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Organizational levels' involvement in electronic health system adoption in Nairobi: a case study of Radiant Group of Hospitals

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Organizational Levels' Involvement in Electronic Health System Adoption in Nairobi: A Case Study of Radiant Group of Hospitals.

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Declaration

I declare that this work has not been previously submitted and approved for the award of a degree by Strathmore University or any other University. To the best of my knowledge and belief, the dissertation contains no material previously published or written by another person except for the specific references which have been duly acknowledged in the dissertation itself.

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Abstract

Kenya has experienced a notable increase in uptake of eHealth interventions since the first initiative documented in 2001. But there is limited knowledge on factors influencing the adoption process of locally produced eHealth systems. EHealth adoption enhances quality of life by improving quality of health service delivery, promoting access and cost containment through modern technology. Despite its benefits eHealth still has high failure rate of more than 40 percent. Studies have shown that a vast amount of eHealth adoption fail during implementation phase. Other studies in Kenya revealed a gap of inadequate involvement between strategic management and system end-users in the adoption of Electronic Health Record (EHR) systems.

The purpose of this study was to investigate how the involvement of all organizational levels influence the adoption of EHR system through a two-dimension framework that integrates the adoption process and intra-organizational levels. The main objective of the study was to explore the effectiveness of all organizational levels' involvement in the adoption of a locally developed EHR system in Kenyan context. The study focused on adoption stages of investment, implementation, and utilization.

The study was conducted at Radiant Group of Hospitals by examining processes that occurred during the adoption of a locally produced EHR system. A case study design was used for the study. A qualitative approach was adopted to provide in-depth understanding of circumstances relating to how the different levels in the organization perceived the EHR system adoption process. The sample size of the study was 15 comprising of: four of strategic personnel, five operations personnel and six frontline personnel. The collected data was entered and analysed using Nvivo Pro 11.

The results from the study indicated that involvement of all organization level in EHR investment decision can positively influence success of EHR adoption as this promotes end-user's ownership of the system. Organizations need to take their time in planning adequately and in choosing the right vendor. Successful Implementation relies mainly on adequate training of frontline level plus training of trainers (TOTs), availability of IT supporting infrastructures as well as a supportive IT team and vendors. The system is likely to be used effectively if perceived useful in easing and aiding one's duties. Individual computer or IT skills and supportive superiors also plays a great role in system usability.

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Dedication

This research dissertation is dedicated to my uncle and aunt, Dr Eliya Zulu and Alice Kilonzo Zulu who have been my biggest support and source of inspiration. I could not have come this far without their encouragements and support.

List of Abbreviations and Acronyms

AfyaEHMS:	Afya Electronic Health Management System
CEHR:	Country Electronic Health Record
EHealth:	Electronic Health
EHR:	Electronic Health Records
EMR:	Electronic Medical Records
GoK:	Government of Kenya
HIT:	Health Information Technology
IQ:	care International Quality Care
KenyaEMR:	Kenya Electronic Medical Record
MOH:	Ministry of Health
MoICT:	Ministry of Information Communication and Technology
NHIS:	National Health Information System
OpenMRS:	Open Medical Record Systems
SDGs:	Sustainable development goals
WHO:	World Health Organization

Definition of Terms and Concepts

Electronic Health (eHealth) is an umbrella term that covers a wide range of health care services delivered through information and communication technologies (ICT), such as electronic health records (EHRs), health information systems, remote monitoring, and consultation services. It includes but not limited to, telemedicine, telehealth, telecare, mhealth, health data analytics and tools for self-care management (Showell & Nøhr, 2012).

Electronic Health Records (EHR) is the digital version of patient's paper chart that gathers, creates, and stores the health record electronically. An EHR includes all relevant clinical data of the patient, administrative functions, computerized physician order entry, laboratory systems, radiology systems and pharmacy systems (Melis, 2011).

Adoption is the process of converting from an old system to a new system that meets a specific need. In terms of technology adoption, it refers to the decision by an organization or individual to acquire, utilize and implement technology (Gates, 2003).

Organizational levels refer to classifications that are distributed according to a hierarchy of authority and perform different tasks. The levels include top level management (Strategic), middle level management (operational) and frontline level management (end-users) (Ben Hador, 2017)

Chapter One: Introduction

1.1 Background Information

Electronic Health (eHealth) has recently been utilized to improve both the quality and efficiency of healthcare by bringing an equilibrium between healthcare service consumers and healthcare provider's needs (Avgar, Litwin, & Pronovost, 2012). EHealth offers many benefits such as: continuity of care through online scheduling of patient appointments, reduction of medical errors through decision support mechanisms, timely access of patient information thus reducing delays in care delivery, reduction in administration cost as healthcare providers have less paper work and can easily and securely share information across facilities (interoperability) (Barbabella & Melchiorre, 2016). EHealth comprises of assortment sub-groups of digital health that includes but not limited to telehealth and telemedicine, Virtual healthcare, Electronic Health Records (EHR), Electronic Medical Records (EMR), Mobile Health (mHealth) and Health Information Technology (IT) systems.

According to global diffusion of eHealth (2016) EHR is presumed to be the future building block of eHealth and countries world-wide are adopting EHR systems (WHO, 2016). The benefits of EHR are theoretically of great value to the healthcare provider, patient and healthcare organization (Menachemi & Collum, 2011). The EHR system adoption can aid in efficient utilization of resources, cost-reduction and improving quality of health care (Broome, Sharma, & Velamoor, 2016). Adoption of EHR systems has proven to be costly which has been a drawback in low and middle-income countries like Kenya especially adoption in public health facilities (Kavuma, 2019). Few of the private facilities in Kenya have adopted EHR systems at a cost which is yet to be measured on its returns (Paton & Muinga, 2018).

The Government of Kenya (GoK) is committed to promoting interventions that enhance access to quality healthcare by mapping sustainable development goals (SDGs) with the Kenya vision 2030 (MOH-Kenya, 2013). This is also supported by the Kenya Health Act of 2017, which stipulates the right to health for all, at the highest attainable standard of health (Kenya Health Act, 2017). As one means to achieve health for all, the Ministry of Health (MOH) has recognized and prioritized the need to develop and operationalize eHealth by launching the National eHealth Policy in 2011 (MOH-Kenya, 2011). Despite the availability of eHealth policy in Kenya, eHealth remains at its embryonic stage due to social, economic and technical challenges (MOH-Kenya, 2016). The eHealth in Kenya lacks a centralized registry of all eHealth projects under implementation in the country hence limited data on effective EHR systems adoption processes (MOH-Kenya, 2016).

Kenya utilizes Open Medical Record Systems (OpenMRS) of EHR but those widely used are disease related, such as Kenya Electronic Medical Record (KenyaEMR) for support management of HIV/AIDS patients; International Quality Care (IQ care) for managing clinical care for HIV or AIDS patients (Paton & Muinga, 2018). The disease related system could be a hindrance in provision of comprehensive continuity of healthcare from primary to referral facilities and an indication for need of a National Electronic Health Record (NEHR) that allows interoperability.

In Kenya various EHR systems have been locally developed and tailored to meet specific hospital needs with limited data on their effectiveness (MOH-Kenya, 2016). This report elaborates the effectiveness of a locally developed EHR system of Aphicon which was implemented at Radiant Group of Hospitals. The paper focused on how the hospital deployed and overcame challenges of the system in relation to their adoption process and organizational levels.

1.2 Problem Statement

Kenya has experienced a notable increase in uptake of eHealth interventions since the first initiative documented in 2001 (MOH-Kenya, 2011). The launching of the eHealth policy in 2011 could be a contributing factor to the scale-up of eHealth adoption. Kenya has limited knowledge on the eHealth projects under implementation due to lack of a centralized registry of eHealth projects (MOH-Kenya, 2016). EHR is one of the eHealth systems initiated in Kenya with limited knowledge on empirical findings on the effectiveness of a locally adopted system.

World-wide eHealth has high failure rate of more than 40 percent with implementation phase contributing most to the failure (Blavin, Ramos, & Shah, 2018). This is mostly due to lack of integration between the system developers and the system end-users (Vogelsmeier, Halbesleben, & Scott-Cawiezell, 2016). Main disputes arise on people-related and software incompatibility issues whereby the end-users are not involved in initial planning hence refuse to use the system as it does not align with existing medical practice system (Vogelsmeier et al., 2016).

A study on the implementation of Electronic Health Records in Kenyan public hospitals by Wamae (2015) revealed a gap of inadequate involvement between strategic management and system ender users (Wamae, 2015). The study was limited as it only focused on one segment of adoption process (implementation) and only involved strategic level and frontline level of the organizational levels. A comprehensive study that covers the entire adoption processes

and aligns all organizational levels could enable a clear picture on areas that might require improvement and bridge the gap between EHR system developers and EHR end-users. Thus, the study explored the organizational level involvement in relation to adoption process through a two dimension framework as proposed by Avgar (2012) that incorporates the adoption process and intra-organizational levels (Avgar et al., 2012).

1.3 Research Objectives

1.3.1 Broad Objective

To explore the effectiveness of all organizational levels' involvement in the adoption of a locally developed Electronic Health Record system in relation to Kenyan context.

1.3.2 Specific Objectives

I. To investigate how the EHR investment processes were conducted at all organizational levels of the hospital.

II. To evaluate the implementation procedures that were undertaken in the hospital at strategic, operational, and frontline levels.

III. To establish how the EHR system is being used and the extent of utilization at strategic, operational, and frontline levels.

1.4 Research Questions

The study was conducted to assess the adoption process of EHR system at Radiant Group of Hospital in Nairobi, Kenya by answering the following questions:

I. How did the strategic measures utilized in the EHR investment process affect the adoption process?

II. How the pre- and post-implementation procedures of EHR adoption were conducted at all organizational levels?

III. To what extent has the EHR system functions been operationalized and used?

1.5 Scope of the Study

The study focused only on Radiant Group of Hospitals located in Nairobi. The facility is of level four that has and successfully utilizes an EHR system. The target population were only medical and administrative staff that fall within strategic, operational, and frontline levels of an organizational

1.6 Significance of the Study

The findings will assist the GOK and other key stakeholders to understand gaps in EHR adoption at all levels of the organization and practical ways that can ensure success in locally developed EHR system adoption.

At the facility level, the findings can help the managers attain practical knowledge relating to EHR adoption to ensure informed decision making. The findings from adoption process can also assist the software system developers on areas that they can improve to enhance health tailored software systems. Health technology systems implementation have high failure rate with 40 percent chances of a system either being abandoned or not meeting business requirements (Mtebe, Nakaka, International, & Alliance, 2018). EHR system implementation involves medical and non-medical professionals which makes implementation of eHealth systems overly complex due to low and high technical savvy, respectively.

Chapter Two: Literature Review

2.1 Introduction

This chapter assess various researches that have covered different aspects of EHR in relation to adoption process from organizational levels' perspective. The review focused on a two-dimensional framework of adoption process. The chapter also covered the theoretical foundation, empirical findings, and analytical framework in regard to the study objectives.

2.2 Context of the Study

The study focused on adoption of Electronic Health Records through a comprehensive organizational level's involvement.

2.2.1 Electronic Health Record

WHO refers to EHR as the systematized collection of patient's health profile, behavioural and environmental information (WHO Executive Board, 2004). The records are entered and accessed electronically by healthcare providers and shared across different health care settings (WHO, 2006). EHR can include assortment of data such as demographics, medical history, medication and allergies, immunization status, laboratory test results, radiology as well as billing information (Richards, Prybutok, & Ryan, 2012).

2.2.2 Organizational Levels' Involvement

Organizational levels' involvement refers to direct participation of all staff through engagement, in an inclusive and collaborative process by applying their own ideas, expertise and efforts towards solving problems and making decisions in order to meet the organization goals (Sepasgozar & Davis, 2018). Effective organizational level involvement has proven to increase performance in organizations by enhancing employee motivation hence increased productivity and profitability (State, 2011). Avgar (2012) stipulates three organizational levels of; Strategic, Operational and Frontline levels and believes involvement of each of these levels in EHR system adoption can lead to success.

2.2.3 Adoption of Electronic Health Records

Adoption refers to the process of acquiring and using new innovation or invention (Hall & Khan, 2016). In relation to EHR, adoption simply means the utilization of technology to enable transition of paper based patient records to digital patient paper records (Price et al. 2013). This study utilized a two dimension framework that integrates the adoption process (investment, implementation and utilization) and intra-organizational levels (strategic, operational and frontlines) for an in depth assessment (Avgar et al. 2012).

