healthcare facilities. Health system challenges Nigeria is facing include: weak staff training, atrocious infrastructure deficiency and inadequate data management. The country is being slow in the adoption of e-health approaches partly because of the investment risk stemming from security concerns and the cost of making available mobile network infrastructure in remote rural areas, also, only about 51% of the

population have an access to 3G network while 87% have an access to 2G network hence the limitation of opportunities for e-health approaches (Ebenso et al., 2018).

According to a reported survey, African countries like Ghana, Kenya and South Africa, (with Kenya having the lead in the digital health market) have the majority health and e-health informatics strategies implemented. Also in Africa, patients' account of their medical histories are usually disintegrated, disconnected and shared out amongst several healthcare givers platforms that could either be private or public and this constitutes a problem that limits sharing, accessibility and completeness of information, specifically with public hospitals that are not Ict accommodating. This claim supports the report that in developing countries, the private health organizations are more Ict compliant than the public health organizations (Omosho & Ayegba, 2019).

References made have shown that countries with less resource, Uganda cited as an example allocates about 11percent of its total budget to the healthcare sector whereas Nigeria allocates as little as 5.5percent of its budget. To stress the poor state of the health care in Nigeria, studies further reveal that despite the fact that Uganda has a high rate of HIV positive patients, they were still ranked at number 149 out of 191 countries and located at 39 steps ahead of Nigeria in the world health report 2000 rankings. This shows that the Nigeria healthcare sector lacks adequate funding and funding is a prerequisite for any relevant scheme in any health policy. The focus of the study was to project a framework in order to carry out an assessment of the healthcare system in Nigeria. The scope of the assessment involved ascertaining and verifying the availability of ICT tools in health facilities, the availability of staff that can use such tools, the acceptance and utilization of electronic medical records, as well as introducing a smart card for storing patients' details and the perception of people to

use such card in health care delivery improvement (Adebayo & Ofoegbu, 2014). The table below shows the respondents opinion statistics concerning the identified issues working against the existing healthcare system.

Table 2.1 Statistic detailing respondent’s opinion (Adebayo & Ofoegbu, 2014)

Issues militating existing Healthcare system	Respondent’s opinion statistic (%)		
	Health practitioners	Non-Health practitioners	total
Absence of adequate clinic and health centre	08	16	24
Poor and incoherent medical record keeping	21	07	28
Poor financing and infrastructure provision	31	19	50
Neglect of staff by government	38	04	42
Lack of staff ICT competency training	41	21	62
Illiteracy and ignorance on the part of patients	12	04	16
corruption	21	19	40
Medical staffs deficient in ICT literacy and compliant	32	30	62
Instant support for e-health strategies deployment	87	92	

In Uganda, the human resource for e-health which is made up of Ict practitioners, health professionals and e-content developers has a low quantity of computer skills and literacy to utilize ICT tools and systems, particularly those in rural areas. The integration of ICT in the present hospital settings is considered burdensome to the doctors and nurses. Even in some of the health facilities where there are computer literate health personnel, the computers are not utilized for official work that is

habitual. Furthermore, there is a shortage of ICT staff that is qualified to manage and keep up the technology tools and to also aid health personnel to utilize these tools and systems, particularly in lower health facilities (Kiberu, 2017). Medical practitioners and patients have an expectation of easy utilization and navigation of the health care technologies for them to achieve the needed functionality since e-health solutions are still in early stages in most of the developing countries. Complicated factors can happen when healthcare practitioners cannot grasp the system adequately. Also, trainings and work experience in e-health is needed for fusing e-health initiatives into pre-existing healthcare services in the developing nations. These trainings have to be drawn out to furnish healthcare practitioners in e-health utilization and management (Omosho, 2019). There is the case of discomfort with the use of technology for instance, which could be connected with having a perception of risk, as well as concerns of safety, reliability and validity of the technology, particularly security, confidentiality and privacy concerns (Fulgencio, 2019). Some authors push that achievable solutions need to be modified towards existing triumph stories, the local setting where the e-health is being built and e-health systems need contextual considerations in implementation and sustainability. There is a claim that just limited numbers of empirical studies have paid attention to e-health outside the developed nations (BOORE, 2018).

To probe consumer's current level of knowledge and understanding on the usage of Ict in healthcare, (Hossain, 2019) asked the respondents if they had an inkling that ICT (mobile gadgets, devices and the internet) can be used to get e-health services. The author also asked respondents to mention possible uses of Ict in getting healthcare services in order to ascertain consumer's perception on the possible utilization of ICT in getting healthcare services. The health information system is a