2.2.4 Current Global Electronic Health Record Status

Facilitation conditions such as technical and organizational infrastructure have theoretically shown to have great influence in affecting the adoption of health technology (Garavand et al., 2016). The WHO (2016) eHealth report shows that the adoption growth of EHR has been steady in the last 15 years with a 46 percent global increase in the last five years. The adoption rate is lowest in the lower-middle and low-income countries at 35 percent and 15 percent respectively. The adoption rate in upper-middle and high-income countries is above 50 percent.

According to WHO eHealth atlas a few countries world-wide have achieved National EHR system (World Health Organization, 2016):

- In Africa only 30 countries out of 54 are part of WHO member states. According to Global Observatory for eHealth only one country (Ethiopia) out of 30 African region countries has both national EHR system and a legislation governing the use of the national EHR system. Five of the 30-member state countries have a national EHR system but lacks or information is not available on legislation governing the use of the national EHR system. Kenya is among the countries with neither a national EHR system nor a legislation for governing EHR system.
- The European region covers a total of 51 countries of which 47 are among the WHO member states. A total of 28 of the member states have a national EHR system accounting to more than half of its member states. Only 20 states have both the national EHR system and a legislation governing the use of national EHR system with eight states having only the national EHR system without or lacking information on the legislation governing its use.
- The Americas region covers both North and South America with a total of 35 countries. Only 18 of the 35 were included in the eHealth global atlas of 125 WHO member states. A total of 10 states has a national EHR system with five having both the national EHR system and a legislation governing its use and the remaining five only a national EHR system.

Countries world-wide are aiming to achieve universal health coverage (UHC) and EHR is one of the means of attaining UHC (WHO, 2016). Kenya is among the countries aiming for UHC (KEMRI, 2019). Understanding and examining frameworks that could lead to success of EHR system in an organization could lead to scale-up and failure rate reduction in EHR system adoption.

2.3 Theoretical Review

A theory is a supposition of ideas that provides a framework to explain something that is based on general principles independent of the things to be explained (Fourcade et al., 2008). A theoretical literature concretely examines the corpus of theory by establishing what theories already exist, the relationships between them, and to what degree the existing theories have been investigated (Turner, Baker, & Kellner, 2018). The study was guided by three theories of: two-dimension framework for technology adoption, technology acceptance model and diffusion of innovations theory.

2.3.1 Two-Dimension Framework for Technology Adoption

Investment Stage of Adoption at Organizational Levels.

Strategic level of an organization is were actionable steps needed to reach specific goals are outlined and aligned with stated vision, mission or values of an organization (State, 2011). In relation to EHR adoption the overreaching healthcare organization strategy around care delivery plays a greater role (Muinga et al., 2018). The hospital should have a clear vision on what the adoption can serve such as patient-centred care or improved quality or around revenue-generation (Avgar et al., 2012). Blavin et al. (2013) argues that successful EHR implementation requires resource availability evaluation at strategic level that includes proper financial planning and extensive commitment in order to avoid system failure (Blavin, Ramos, & Shah, 2018). Resources should be assessed in terms of availability at all levels of the organization for initial adoption cost, ongoing maintenance and technical support of the system (Stone, 2014). The initial adoption cost includes cost needed to purchase and get an EHR system working such as availability of software and hardware e.g. computers, network installation, operating licence fees, support staff and staff training (Regan & Wang, 2016). Ongoing maintenance and technical support includes long term costs that are going to be incurred such as annual licence fees, training, technical staff employment, monitoring of the system outcomes, modifying, upgrading and maintaining the EHR system (Hitt & Brynjolfsson, 2000) . Regan et al. (2016) recommends the complex interaction between people, process and technology as factors critical in succeeding EHR system adoption (Regan & Wang, 2016).

Operational level of an organization connects the frontline level to the overall goal of the organization and takes responsibility of the day-to-day operations that directly affect external customers (Clark et al. 2013). The operational level comprises of managers, supervisors, team leaders or team facilitators such as nurse in-charge, hospital superintendent, procurement

officer etc. (Stefan et al. 2016) . In relation to EHR adoption managers evaluate the organizations capacity for change, effectuate managerial authority over expected workflow changes as well as the organizational resources available (Avgar et al. 2012).

Frontline level is another critical aspect in succession of EHR as it comprises of those directly interacting with the system or those in direct contact with the customers or clients (Park & Chen, 2012). In healthcare setting it includes community health workers (CHW), clinical officers, nurses, doctors, pharmacist etc. In relation to EHR adoption employees are assessed on staffing adequacy, skill sets and working conditions that can facilitate for adequate implementation and use of the new technology (Avgar et al. 2012).

Implementation Adoption Stage at Organizational Levels

Implementation is the process of putting a plan into action in this case the organization has decided to invest in EHR. At strategic level, according to Lipsky et al. (2009) for IT implementation to succeed, it should be introduced in a manner that is consistent with and complementary to the working organizational model for delivering care (Lipsky, Avgar, & Lamare, 2009) .

At operational level, managers should ensure employee involvement, devolution of authority and organizational learning capacity (Avgar et al. 2012). Pisano et al. (2001) augments that organizations that are better equipped at facilitating learning at both individual and collective levels are likely to see greater technology related gains.

EHR implementation at frontline level is likely to succeed if there is perceived preparedness for technology change and perceived employment and wage security (Ajami & Bagheri-Tadi, 2013). The frontline employees should be able to use the new technology and accept that they are not working themselves or their co-workers out of a job or even perceive so (Ajami, Ketabi, Isfahani, & Heidari, 2011).

Utilization Adoption Stage at Organizational Levels

Utilization refers to the act of using something in an effective way (Ellsworth et al., 2017). In this case, the EHR system has been implemented and is being used on an ongoing basis to deliver care in new ways that were previously impossible. At strategic level, the immediate and comprehensive access to essential patient care and organizational effectiveness information can help the organization to learn, monitor and improve its performance (Avgar et al. 2012). EHR can also be utilized to enhance cultural reform by creating an environment

in which employees are encouraged to seek out new knowledge and to share it with others (Argote & Miron-Spektor, 2011).

On operational aspect managers should encourage the use of EHR in ways that enhances coordination across healthcare providers, promote information sharing and learning (WHO Executive Board, 2004). Health managers should provide incentives for using the EHR system in ways that go beyond a mere digital replication of paper and pencil documentation through employment contact (Gittell, 2012).

At frontline level, EHR use requires both adequate employee skill levels and a relative degree of workforce stability hence need for skill level maintenance (Litwin, 2011) . A continued trust in employee involvement mechanism is the basis of ensuring a two-way feedback between the frontlines and those charged with designing and effectuating the EHR system (Clark et al., 2013).

2.3 Empirical Review

Empirical literature refers to information which is verifiable and acquired by observation or experimentation in the form of recorded data, which may be subject of analysis rather than theory or pure logic (Nakano & Muniz, 2018). The study was based on the below empirical studies that relate to the specific objectives of this study.

2.3.1 Electronic Health Record System Investment Decision

Investment decision relates to the choice made by the top level management with respect to resources (financial, Physical or human) to be deployed in investment opportunities in order to achieve higher gains in the future (Virlics, 2013).

A study in Nairobi by Anyango (2017) on challenges of EHR Systems revealed that financial barrier was a major drawback in investment of EHR (Anyango, 2017). The study elaborates financial barrier in terms of cost involved in the adoption process such as high ongoing costs as well as start-up costs. These findings also align with a study done in the United States by Kaushal (2008) in terms of high cost barriers, especially the purchase associated with EHR and the ongoing cost of the system as vendors charged a lot of money for after-sales services (Kaushal et al., 2008).

Mtebe (2018) argues that organizational context also plays a greater role in adoption of EHR and emphasizes on management support for systems adoption capability (Mtebe et al., 2018). The study found that majority of EHR systems are acquired in top-down approach with few

end-users being involved in investment decisions. Mtebe recommends involvement of top management and representatives of relevant departments to be involved in the initiation, negotiation, and procurement of information technology systems to reduce implementation failure rate. A study by Xu (2015) on advancing return on investment analysis for EHR investment also concurs with Mtebe that investment on EHR systems proves to be risky due to ineffective organizational involvement (Xu, 2015). The top down approach in investment decision has led to immature products by vendors that do not comply with organizational needs hence unnecessarily high cost and lack of flexibility of the systems (Xu, 2015).

2.3.2 Electronic Health Record System implementation procedure

EHR system implementation requires extensive commitment to system administration, control, maintenance and support to keep it working effectively and efficiently (Park, Chen, & Rudkin, 2015). After the EHR system implementation healthcare providers and administrative staff are expected to maintain and optimize their work performances with the use of the new system (Regan & Wang, 2016).

A study conducted in Middle Eastern countries by Alanazi et al. (2020) to identify factors that affect the successful implementation of EHR systems highlighted the following as the major contributing factors: Healthcare providers' perception of the EHR system, incompatible workflow, communication disruptions and inadequate training of the end-users of the system (Alanazi, Butler-, & Alanazi, 2020).

Lack of involvement due to inadequate end-user training and Communication disruption at organizational levels was also a highlighted factor in EHR adoption in African countries (Wamae, 2015) (Boonstra, Versluis, & Vos, 2014), (Akanbi et al., 2014). The studies revealed a disconnect between strategic managers and end-users of the system whereby strategic managers confirmed that system end-users were involved in initial planning yet the actual response from users indicated a gap in preparatory stages. This disconnect also contributed to negative perception of the system by the healthcare providers.

2.3.3 Utilization of Electronic Health Record System

EHR system was developed with intention of recording patient information but its functions are much broader (Barbabella & Melchiorre, 2016). The six main functions of EHR system are: to record and provide basic demographic and clinical health information, provide clinical decision support, for order entry and prescribing, to provide health information and reporting, to support security and confidentiality and to facilitate exchange of electronic

information through interoperability (Waithera, Muhia, & Songole, 2017). These functions aid in reduction of medical errors, improve quality of care and deliver healthcare services more efficiently (Dornan et al., 2019). The system also has the potential to improve health surveillance and evaluation hence provision of evidence-based informed decisions (Dornan et al., 2019).

Several studies in Africa revealed increased benefits on EHR usage among healthcare providers such as: easy retrieval of patient's information and report generation, ease of communication among departments on patient's progress, availability of legible data and better accountability of funds and supplies (MartínezPérez & Massaguer Pla, 2012), (Akanbi et al., 2014), (Odekunle, Odekunle, & Shankar, 2018) (Kavuma, 2019). Despite these noticeable benefits EHR is still not fully utilized as a study on utilization of Electronic Health Records for Public Health in Asia by Dornan et al. (2019) which included 15 countries revealed that EHR systems had functions which were not accessible, wide-spread of password sharing among users hence security issues, infrastructure constraints due to unreliable electricity and internet connectivity (Dornan et al., 2019).

Another study in Iran by Ayatollahi et al. (2014) showed organizational culture issues as a major barrier due to lack of efficient planning, lack of skilled manpower and limitations in information technology training for healthcare professionals (Ayatollahi, Mirani, & Haghani, 2014). In Lower Middle Income Countries (LMIC) apart from organizational culture issues and infrastructure constraints, nonadaptation of the system by health professionals due to perceived non usefulness of the system also hindered the utilization of the implemented EHR system (Were & Meslin, 2011).

2.4 Summary of Knowledge Gaps

The gaps foreseen in this research in relation to investment, implementation, and utilization of EHR system revolved around organizational cultural issues, financial barrier, and infrastructure constraints.

In terms of EHR investment decisions most researches above reveal challenges of:

- Financial barrier due to ineffective planning hence undermining the effects of start-up and on-going costs (Anyango, 2017) and (Kaushal et al., 2008).
- Organizational cultural issues due to top-down approach as end-users of the system are not involved in initial planning (Mtebe et al., 2018), (Xu, 2015).

- Infrastructure constraints due to system not aligning to organizational goals and inadequate staff with technology savvy (Regan & Wang, 2016), (Stone, 2014).

In relation to implementation of the EHR system the researches show challenges of:

- Perception of healthcare providers (Alanazi et al., 2020), (Ajami & Bagheri-Tadi, 2013)
- Incompatible workflow (Alanazi et al., 2020) (Lipsky et al., 2009)
- Ineffective communication resulting from top-down approach (Wamae, 2015) (Boonstra et al., 2014), (Ajami et al., 2011).
- Inadequate training of system end-users (Wamae, 2015), (Avgar et al., 2012)

Utilization of the EHR system seems to have challenges related to:

- Inaccessible system functions (Dornan et al., 2019) (Akanbi et al., 2014).
- Security issues as end users share passwords (Dornan et al., 2019), (Kavuma, 2019).
- Infrastructure constraints such as unreliable electricity and internet (Dornan et al., 2019), (Garavand et al., 2016), (Wamae, 2015).
- Perceived non-usefulness of the system by healthcare providers (Ayatollahi et al., 2014), (MartínezPérez & Massaguer Pla, 2012), (Litwin, 2011).

2.5. Analytical Framework

The study was also be guided by the following analytical framework which relates to the guiding theory of the study.

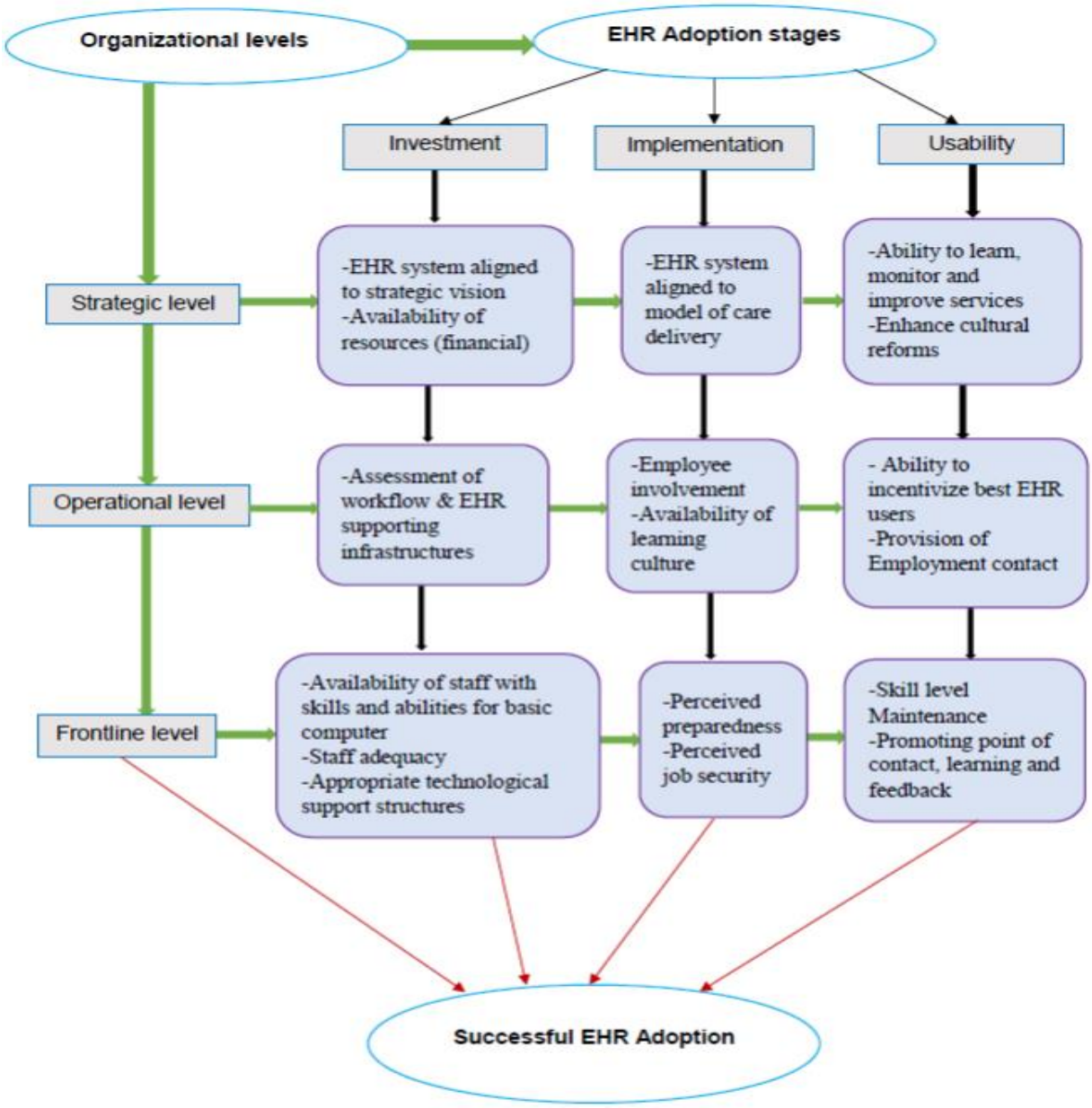

Figure 1: Analytical Framework (Adopted from Avgar et al 2012)

2.6 Chapter Summary

The literature above discusses issues relating to EHR system adoption in terms of factors contributing or hindering the systems successful adoption. The researchers discussed the benefits and drawbacks of the system and emphasizes on effective organizational involvement from initial planning to deployment of the system. Financial barrier is a huge drawback to EHR adoption according to the above literature and could be addressed through effective planning and forecasting to ensure the organization is ready to face both start-up cost and the on-going cost. The study aimed to assess these challenges in relation to a locally developed EHR system in Kenyan context of the private healthcare sector on a comprehensive organizational levels' perspective.

Chapter Three: Research Methodology

3.1 Introduction

This chapter describes the methodology which was used in undertaking the study. This includes the study design, the study population and sampling, the data collection methods, data analysis, the research quality, and ethical considerations.

3.2 Research Design

Research design refers to the set of methods and procedures used in collecting and analysing measures of the variables specified in the problem (Megel & Heermann, 1993). In this study a case study design was used. A case study is an in-depth exploration of multiple perspective of the complexity of a particular policy, institution, program or system that involves the collection of extensive qualitative data usually through interview, observation and document analysis (Starman, 2013). The case study design was opted as the study aimed to explore organizational levels involvement in relation to EHR system adoption. The qualitative approach was adopted to provide in-depth understanding of circumstances relating to how different levels in the organization perceived the EHR system adoption process. The study explored the perspectives of respondents on investment decisions, implementation process and system utilization.

3.3 Population and Sampling

According to Radiant Group of Hospitals website, the hospital is a four-level private health facility that has five branches of: Pangani, Umoja, Kiambu, Kasarani and Sportsview. The hospital offers a range of services that are grouped under: general services such as outpatient, inpatient, theatre, pharmacy, and laboratory etc., other services such as physiotherapy, dialysis, optical etc. and special clinics such as gynaecology, cardiology, and dermatology etc. The study focused on Pangani branch which effectively utilizes an EHR system. Pangani branch has a bed capacity of 150 and it offers services ranging from outpatient, inpatient, maternity, and Intensive Care Unit (ICU), dialysis, threate, dental and special clinics. Pangani branch was the area of study as it has a well-established EHR system and was accessible to the investigator. Conferring with the human resource department of Radiant Group of Hospitals, the total population of health personnel at Radiant Group of Hospitals in Pangani branch is 65.

A purposive sampling technique was utilized in selecting participants of the study. Purposive sampling refers to non-probability sampling in which decisions concerning the individuals to

be included in the sample are taken by the researcher (Palinkas et al., 2016). This involves identifying and selecting individuals or groups of individuals that are knowledgeable about or experienced with the research issue, or have capacity and willingness to participate in the research (Etikan, Musa, & Alkassim, 2017). In this study personnel from different organization levels that utilized EHR system were included based on their knowledge and experience with EHR system. This means medical and administrative staff were included in the study with an exclusion of kitchen and housekeeping staff.

3.3.1 Sample Size

In regards to sample size, qualitative research has limited data on sample size guiding principles as sample sizes are tailored or relatively static in relation to researchers perspective or aim of the study (Vasileiou, Barnett, Thorpe, & Young, 2018). Therefore, in relation to this study the sample size was 15 which included one personnel from each cadre of the organizational levels as the aim was to have in-depth understanding of EHR system adoption per each level. The study did not aim to compare the usefulness and usage of the EHR system by each cadre. The study purpose was to explore decisions made regarding EHR system adoption in relation to the organizational levels as per specified to strategic, operation and frontline. Table 1 below shows staff of Pangani branch in relation to organization levels:

Strategic personnel		Operations personnel		Frontline personnel	
Chief Executive officer	1	Matron	1	Doctors	8
Chief Operations Officer	1	Operations Manager	1	Nurses	21
Senior Accountant	1	Senior Pharmacist	1	Pharmacists	4
Branch Manager	1	Senior Laboratorian	1	Laboratorian	6
		Administrator	1	Accountants	2
				Records	4
Total	4	Total	5	Total	45
TOTAL PERSONNEL 54					

Table 1: Staff of Pangani Branch

3.4 Data Collection

The researcher was the data collector during data collection. Primary data was collected through interviews using interview guides which were in English through phone call interviews as per appendix B, C and D. The interviews were recorded through Cube ACR app

for verification and data accuracy. The interview guides were sent a week before data collection to all the participants to ensure adequate preparation of respondents on what to expect as well as psychological preparation. The length of interviews was predetermined between 45 minutes to an hour and extensions were allowed depending on participant's availability in order to give participants freedom to recall and express their ideas using their own words.

3.5 Research Quality

In qualitative research, quality relates to the interaction between data collection and data analysis to allow meaning to be discovered and elucidated (Riggs, 2015). For quality purposes the research needs to satisfy the criteria of validity and reliability in terms of objectivity and consistency to ensure that the research findings are not biased in any way (Cameron, 2011).

3.5.1 Validity

Validity relates to accuracy and objectivity whereby the research instruments measure what they are supposed to measure without providing mixed or biased results (Heale & Twycross, 2015). To ensure validity all the interviews were recorded and transcribed in verbatim. The interviewer also sorted out clarity on any meanings that were not clear either through probing more or using follow-up calls. The results were also reported using actual words or quotes from the interviewed personnel.

3.5.2 Reliability

This refers to consistency of the techniques used to collect data and analytical procedures in giving the same results over time when repeated on another occasion or by another researcher (Hafeez-Baig, Gururajan, & Chakraborty, 2016).To ensure reliability, the researcher made detailed notes of the research design including the methods of obtaining data and the respondents who were interviewed using memos and annotations in Nvivo Pro 11. These records can be referred by other researchers to reanalyse the data and assess for consistency.

3.6 Data Analysis and Presentation

The data was analysed using Nvivo Pro 11. The recorded interviews were transcribed and verified using Cube ACR app then imported to Nvivo Pro 11. The imported data was analysed using thematic analysis and interpretation was drawn through inductive coding. Thematic analysis refers to process of identifying, organizing, describing and reporting themes found within a data set and is usually applied to a set of text such as interview transcripts (Ibrahim, 2012). Inductive coding is a data analysis process whereby the researcher reads and interprets

raw textual data to develop concepts, themes or a process model through interpretations based on the data (Liu, 2016).

The imported data was classified to various codes of investment, implementation, utilization, and respondents' general views according to the conceptual framework. The codes were arranged in relation to dynamic sets of strategic, operation and frontline organizational levels. The report on the data was produced using a summary of actual words or quotes from the interviewed personnel's as per exploration of coding queries.

3.7 Ethical Considerations

The ethical considerations were achieved by observing privacy and confidentiality in accordance with ethical standards in research during data collection, analysis, and reporting. Ethical approval was obtained from Strathmore University Institutional Ethics Review Committee (SU-IERC) for review and approval as per appendix E. The permission to conduct the research was obtained from Radiant Group of Hospitals a month before collecting data through a letter of introduction from Strathmore University introducing the researcher as a student in the institution as per appendix F. Consent of the respondents was sought out verbally before participating in the study as per appendix A.

3.8 Dissemination of results

Written copies of the results of the research will be presented to SU-IERC, copies will be kept at Strathmore University library, some copies will be sent to Radiant Group of Hospitals. Results may be published through conferences and peer review journals such as Strathmore University Research & Innovation Conference and International Journal of Medicine and Medical research, respectively. The findings will also be disseminated to organizations that are involved in eHealth or specifically EHR systems to be used for informed decision making and improve the health status of Kenyans and the communities in particular.

Chapter Four: Presentation of Research Findings

4.1 Introduction

This chapter contains data presentation analysis and the main research findings. The information is categorized based on the research objectives by examining elements of EHR adoption processes in relation to organizational levels involvement.

4.2 Response Rate

The interviews were conducted at Pangani branch which is the main branch of Radiant Group of Hospitals. The study had a sample size of 15 participants: four strategic personnel, five operations personnel and six frontline personnel. There was no failed response thus making the response rate 100%. Table 2 below shows the general information of respondents in relation to their organizational level.

Designation	**Respondents**	**Organization level**	**Total per level**
CEO	1	Strategic level	4
COO	1		
Branch Manager (Admin)	1		
Finance Manager	1		
Matron	1	Operations	4
Head of IT	1		
Senior Pharmacist	1		
Senior Laboratorian	1		
Pharmacist	1	Frontline	7
Lab Technician	1		
Nurse	1		
Doctor	1		
Clerk	1		
Client Relations Officer	1		
Accountant	1		

Table 2: General Information of Respondents

4.2.1 *Respondents Characteristics*

The figures below display the distribution of interviewed respondents according to the demographic data of gender, education level, Compute/IT literacy level and EHR experience in years.

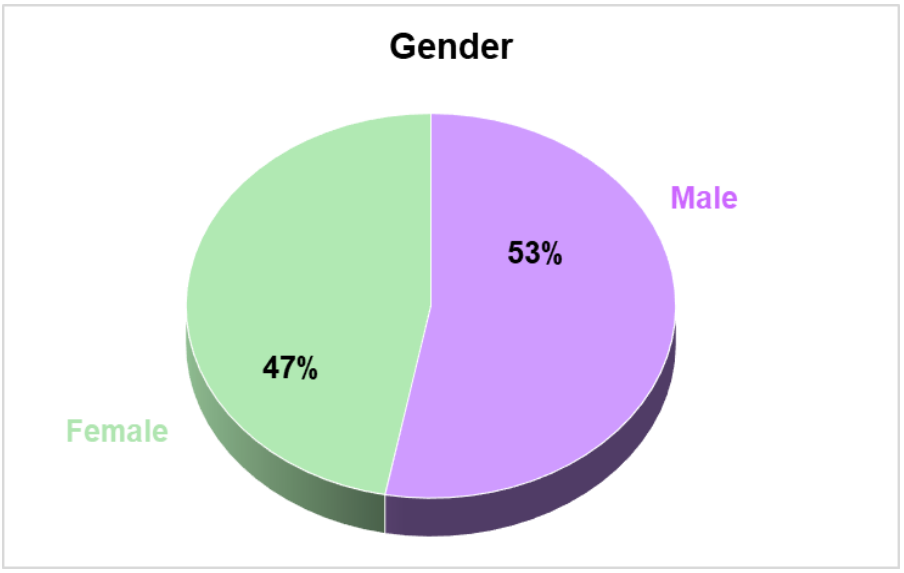

Figure 2: Gender of Respondents

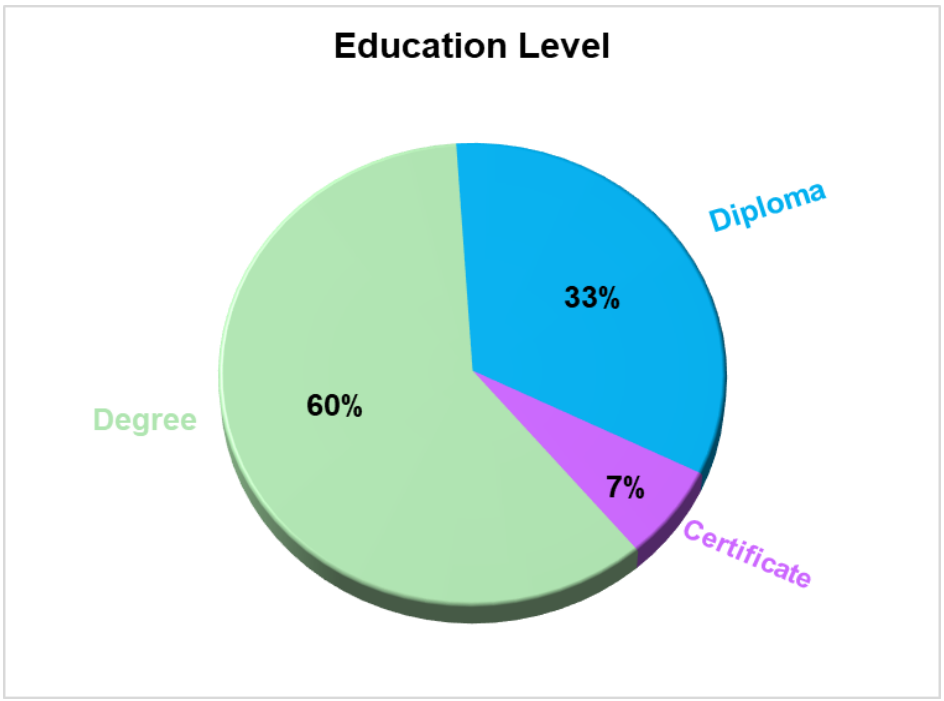

Figure 3: Education Level of Respondents

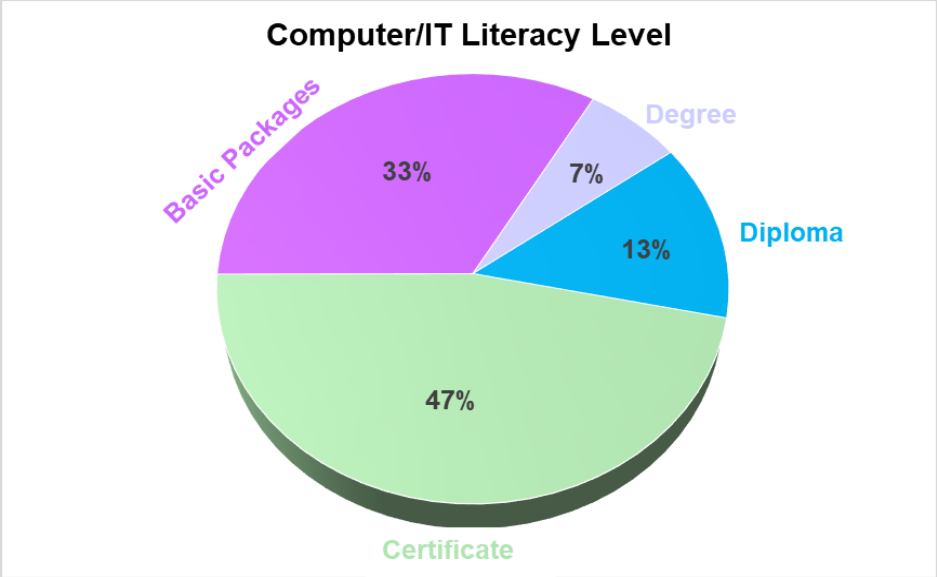

Figure 4: Computer/IT Literacy Level of Respondents

Figure 5: EHR Experience of Respondents

According to figure 3 number of female respondents was 47% compared to the number of male respondents at 57%.

In terms of education level as per figure 4, most of respondents had a degree at 60% and some had diploma at 33% with the least respondents having a certificate at 7%.

As indicated in figure 5 on computer or IT literacy, 47% of respondents had certificate, 33% computer basic packages, 13% had diploma and 7% had a degree.

As observed from figure 6 most of the respondents had 4 years' experience of EHR system at 33%, those of 5- and 3-years' experience had a corresponding percentage of 27 and least of respondents had 6 years' experience at 13%.

4.3 Primary Data Analysis as per Objectives

The data is analysed in relation to the research objectives. In accordance with the research conceptual framework and analytic framework each organization level makes different decisions in regard to adoption process. Thus, the respondents were asked different questions at investment, implementation, and system utilization stages in respective to their organizational level.

4.3.1 EHR investment processes at all organizational level

In this stage the respondents were asked questions on investment decision in regard to their organizational level.

Strategic Level

In this level respondents were asked to elaborate on the process that led to adoption of the system in regard to financial, system technical features, organizational culture, and alignment of the system to organization purpose. The results are displayed in table 3 below.

Respondents	Financial	Alignment	Technical	Organization culture
CEO	Pocket friendly	Perfect for Radiant with end-to-end system plus branch connectivity	A system with necessary checks and balances	Staff complained and a new system was adopted but the board made all investment decisions
COO	Cheap plus one server connectivity	Aim to expand to more counties so the branch connectivity aligns with that	A fast system with branch integration	Staff gave out their ideas through departmental heads and the board made the choice on Aphicon
Branch Manager	Not expensive	Aligns with our vision and strict limitation on system rights is a bonus	A system with branch interaction and excellent stock management	Staff expressed their requirements on system specifications
Financial Manager	Cheap system but training was expensive	Branch connectivity makes it best for radiant	Excellent billing services	Subordinates gave out ideas on system expectations

Table 3: Investment Decision of Strategic Level

It was noted that each respondent at strategic level agreed to the financial decision on a system that was cheap. In terms of system alignment, the strategic level knew exactly what they needed for their hospital such as connectivity of all Radiant branches. On technical features of the system each respondent had different expectations based on their designation. According to organization culture it was noted that the hospital utilizes a mix approach of both bottom-up and top-down approaches in investment decisions.

> *"We cannot stop our patients from moving from one branch to another, which lead to duplication of files so for continuity of care of our clients who visit either of our branches we needed a new system" – COO.*
>
> *"We needed a cheap system which suits our kind of hospital as it's not a high earning hospital" – Financial.*
>
> *"Their ideas were incorporated in the system development, and this gave them opportunity to feel the ownership of the system so that the system doesn't feel like top management owned but it goes down to junior staff ownership" – Branch Manager.*
>
> *"We have polices that guide the systems we can adopt, and we focus much on how the system aligns with our vision plus system rights like limitations on who has access to what" – CEO.*

Operations Level

The respondents at this level were asked to explain the process that occurred to ensure that the hospital as well as the staff were ready for an EHR system in aspects of workflow assessment and IT supporting features.

Respondents	Workflow Assessment	IT Supporting Infrastructures
Head of IT	Separate branch servers Poor system security	Internet link in all branches (two service providers – Airtel and Telkom) Installed firewall in the main server branch for safety purposes
Senior Pharmacist	Variance in stock management	Ensured sufficient staff capacity Assed the system rights in collaboration with IT department and system vendors
Matron	Double-entry issues Poor report generation	Adequate staff capacity to bring the new system to operation (all staff are computer literate)
Senior Laboratorian	Diagnostic variances Double entry issues	Additional laptops were bought in readiness of the new system

Table 4: Investment Decision of Operations Level

On workflow assessment each respondent expressed a different view in relation to their professional cadre such as variance in stock management and diagnostic variance for pharmacist and laboratorian, respectively. In terms of IT supporting infrastructures the respondents were also of different views as per their profession capacity such as issues of internet and firewall as expressed by the head of IT.

> *"There were a lot of issues like double entry, you would find a patient is booked almost thrice so it bought a lot of stock imbalances whereby the pharmacy department was affected in a bigger way" – Senior Pharmacist.*

> *"We engaged airtel Kenya who provide us with the MTLF which is a private network purposely made for Radiant like the way you use Facebook, and we also got a Public IP from Telkom, so a firewall was installed in Kasarani branch for safety purposes due to the Public IP" – Head of IT.*

Frontline Level

In this level respondents were asked how the hospital ensured they were ready for an EHR system in regard to their IT / computer skills and working conditions such as appropriate technological supporting features.

Respondents	IT/Computer Skills	Working Conditions
Client Relations Officer	Diploma in IT	Asked on my ideal system specifications for tailor based system
Doctor	Did computer packages	Expressed my ideas on system requirements Given a new laptop
Nurse	Certificate in IT	Gave out my ideas plus most of the infrastructure were available i.e. Laptops
Pharmacist	Certificate in IT	Consulted with head of unit on what we want in a system
Clerk	Certificate in IT	Apart from our contributions nothing much was changed, still had consistent power, internet plus laptops
Accountant	Did computer packages	Gave out ideas on how I want the system to be
Lab Technician	Did Computer packages	Asked on our ideas for a customized system.

Table 5: Investment Decision at Frontline Level

It was noted that most employees at frontline level were computer literate with having done either a Diploma or Certificate or just computer packages. In terms of working conditions most respondents expressed their views in terms of being involved at planning stage by giving out their ideas and provision of hardware such as laptops.

> *"I have a certificate in IT, and I was also asked from interviews if I am computer literate before I was employed as it's one of the requirements for my job" – Nurse.*

> *"I was asked on what specifications I would like to see in the new system and was told it will be tailored based on my needs" – Pharmacist.*

4.3.2 Implementation procedures undertaken at organizational levels.

In this stage the respondents were asked questions on implementation procedures in relation to their organization level.

Strategic Level

At this level respondents were asked to explain the implementation process in the aspects of communication, Training and the challenges faced plus an elaboration on aspects that contributed to successful implementation.

Respondents	Communication	Training	Challenges	Success Factors
CEO	-Made everyone understand why they will go through heavy training	-Invested heavily on training and we were patient with everyone	-Staff were not very welcoming to system restrictions and multiple approvals Training was quite expensive	-Benching-making -The piloting -Highly supportive vendors -Use of TOTs
COO	-Did induction phase for awareness of the coming changes -Staff feedback	Massive training was done in 3 phases -General -Per unit -TOTs	-Staff referred back to old system -Complaints on multiple system approval -Overlooked the use of one internet provider	-Use of locally developed system – eased system modifications -Use of TOTs Staff excitement of branch connectivity
Branch Manager	-Explained the arrival of the new system repetitively -Staff feedback	-A lot of training was done for about 2 months -Trained TOTs	-Comparison of new and old system -Delay in billing and patients complained	-Planned well from the very beginning and everyone gave their inputs -Use of TOTs and piloting
Financial Manager	-Made everyone aware of the new incoming system -Vendors were encouraging staff to ask questions on how best the system can be modified and understandable	-Very comprehensive and detailed training was done	-Training was a bit expensive we almost paid our salaries double -Delay in billing -Too much limitations on rights	-Planned well for initial and ongoing costs - The piloting and use of TOTs

Table 6: Implementation Procedures at Strategic Level

The respondents expressed their views on communication in terms of informing everyone about the new system and the importance of training. According to the respondents the actual training seemed to have been done in phases and was very comprehensive. It was noted that implementation stage had several challenges which were expressed differently by respondents such as comparison of the old system to the new one. On success factors the respondents agreed on use of Training of Trainers (TOTs) as a much contributing factor as well as piloting and use of a local vendor.

"I have been at Radiant for about 7 years and been in-charge of implementation of two previous systems. I learned a lot from my previous experiences on the things that might have gone wrong and this time around we did it differently like the use of TOTs, the piloting and use of local vendor". – COO

"Some staff were not very welcoming of the new system; they were comparing the new and old system which implies to all changes even in new relationships sometimes we compare old partners to new ones". – Branch Manager

Operations Level

In this level respondents were asked to elaborate the implementation process in regard to staff involvement, training, workflow changes and challenges faced.

Respondents	Involvement	Workflow	Training	Challenges
Head of IT	Shared content of system features before initiation	Pilot was done to sort out any issues before full-roll out	Comprehensive training with practice sessions at the pilot branch	Resistance on some individuals due to system multiple approvals
Senior Pharmacist	Consultative back and forth meetings with subordinates and general management	Pilot was done to see areas of disruption in work processes	Ensured effective training and issues were addressed as they come	Staff compared the old and new system on restrictions and limitations of rights
Matron	Subordinates were involved in system development and most of their ideas were incorporated	Departmental heads did an implementation work schedule	Detailed training was done for all staff including TOTs	-Staff were exhausted from filling in for colleagues -Referral features were not working
Senior Laboratorian	Ensured staff feedback and addressing any issues of concern	Staff schedules were changed to accommodate training	Training was done in general and per departmental plus TOT's	Not much the piloting sorted out most issues

Table 7: Implementation Procedures at Operations Level

The interviewees showed that staff were involved with each having a different perspective of involvement in relation to their professional capacity. In relation to workflow the interviewees agreed that piloting showed areas of disruption before full implementation and change of staff schedule ensured that clients or patients continued to receive the needed services during implementation. On training it was shown that detailed and comprehensive training was

done as general and per departmental including the TOTs. In terms of challenges all the interviewees apart from one agreed to have noted some challenges like resistance due to multiple approvals of the system, staff exhaustion and comparison of the new and the old system.

> *"The training was very comprehensive, and staff were given time to practice in the afternoon sessions of the training at the piloted branch" – Senior Laboratorian.*
>
> *"We met a bit of resistance especially with some people opting for short-cuts, like if there is need for a three-step verification some staff would not want to go through that process" – Head of IT.*
>
> *"The training was done as overall group training which included everything general about the system, then per unit training which was departmental based and included modules of the system that are specific per department and then Training of Trainers (TOTs) which included two selected representatives for each department". – Matron.*

Frontline Level

At this level, the respondents were asked to elaborate the implementation process in aspects of their perception, training, involvement, and challenges.

Respondents	Involvement	Training	Challenges	Perception
Client Relations Officer	Were communicated and psychologically prepared of the new system	Was taken through training for 3 days general and 7 days per department	Misplaced bookings, instead of booking in new we booked in old system	Very easy system, can have training in morning and running it by end of the day
Doctor	Were encourage to ask questions and give feedback	Effective training was done and was trained as a TOT	Not all specifications we wanted were available	Training was done very well and system is so good
Nurse	IT department shared all contents of the system	Did training in groups and per department for 2 weeks	Taking shifts for colleagues was tiring	System is easy to understand and better than the old one
Pharmacist	Communicated on the coming new system and the training dates	Was taken through training as general and as TOT	-No queuing system -Incomplete drug data lead to delays in dispersing drugs	I embrace change fast so didn't find any problems, it's an easy system
Clerk	Was told of the new system and I was anxious as well as excited	Went for training several times for about a month	Booking misplacements cause of access to old system	I think it came to help though were used to the old system
Accountant	Were asked to contribute on any required modifications	Was taken through training though not thorough	-Had issues with billing -System is very strict.	It was had transition but it was okay
Lab Technician	Encouraged to ask questions on areas we want change or not understood	Did training as general and another as TOT	Not much just too much limitations and restrictions	Its good, everything I would like to see in a system is there though very strict.

Table 8: Implementation Procedures at Frontline Level

Respondents agreed that they were involved in the implementation stage through awareness, expression of feedback and were encouraged to ask questions. In terms of training all the respondents agreed to have undergone appropriate training apart from one respondent who viewed the training as not been thorough. The respondents agreed to have faced challenges during implementation. Each respondent expressed the challenges in a different perspective such as taking shifts for colleagues and misplaced bookings. The respondents had different

perceptions of how they perceived the implementation stage with most agreeing to the system being easy whilst others viewed it as a hard transition.

> *"During training I seemed to have understood the system but when actual time to use the system came, I could not remember my password, didn't know where to order or didn't necessary know what to do". – Accountant*

> *"The system is so easy; you can be taken through training in the morning and good to run it by the end of the day and will not have much of a problem". – Client Relations Officer*

4.3.3 EHR System utilization at all organizational levels

In this adoption stage the respondents were asked questions on system utilization as per their organizational level.

Strategic Level

In this level respondents were asked on how useful the system is in relation to the system functions, IT infrastructures and how they ensure security measures of the system.

Respondents	System Functions	IT Maintenance infrastructures	Security Issues
CEO	My focus is reports – System has accurate and easily accessible reports	Constant power plus backup generators in all branches	-System has multiple approval processes -Personal login credentials for each staff
COO	It's a real time system and very convenient for progress reports and departmental performance monitoring	-Power is always available -Have two internet service providers (Airtel and Telkom as backup)	It's very strict compared to the old one
Branch Manager	-A very fast system Meeting 80% of its intended purpose with room for modifications -Easy in all branch monitoring	-Power is available 24/7 -Internet also available	Staff have personal passwords that they do not share
Financial Manager	It works perfectly but other FMIS is incorporated for further financial issues	-Enough hardware – Laptops and IT department sorts out any arising issues -Budgeted maintenance cost available	It's risk-proof cause its very strict

Table 9: System Utilization at Strategic Level

All respondents reported that the system functions were good and meeting their needs such as accurate reports. In terms of IT maintenance infrastructures, the respondents expressed issues like constant electrical power, availability of reliable internet connectivity as well as

enough hardware and budgeted maintenance cost. Respondents also agreed on system security in terms of the system being strict with multiple approvals and use of passwords.

> *"As a CEO my main focus on EHR system is reports, Aphicon proved to be accurate on reports and I can easily access all my reports from all the five branches on the dashboard". – CEO*

> *"The system is so good and has very good internal controls, in the previous system one would revert prescriptions or any other orders which contributed to some staff pocketing medications whilst this new system one cannot revert any orders entered in the system without approval". – Financial Manager*

Operations Level

At this level respondents were asked to elaborate the usefulness of the system in terms of system functions, security issues and how they ensure subordinates are motivated to use the system.

Respondents	System Functions	Motivation	Security Issues
Head of IT	It's very good with minimal downtimes compared to previous system	IT team is always available to assist everyone on any issues	Everyone has personalized login credentials
Senior Pharmacist	A very good patient based system and branch connectivity is an excellent aspect	Ensured that IT department is available to handle arising issues plus the TOTs are present in every unit	-The use of password for each staff -The system is also very strict with multiple approvals
Matron	Very fast and swift in transferring information among departments	Every branch has an IT staff to assist, even with Covid virtual assistance is there 24/7	-Patient data cannot be accessed without patient phone number and ID number -Staff also have passwords
Senior Laboratorian	It's perfect and has all features of hospital system i.e. clinical, nursing, laboratory, billing etc.	-The system addressed issues complained by staff so they are eager to use it - The use of TOT also ensures ownership	Use of password ensures privacy and reduces risk of fraud

Table 10: System Utilization at Operations Level

The interviewees agreed that the system has good functionality in terms of minimal downtimes, patient-based system, fast and swift. On motivation the interviewees reported that availability of IT team and the TOTs to assist or handle any arising issues were main motivational factors to subordinates. The interviewees also commented on security issues in

relation to use of personalized passwords and use of patient phone number and Identification (ID) number for patient information security.

> *"The system is patient-based which makes it easy to deliver patient-based care as per today's necessity" – Matron.*
>
> *"Good thing is that staff raised complaints on the previous system, and we addressed those issues by introducing a new system. Our hearing to staff complaints was a motivation enough for one to be eager to use the system, plus I personally keep my members engaged in my department and update them on every process or changes in the hospital" – Senior Laboratorian.*
>
> *"Not all the specifications we wanted in the system were available initially but over time they have been added or addressed one by one and now most of the staff are satisfied with the system" – Head of IT.*

Frontline Level

In this level respondents were asked on the how useful is the system in terms of system functions, their perceptions and what motivates them to use the system.

Respondents	System Functions	System Perception	Motivation
Client Relations Officer	Its excellent in patient registration and retrieval of data	It's the easiest system I have ever interacted with	System issues are resolved immediately
Doctor	It's effective with no down times and any variances are traced easily	I enjoy using it as patient data can easily be retrieved and timely	Have platform were we raise complaints and are handled promptly
Nurse	Able to input and access all necessary patient data as per my work requires	It's very good and easy to use I like it more as their no double entry experiences so far	Our colleagues assist as a lot, the TOTs and IT staff is hands-on
Pharmacist	System indicates drug prices which is convince for decision making	I like it, it has made my work very easy as everything is integrated	System has multiple approvals and our superiors do not delay in approvals
Clerk	Very effective in terms of patient registrations and strict in patient data entry	It's very good as it gives accurate information and ensures easy follow-up of patients	There is always immediate response by IT staff on issues raised
Accountant	Apart from limitations of rights the system is the best in billing	I like it cause it integrates insurance clients and cash paying which was a cumbersome in the old system	The system integration plus IT staff are available round the clock to assist
Lab Technician	Very fast and gives simple interpretation on my work e.g. HB can indicate low or normal	I am comfortable with it, able to do my work with ease and fast	The TOTs assist plus the IT staff are available 24/7 on phone

Table 11: System Utilization at Frontline Level

The participants reported that they use the system on daily basis and agreed on the system functions as being appropriate for their work environment in relation to their professional capacity. In terms of their perception on usability of the system the respondents commented in terms of the system being good, easy, information accuracy, likable, and enjoyable. On motivation the participants agreed on prompt response in resolving of any arising issues by the IT team and their colleagues (TOTs) as well as timely approval of orders by their superiors.

"In terms of work, it has made my work easier, everything is integrated in the system, from stock transfer and everything that involves patient care is centralized in the system" – Doctor.

"I am comfortable with it because it's meeting my needs especially on the integration of insurance clients and cash paying clients which was a cumbersome in SmartCare but Aphicon sorted that out" – Accountant.

4.3.4 General Respondents view on EHR.

The respondents were asked to give their general views on EHR in terms of whether they would opt for an EHR system or manual system as per indicated in figure 7. The respondents were also asked to express their views on system integration, system vendors and patient benefits, the results are as shown in Table 12.

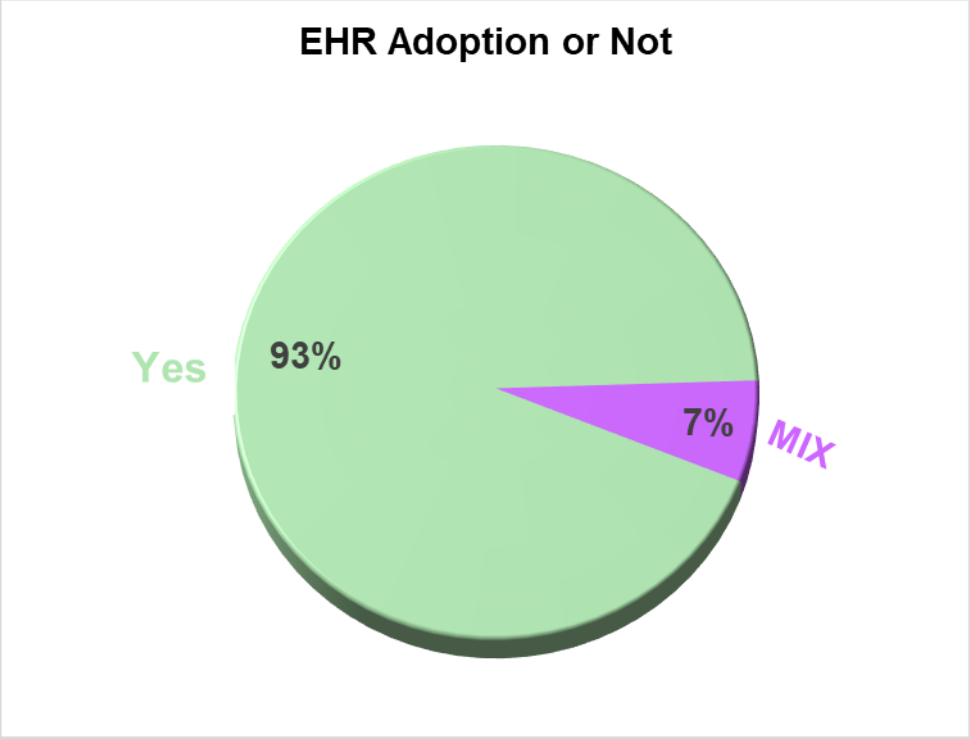

Figure 6: Respondents view on whether to adopt EHR or Not.

In figure 7 it was noted that most respondents would prefer an EHR system at 93% with only a few opting a mix of both manual and EHR system at 7%.

"EHR systems or hospital-based systems are a good thing because they make the work easier and in terms of data storage and reports they are quite efficient. However, they should be a right team, effective training and issues should be addressed as they come" – Strategic Level.

"It is a good thing to have an EHR system as now we are moving more towards digital and any organization that requires accurate information and easy follow up of patient should have an EHR system" – Operational Level.

"Would recommend an EHR system to all hospitals especially those with high patient turnaround, patients file easily get lost or misplaced as well as repetition of patient documents if old one is found" – Frontline Level.

Respondents General Views

Respondents	System Integration	System Vendors	Patient Benefits
Strategic Level	Has made hospital management so easy and would recommend such a system at national level even for statistical purposes	-Choosing a local vendor was one of our greatest choices -Extremely supportive, provided timely assistance and any modifications or queries were handled	-Appropriate continuity of care due to branch connectivity -No delays as system is fast and patients don't wait for long -Unnecessary delays are reduced as patients can easily be monitored in the system and areas that need improvement are improved -Patients receive holistic care as the system is patient based -Helps to reduce turnaround time as patient data is easily retrieved, timely and efficiently -Patients receive appropriate medications based on their ability to pay and drug allergies - Time saving for recurrent appointments
Operations Level	-Supervision and monitoring became easy and with appropriate checks and balances such systems should be adopted at central level -The system only needs to add virtual medicine features then it's perfect for national wide.	-The system vendors did not disappoint. Even up to date there are readily available -Throughout the all process if we need to modify or remove something or adjust anything in the system it was done in real time	
Frontline Level	Would appreciate a central level integration system to reduce registration processes as well as for appropriate continuity of care	During training staff from Aphicon (Vendors) were present and very supportive they even listened to our concerns	

p Table 12: Respondents General Views of EHR system

Irrespective of organizational level all the respondents agree to a system integration and recommend such integration at a large scale like national or central level. In relation to system vendors most of the respondents agreed that choosing a local vendor who is supportive is the most ideal thing to ensure success of EHR system adoption. In general view all respondents appreciated that EHR system has great benefits not only to the hospital but the patients as well in terms of continuity of care, reduction of turnaround time and appropriate medication.

"Radiant is also a referral hospital and sometimes we receive patients in severe conditions with no notes or any supporting documents and the time we diagnose and figure out what is going on its usually too late. Had it been we have a central system that allows different facility connectivity like Aphicon then we would reduce such unnecessary delays". – Strategic Level.

"Know what you want when it comes to EHR system and select the right people that is the right vendor because if a vendor disappoints you then the system is doomed to fail". – Operations Level.

"The system does not support virtual medicine (telemedicine, mhealth), the Covid pandemic has taught us that clients need such services but for the hospital to offer these services will be required to buy another system which could be quite expensive". – Frontline Level.

Chapter Five: Discussion

5.1 Introduction

This chapter elaborates on the research findings in relation to the research objectives. The discussion is based on whether organizational level involvement can influence the adoption of EHR system in private health facilities.

5.2 Investment Decision at all organizational levels

The decisions at this stage are discussed in the aspect of finance, organization culture (top-down, bottom-up or mx) and system infrastructure and alignment.

The study revealed that financially the hospital prepared adequately and also understood their financial capacity and limitations. The strategic level ensured the purchase of a cheap system that accommodates the hospital earning capacity. The findings are in agreement with Anyango (2017) and Kaushal et al 2008 who revealed that financial barrier due to ineffective planning contributes to EHR system adoption failure. In this case, the hospital overcame financial barrier issues through effective planning and knowing their financial capacity.

The hospital uses a mix of top-down and bottom-up approach in decision making. The study showed that, the strategic level incorporated the views and contributions of the frontline (end-users) level personnel in the system development. This aligns with findings of Mtebe (2018) and Xu (2015) that successful EHR adoption requires involvement of system end-users (frontline) in initial planning. However, Vogelsmeier (2016) results are in contrast as it showed that there was a gap between strategic management and end-users in initial planning involvement.

The findings on system infrastructure and alignment indicates that appropriate assessments in workflow were done and the system perfectly aligned with the hospital vision and goals. The hospital prepared adequately by ensuring internet connectivity to all their branches, purchasing new laptops, choosing the right vendor and adequate staffing of employees who are literate in computer or IT. The findings are in accordance with results from Regan (2016) and Stone (2014) that successful EHR adoption occurs due to system alignment to organizational goals and adequate staffing with technology savvy.

5.3 Implementation Procedures Undertaken at all Organizational Levels.

The discussion is based on communication approach of the organization (top-down, bottom-up, mix), training, perception of the health workers and success contributing factors.

The findings revealed that during implementation there was effective communication of a mix approach. The strategic level made the frontline level (end-users) aware of the system and the operations level ensured that frontline voiced out concerns by giving feedback and asking questions. The mix approach of communication aligns with Wamae (2015) Boonstra (2014) and Ajami et al (2011) who revealed top-down or bottom-up as means of ineffective communication in system adoption whilst mix as the most effective.

Majority of respondents perceived the training as comprehensive in all levels of the organization. All the respondents apart from one at frontline level believed the training was detailed and done effectively. The strategic level believed that they invested heavily on training and it was thorough. The agreement of strategic and frontline on training comprehensiveness disagrees with Boonstra et al (2014) and Akanbi et al (2014) who revealed that there is a disconnect between strategic management and end-users whereby the strategic agrees to effective training whilst end-users felt a lack in training or preparatory stage. However, Wamae (2015) and Avgar (2012) supports the notion that effective EHR adoption depends on adequate training of end-users.

The study further indicates that during implementation the health workers (frontline) had a positive perception of the system. They believed the system came to aid in their work, perceived it as being easy to understand and felt fully prepared. This is in contrast with findings by Alanazi et al (2020) and Ajami et al (2013) were health workers perceived the system as not easy to understand and do not feel adequately prepared.

The study also revealed success EHR implementation contributing factors such as use of benching-making with other facilities using the same system, the use of pilot that enables reduction of challenges, utilization of the right vendor who is supportive and use of TOT's that boosted end-user's ownership of the system. The use of the right vendor was also agreed by Xu (2015) and Ayatollahi et al (2014). However, the study has revealed other EHR adoption success factors such as the use of TOT's which have not yet been suggested by other researchers.

5.3 EHR System Utilization

The discussion is based on the aspects of system function, IT maintenance infrastructure, system security, motivation, and perception of end-users.

All the participants agreed to the system functions as being highly effective and accessible to appropriate personnel irrespective of the system limitations of rights. The system functions

are accessible on daily basis and used according to one's scope of duty. The findings contradict the results of Dornan et al (2019) and Akanbi et al (2014) who reported that most EHR systems have inaccessible system functions.

The hospital also has IT maintenance infrastructures such as constant electrical power supply with a back-up generator, undisrupted internet connectivity and a budgeted maintenance cost. The findings disagree with studies by Garavand et al (2016 and Wamae (2015) that in low-income and middle-income countries unreliable electricity and internet affects EHR system utilization.

The study further revealed that the system has tight security with each respondent having personalized login credentials that are not shared among staff. The system also has good internal controls with multiple approval processes and limitations of rights. The system ensures protection and privacy of patient files by allowing access only through entry of both the patients' phone number and identification number. The findings are in contrast with the results of Dornan et al (2019) and Kavuma (2019) that end-users share passwords or login credentials, and patient information is not protected.

The study established that staff motivation to use the system is in conjunction with how they perceive the system. The end-users have positive perception on the use of the system. Majority believes that the system is good, easy to use, aids in their work and provides accurate information. Apart from the positive perception, the staff are motivated to use the system due to prompt assistance on any arising issues by the IT support team and TOTs as well as timely approval of orders by their superiors. This aligns with Ayatollahi et al (2014), MartínezPérez & Massaguer Pla (2012) and Litwin (2011) that staff are likely to be motivated to use the system if perceived as useful to their daily activities.

Chapter Six: Conclusions and Recommendations

6.1 Introduction

This chapter provides the summary of the study, the researchers' recommendations, study limitations and suggestions for future studies.

6.2 Conclusion

The findings in this study shows that EHR system investment decision is a team-based activity that requires collaboration of all levels of organization from top management down to the junior staff. The strategic level understands the financial situation and strategic goals of the hospital hence make decisions on which system to purchase based on hospital earning capability and the hospital overall forecast. However, the strategic level depends on the frontline level (end-users) to ensure the purchase of a right system with right specifications. The operation level stands as the negotiator or go-between to ensure the strategic level understands the needs of the frontline level and for the frontline to understand the hospital limitations such as financial limitations. Furthermore, the hospital also has IT investment policies that provide directions in their investment decisions.

The results also highlighted that effective implementation relies on learning from previous experiences to find new innovate ways of improvement. Radiant learnt from their two previous systems on the importance of involving everyone, choosing the right vendor, and learning from others through benchmarking. The study showed that adequate training, the use of TOTs, availability of IT supporting infrastructures, supportive IT team and supportive vendors are the main contributing factors to successful implementation of EHR system.

Effective EHR system utilization is not a day one process due to different needs of various hospital departments, hence it should be regarded as a continuous improvement aspect with ongoing modifications. The study showed that usability of the system is skill-based and also depends on one's perception of the system, supportive seniors as well as one's professional capacity.

In general, the study showed that an EHR integrated system is a way to go even at a national level. The patients also benefit largely from the use of an EHR system than a manual system as majority of respondents also opted for EHR adoption. Despite the successful integration the study also revealed that vendors do not fully understand the needs of today's healthcare system environment like virtual medicine.

6.3 Recommendations

The involvement of all organizational levels seems to have worked for Radiant Group of Hospitals. Other hospitals can utilize the strategies deployed at Radiant to ensure positive outcomes in EHR system adoption. Other organizations cannot afford to learn from their experiences as Radiant due to financial constraints and might end up sticking to one system that is not effective.

The use of a locally developed system has proved to be effective and maybe that is what the Government of Kenya should promote as the vendors seemed more understanding to Radiant hospital needs compared to their previous system developers.

System vendors should also engage the hospitals more to understand today's model of care delivery in order to provide comprehensive systems. The vendors can modify the systems to integrate and enhance virtual medicine capabilities. In situations of pandemics like the Covid-19 virtual services could ensure undisrupted provision of healthcare services.

6.4 Study Limitations

The study was only limited to Radiant Group of Hospitals and only involved one personnel per each cadre of organizational level. The frontline level (end-users) is broader with various professional capacities and EHR implementation is affected largely by this level hence needed more inclusion.

The study only involved a private health facility and EHR adoption relates to both public and private health facilities, hence, the results of this study can be more applicable to private healthcare setting.

6.5 Suggestions for Future Studies

Other researchers can expand more on the study to understand views of different organizational level involvement in EHR adoption by comparing a public facility and a private facility.

Other studies can also compare views of EHR adoption process of the frontline level per professional scope like pharmacist's vs doctors or nurses or laboratorian etc.

It could also be beneficial to understand the extent of locally developed EHR system adoption in Kenya and how the vendors interact with their customers to ensure hospital tailored EHR systems.

References

Ajami, S., & Bagheri-Tadi, T. (2013). Barriers for adopting electronic health records (EHRs) by physicians. *Acta Informatica Medica*, *21*(2), 129–134. https://doi.org/10.5455/aim.2013.21.129-134

Ajami, S., Ketabi, S., Isfahani, S., & Heidari, A. (2011). Readiness Assessment of Electronic Health Records Implementation. *Acta Informatica Medica*, *19*(4), 224. https://doi.org/10.5455/aim.2011.19.224-227

Akanbi, M. O., Ocheke, A. N., Agaba, P. A., Daniyam, C. A., Agaba, E. I., Okeke, E. N., & Ukoli, C. O. (2014). Progress and challenges, *14*(1), 1–6.

Alanazi, B., Butler-, K., & Alanazi, M. (2020). Perceptions of healthcare professionals about the adoption and use of EHR in Gulf Cooperation Council countries : a systematic review, 1–10. https://doi.org/10.1136/bmjhci-2019-100099

Anyango, O. J. (2017). Challenges to Electronic Medical Record Systems adoption : A Case of Coast Province General Hospital .

Argote, L., & Miron-Spektor, E. (2011). Organizational learning: From experience to knowledge. *Organization Science*, *22*(5), 1123–1137. https://doi.org/10.1287/orsc.1100.0621

Avgar, A. C., Litwin, A. S., & Pronovost, P. J. (2012). Drivers and barriers in health IT adoption: A proposed framework. *Applied Clinical Informatics*, *3*(4), 488–500. https://doi.org/10.4338/ACI-2012-07-R-0029

Ayatollahi, H., Mirani, N., & Haghani, H. (2014). Electronic health records: what are the most important barriers? *Perspectives in Health Information Management / AHIMA, American Health Information Management Association*, *11*.

Barbabella, M. G., & Melchiorre. (2016). How can eHealth improve care for people with multimorbidity in Europe? On behalf of the ICARE4EU consortium. *Policy Brief 25*, 7.

Ben Hador, B. (2017). Three levels of organizational social capital and their connection to performance. *Journal of Management Development*, *36*(3), 348–360. https://doi.org/10.1108/JMD-01-2016-0014

Blavin, Ramos, & Shah. (2018). Lessons from the Literature on Electronic Health Record Implementation, 202–223. Retrieved from https://www.healthit.gov/sites/default/files/hit_lessons_learned_lit_review_final_08-01-2013.pdf

Boonstra, A., Versluis, A., & Vos, J. F. J. (2014). Implementing electronic health records in hospitals : a systematic literature review, (December). https://doi.org/10.1186/1472-6963-14-370

Broome, B., Sharma, N., & Velamoor, S. (2016). Achieving ROI from EHRs : Actionable insights that can transform care delivery. Retrieved from https://healthcare.mckinsey.com/achieving-roi-ehrs-actionable-insights-can-transform-care-delivery

Cameron, R. (2011). An analysis of quality criteria for qualitative research. *25th ANZAM Conference*, (December), 1–16.

Clark, J. R., Huckman, R. S., & Staats, B. R. (2013). Learning from customers: Individual and

organizational effects in outsourced radiological services. *Organization Science*, *24*(5), 1539–1557. https://doi.org/10.1287/orsc.1120.0796

Dornan, L., Pinyopornpanish, K., Jiraporncharoen, W., Hashmi, A., Dejkriengkraikul, N., & Angkurawaranon, C. (2019). Utilisation of Electronic Health Records for Public Health in Asia: A Review of Success Factors and Potential Challenges. *BioMed Research International*, *2019*. https://doi.org/10.1155/2019/7341841

Ellsworth, M. A., Dziadzko, M., O'Horo, J. C., Farrell, A. M., Zhang, J., & Herasevich, V. (2017). An appraisal of published usability evaluations of electronic health records via systematic review. *Journal of the American Medical Informatics Association*, *24*(1), 218–226. https://doi.org/10.1093/jamia/ocw046

Etikan, I., Musa, S. A., & Alkassim, R. S. (2017). Comparison of Convenience Sampling and Purposive Sampling Comparison of Convenience Sampling and Purposive Sampling, (February). https://doi.org/10.11648/j.ajtas.20160501.11

Fourcade, M., Polillo, S., Reed, I., Summers-effler, E., Vanantwerpen, J., Goldstone, J., … Terhune, D. B. (2008). The Meaning of ' Theory ,' (June).

Garavand, A., Mohseni, M., Asadi, H., Etemadi, M., Moradi-Joo, M., & Moosavi, A. (2016). Factors influencing the adoption of health information technologies: a systematic review. *Electronic Physician*, *8*(8), 2713–2718. https://doi.org/10.19082/2713

Gates, B. (2003). Chapter 6 : Adoption of Technology. *Management*, (University of Pretoria etd-Giesing), 77–86.

Gittell, J. H. (2012). New Directions for Relational Coordination Theory. *The Oxford Handbook of Positive Organizational Scholarship*, 400–411. https://doi.org/10.1093/oxfordhb/9780199734610.013.0030

Hafeez-Baig, A., Gururajan, R., & Chakraborty, S. (2016). Assuring reliability in qualitative studies: A health informatics perspective. *Pacific Asia Conference on Information Systems, PACIS 2016 - Proceedings*, (June).

Hall, B. H. (Univerisity of C. B., & Khan, B. (Univerisity of C. B. (2016). New Economy Handbook: Adoption of new Technology, *24*(5), 381. https://doi.org/10.1097/MOO.0000000000000298

Heale, R., & Twycross, A. (2015). Validity and reliability in quantitative studies. *Evidence-Based Nursing*, *18*(3), 66–67. https://doi.org/10.1136/eb-2015-102129

Hitt, L. M., & Brynjolfsson, E. (2000). Beyond Computation: Information Technology, Organizational Transformation and Business Performance Erik. *Journal of Economic Perspectives*, *14*(4), 23–48.

Ibrahim, M. (2012). THEMATIC ANALYSIS : A CRITICAL REVIEW OF ITS PROCESS AND EVALUATION, *1*(1), 39–47.

Kaushal, R., Levy, D. E., Ph, D., Rosenbaum, S., Shields, A. E., Ph, D., & Blumenthal, D. (2008). Electronic Health Records in Ambulatory Care — A National Survey of Physicians.

Kavuma, M. (2019). The usability of electronic medical record systems implemented in sub-Saharan Africa: A literature review of the evidence. *Journal of Medical Internet Research*, *21*(2). https://doi.org/10.2196/humanfactors.9317

Kenya Health Act. (2017). Kenya Gazette Supplement. *Finance Act, 2018*, *59*(59), 165. Retrieved from http://www.ilo.org/dyn/travail/docs/505/Employment Act 2007.pdf

Lipsky, D. B., Avgar, A. C., & Lamare, J. R. (2009). Organizational Strategies for the Adoption of Electronic Medical Records : Toward an Understanding of Outcome Variation in Nursing Homes Organizational Strategies for the Adoption of Electronic Medical Records :

Litwin, A. S. (2011). Technological change at work: The impact of employee involvement on the effectiveness of health information technology. *Industrial and Labor Relations Review*, *64*(5), 863–888. https://doi.org/10.1177/001979391106400502

Liu, L. (2016). Using Generic Inductive Approach in Qualitative Educational Research : A Case Study Analysis, *5*(2), 129–135. https://doi.org/10.5539/jel.v5n2p129

MartínezPérez, G., & Massaguer Pla, D. (2012). Remote Usability Study on mHealth app VirTelMed in a South African Setting. *International Journal of Computer Applications*, *59*(6), 28–34. https://doi.org/10.5120/9554-4012

Megel, M. E., & Heermann, J. A. (1993). Research design. *Plastic Surgical Nursing*, *13*(4), 209–210. https://doi.org/10.1097/00006527-199301340-00010

Melis, B. (2011). Electronic health records. *Surgical Products*, *30*(10), 34. https://doi.org/10.19030/ajhs.v3i3.7139

Menachemi, N., & Collum, T. H. (2011). Benefits and drawbacks of electronic health record systems. *Risk Management and Healthcare Policy*, *4*, 47–55. https://doi.org/10.2147/RMHP.S12985

MOH-Kenya. (2011). Kenya National ehealth Strategy 2011-2017 Ministry of MedicalServices Ministry of Public Health and Sanitation. Retrieved from http://publications.universalhealth2030.org/uploads/kenyanation_ehealth_strategy.pdf

MOH-Kenya. (2013). *Health Sector Strategic and Investment Plan (KHSSP) July 2013-June 2017. Ministry of Health, Kenya*.

MOH-Kenya. (2016). Kenya national eHealth policy 2016-2030. *Policy Document*.

Mtebe, J. S., Nakaka, R., International, A., & Alliance, H. (2018). Journal of Health Informatics in Developing Countries Submitted : July 10 th , 2018 Accepted : September 8 th , 2018 Assessing Electronic Medical Record System Implementation at Kilimanjaro Christian, *12*(2), 1–16.

Muinga, N., Magare, S., Monda, J., Kamau, O., Houston, S., Fraser, H., … Paton, C. (2018). Implementing an open source electronic health record system in kenyan health care facilities: Case study. *Journal of Medical Internet Research*, *20*(4). https://doi.org/10.2196/medinform.8403

Nakano, D., & Muniz, J. (2018). Writing the literature review for empirical papers. *Producao*, *28*(March). https://doi.org/10.1590/0103-6513.20170086

Odekunle, F. F., Odekunle, R. O., & Shankar, S. (2018). Why sub-Saharan Africa lags in electronic health record adoption and possible strategies to increase its adoption in this region. *International Journal of Health Sciences*, *11*(4), 59–64. https://doi.org/10.12856/JHIA-2018-v5-i1-147

Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., Hoagwood, K., … Northwest, K. P. (2016). HHS Public Access, *42*(5), 533–544. https://doi.org/10.1007/s10488-013-0528-y.Purposeful

Park, S. Y., & Chen, Y. (2012). Adaptation as design: Learning from an EMR deployment study. *Conference on Human Factors in Computing Systems - Proceedings*, (June), 2097–2106. https://doi.org/10.1145/2207676.2208361

Park, S. Y., Chen, Y., & Rudkin, S. (2015). Technological and organizational adaptation of EMR implementation in an Emergency Department. *ACM Transactions on Computer-Human Interaction*, *22*(1), 1. https://doi.org/10.1145/2656213

Paton, C., & Muinga, N. (2018). Electronic Health Records: A case study from Kenya. *Pathways for Prosperity Commission Background Paper Series; No. 12. Oxford, United Kingdom*. Retrieved from https://pathwayscommission.bsg.ox.ac.uk/sites/default/files/2018-10/paton_and_muinga_-_electronic_health_records.pdf

Price, M., Singer, A., & Kim, J. (2013). Adopting electronic medical records. *Canadian Family Physician*, *59*, e322-9.

Regan, E. A., & Wang, J. (2016). Realizing the value of EHR systems critical success factors. *International Journal of Healthcare Information Systems and Informatics*, *11*(3), 1–18. https://doi.org/10.4018/IJHISI.2016070101

Richards, R. J., Prybutok, V. R., & Ryan, S. D. (2012). Electronic medical records: Tools for competitive advantage. *International Journal of Quality and Service Sciences*, *4*(2), 120–136. https://doi.org/10.1108/17566691211232873

Riggs, D. W. (2015). Qualitative Research in Clinical and Health Psychology. *Qualitative Research in Clinical and Health Psychology*, (January 2015), 56–73. https://doi.org/10.1007/978-1-137-29105-9

Sepasgozar, S. M. E., & Davis, S. (2018). Construction technology adoption cube: An investigation on process, factors, barriers, drivers and decision makers using NVivo and AHP analysis. *Buildings*, *8*(6), 12–15. https://doi.org/10.3390/buildings8060074

Showell, C., & Nøhr, C. (2012). How should we define eHealth, and does the definition matter? *Studies in Health Technology and Informatics*, *180*(May 2014), 881–884. https://doi.org/10.3233/978-1-61499-101-4-881

Starman, A. B. (2013). Adrijana Biba Starman The case study as a type of qualitative research, 28–43.

State, A. I. (2011). ORGANIZATIONAL GROWTH STRATEGIES: THE COMPETITIVE EDGE IN THE NEW ECONOMY Akaso, A. A., *2*(2), 142–146.

Stefan, S. C., Popa, I., & Dobrin, C. O. (2016). Towards a model of sustainable competitiveness of health organizations. *Sustainability (Switzerland)*, *8*(5). https://doi.org/10.3390/su8050464

Stone, C. P. (2014). A Glimpse at EHR Implementation Around the World: The Lessons the US Can Learn. *Institute for E-Health Policy/HIMSS Foundation*, (May), 1–12. Retrieved from http://www.e-healthpolicy.org/docs/A_Glimpse_at_EHR_Implementation_Around_the_World1_ChrisStone.pdf

Turner, J. R., Baker, R., & Kellner, F. (2018). Theoretical Literature Review: Tracing the Life Cycle of a Theory and Its Verified and Falsified Statements. *Human Resource Development Review*, *17*(1), 34–61. https://doi.org/10.1177/1534484317749680

Vasileiou, K., Barnett, J., Thorpe, S., & Young, T. (2018). Characterising and justifying sample size sufficiency in interview-based studies : systematic analysis of qualitative health research over a 15-year period, *7*, 1–18.

Virlics, A. (2013). Investment Decision Making and Risk. *Procedia Economics and Finance*, *6*(December 2013), 169–177. https://doi.org/10.1016/s2212-5671(13)00129-9

Vogelsmeier, A. A., Halbesleben, J. R. B., & Scott-Cawiezell, J. R. (2016). Technology Implementation and Workarounds in the Nursing Home. *Journal of the American Medical Informatics Association*, *15*(1), 114–119. https://doi.org/10.1197/jamia.M2378

Waithera, L., Muhia, J., & Songole, R. (2017). Impact of Electronic Medical Records on Healthcare Delivery in Kisii Teaching and Referral Hospital. *Medical & Clinical Reviews*, *03*(04), 1–7. https://doi.org/10.21767/2471-299x.1000062

Wamae, P. (2015). IMPLEMENTATION OF ELECTRONIC MEDICAL RECORDS IN KENYAN PUBLIC HOSPITALS : CHALLENGES AND OPPORTUNITIES BY A THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF DOCTOR OF PHILOSOPHY (INFORMATION SCIENCE) IN THE SCHOOL OF EDUCATION KENYATT, (May).

Were, M. C., & Meslin, E. M. (2011). Ethics of implementing Electronic Health Records in developing countries: points to consider. *AMIA ... Annual Symposium Proceedings / AMIA Symposium. AMIA Symposium*, *2011*(January), 1499–1505.

WHO. (2006). A manual for developing countries. *Community Eye Health*, *15*(44), 64.

WHO. (2016). *Global diffusion of eHealth: making universal health coverage achievable*. Geneva. Retrieved from http://apps.who.int/iris

WHO Executive Board. (2004). eHealth: Report by the Secretariat (Executive Board EB115/39 115th Session, Provisional agenda item 4.13), (1), 1–6. Retrieved from http://www.who.int/healthacademy/media/en/eHealth_EB-en.pdf?ua=1

Xu, S. (2015). Advancing return on investment analysis for electronic health record investment. *Jhin*, *21*(4), 32–39.

Appendices

Appendix A: Consent Form

CONSENT FORM

Title of the Study	Organizational Levels' Involvement in Electronic Health System Adoption in Nairobi: A Case Study of Radiant Group of Hospitals
Study Description	You are invited to participate in a research study conducted by Tchaiwe Zulu, an MBA student in Healthcare Management at Strathmore University Business school. The study seeks to collect information on your perspectives on Electronic Health Records (EHR) System. Your voluntary participation shall involve being interviewed for 45 minutes to 1 hour through an interview guide. The interview shall be recorded and records shall be destroyed after dissemination of results.
Interview Venue	The interview will be conducted through a phone or zoom call at day and time of your convenience.
Risks	There are no anticipated risks associated with this research
Perceived Benefits	The researcher shall benefit through partial fulfilment for the award of an MBA in Healthcare Management. The findings will also add to existing knowledge on EHR adoption in Kenya and help the hospital to make evidence informed decisions.
Confidentiality	All information collected shall be treated with utmost confidentiality. The anonymity of the respondents shall be maintained at all times, including after the study. The primary data collected shall be securely stored in an encrypted database and shall only be used for the purpose of this research.
Voluntary Participation	Your participation in the study is completely voluntary. You may choose not to participate and may withdraw your consent to participate at any time in the course of the interview. You will not be penalized in any way should you decide not to participate or to withdraw from this study.
Payment and compensation	You're supposed to receive refreshments during the interview from the investigator but due to COVID-19 the equivalent budgeted for refreshments will be given in monetary value of KSh 300.
Contact Information	For any clarification on the consent please contact me as follows: *Tchaiwe Zulu* *+254-797-733-727* *Institute of Healthcare Management* *Strathmore Business School*

Consent

The participant shall verbally communicate acceptance of participation before commencing the interview by saying: ***"I have read and understood this consent, as well as been given an opportunity to ask any incidental questions. I voluntarily give my consent to participate in this study."***

Appendix B: Interview Guide for Strategic Level

Interview Guide for Strategic Personnel

Section A: Background Information of Strategic Team

1. Briefly explain your professional background?
2. Tell me about your recent or previous interaction with EHR system?
3. How long have you being using the EHR system?

Section B: Investment Decision

"*The organization intends to be a great and long term healthcare provider by consistently exceeding the expectations of their clients and partners*".

4. Explain the process that lead to the choice of your current EHR system?
5. What aspects or factors made the system appropriate for this hospital?
   (Economic, Social, Technical and alignment to organizational purpose)
6. In absence of any limiting factors elaborate on what would the hospitals ideal process of acquiring or investing in an EHR system?

Section C: Implementation Process

"According to the mission statement, the hospital is guided by a patient-centred model of care delivery".

7. Explain how the implementation process of EHR system was done?
8. What aspects or factors contributed to successful implementation of the system?
9. In relation to your professional capacity what challenges occurred in the implementation phase?
10. What could have been done better or differently that might have navigated the challenges?
11. How do patients or your clients benefit from this system?

Section D: Usability of the System

"Usability relates to ease of use and learnability of a software or system to achieve quantified objectives with effectiveness, efficiency and satisfaction in a specified context of use".

12. In brief explain how useful is the EHR system in relation to your position?
13. How supportive were the system designers?
14. What other measures have been put in practice to empower staff to utilize the system?

Appendix C: Interview Guide for Operations Level

Interview Guide for Operational Personnel

Section A: Background Information of Operational Team

Electronic Health Record (EHR) is the collection of patient and demographic information in a digital format.

1. Tell me about your professional background
2. Briefly explain your experience of interacting with an EHR system either of current or past or even both?
3. How long have you been using the EHR system?

Section B: Investment Decision

"*The organization intends to be a great and long term healthcare provider by consistently exceeding the expectations of their clients and partners*".

4. Explain the process that occurred before opting for the current EHR system?
5. What existing infrastructures supported the use of health technology in the hospital?

Section C: Implementation Process

"According to the mission statement, the hospital is guided by a patient-centred model of care delivery".

6. Explain in details how the EHR system implementation process was done?
7. Does the hospital have or enhance a learning culture among its employees? *(If Yes, how? If No, what do you think could be done?)*

Section D: Usability of the System

"Usability relates to ease of use and learnability of a software or system to achieve quantified objectives with effectiveness, efficiency and satisfaction in a specified context of use".

8. How has your subordinates been motivated to use the system?
9. How does the hospital ensure EHR system trained personnel are retained?

Section E: Adaptation Techniques

"Adaptation refers to modification of new technology or specific aspects of a new system in order to fit the users' environment"

10. Were there any complaints raised by your subordinates in relation to the system during and after implementation?
11. How did you manage those complaints?
12. What's your final remark as the general view on the EHR system?

Appendix D: Interview Guide for Frontline Level

Interview Guide for Frontline Personnel

Topic: Organizational Levels' Involvement in Electronic Health System Adoption in Nairobi: A Case Study of Radiant Group of Hospitals.

Section A: Background Information of Frontline Team

1. Tell me about your professional background?
2. Explain about any EHR system you have interacted with whether in the past or present?
3. How long have you been using the EHR system?

Section B: Investment Decision

"*The organization intends to be a great and long term healthcare provider by consistently exceeding the expectations of their clients and partners*".

4. Prior to interaction with the EHR system what was your computer skill level?
5. Prior to introduction of the current EHR system how did the hospital ensure you are ready for the system?
6. Is there anything you think was done exceptionally well or could have been done better to enhance your abilities in using the system?

Section C: Implementation Process

"According to the mission statement, the hospital is guided by a patient-centred model of care delivery".

7. Explain how the implementation process of the current EHR system was done?
8. Describe how you felt about the system features?
9. What did the EHR system do exceptionally that couldn't be possible prior to its deployment?
10. Do you think the system is capable of making diagnostic decision and carrying out patient treatment the same way you could or even more without needing your input?

Section D: Usability of the System

"Usability relates to ease of use and learnability of a software or system to achieve quantified objectives with effectiveness, efficiency and satisfaction in a specified context of use".

11. Tell me how you use the system?
12. How do patients benefit out of the system?
13. How does the organization motivate you to enhance your usage of the system?

Appendix E: Ethical Approval

Strathmore UNIVERSITY

28th May 2020

Ms Zulu, Tchaiwe
tchaiwezulu@outlook.com

Dear Ms Zulu,

RE: Organizational levels' perception in Electronic Health System Adoption in Nairobi: A case study of radiant group of hospitals

This is to inform you that SU-IERC has reviewed and **approved** your above research proposal. Your application approval number is **SU-IERC0714/20.** The approval period is **28th May 2020 to 27th May 2021.**

This approval is subject to compliance with the following requirements:

i. Only approved documents including (informed consents, study instruments, MTA) will be used
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by SU-IERC.
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to SU-IERC within 72 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to SU-IERC within 72 hours
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to SU-IERC.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://oris.nacosti.go.ke and also obtain other clearances needed.

Yours sincerely,

for Dr Virginia Gichuru,
Secretary; SU-IERC

STRATHMORE UNIVERSITY INSTITUTIONAL ETHICS REVIEW COMMITTEE (SU-IERC)
28 MAY 2020
TEL: +254 (0)703 034 000
P. O. Box 59857 - 00200
NAIROBI - KENYA

Cc: Prof Fred Were,
Chairperson; SU-IERC

Ole Sangale Rd, Madaraka Estate. PO Box 59857-00200, Nairobi, Kenya. Tel +254 (0)703 034000
Email info@strathmore.edu www.strathmore.edu

Appendix F: Introduction Letter

Strathmore UNIVERSITY
BUSINESS SCHOOL

Monday, 01 June 2020

To whom it may concern,

RE: FACILITATION OF RESEARCH – ZULU TCHAIWE ELLEN

This is to introduce Zulu Tchaiwe Ellen, admission number **MBA HCM/101614/2018** who is an MBA in Healthcare Management (MBA HCM) student at Strathmore University Business School (SBS). As part of our SBS MBA HCM Master's Program, Tchaiwe is expected to do applied research and to undertake a project. This is in partial fulfilment of the requirements of the Master of Business Administration. She would like to request for appropriate data from your organization to help her finalize her research.

Tchaiwe is undertaking a research project on **"Organizational levels' perception in Electronic Health System Adoption in Nairobi: A case Study of Radiant Group of Hospitals"**. The information obtained from your organization shall be treated confidentially and shall be used for academic purposes only.

Our MBA seeks to establish links with industry, and one of these ways is by directing our research to areas that would be of direct usefulness to industry. We would be glad to share our findings with you after the research, and we trust that you will find them of great interest, if not of practical value to your organization.

Any assistance you can provide to her will be greatly appreciated and we shall be willing to provide any further information required.

Yours Faithfully,

Veronica Muniu,
Manager – Programs.

Strathmore UNIVERSITY
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P.O Box 59857 00200 Nairobi, Kenya
Cell: +254 703 414/6/7
Email: info@sbs.ac.ke or Visit www.sbs.strathmore.edu
Twitter:@SBSKenya

Appendix G: Research License

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: 250549

Date of Issue: 10/July/2020

RESEARCH LICENSE

This is to Certify that Miss.. Tchaiwe Zulu of Strathmore University, has been licensed to conduct research in Nairobi on the topic: Organizational Levels' Involvement in Electronic Health System Adoption in Nairobi: A Case Study of Radiant Group of Hospitals for the period ending : 10/July/2021.

License No: NACOSTI/P/20/5162

250549

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

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