

**INFORMATION TECHNOLOGY INTEGRATION AND PERFORMANCE OF
SELECTED PUBLIC HOSPITALS IN KENYA**

BY

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University or for any other award. No part of this thesis should be reproduced without authority of the author or/and Kenyatta University

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DEDICATION

This study is dedicated to my immediate family, my wife Jane and my daughter Gloria for their overwhelming continuous support and encouragement.

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ABBREVIATIONS AND ACRONYMS

BSC	Balanced Scorecard
CBHF	Community Based Health Financing
CEO	Chief Executive Officer
CST	Control System Technician
DCT	Dynamic Capabilities Theory
DOI	Diffusion of Innovations
EMR	Electronic Medical Record
FBO	Faith Based Organizations
EHR	Electronic Health Records
GDP	Gross Domestic Product
GoK	Government of Kenya
HISA	Health Informatics Society of Australia
HMIS	Hospital Management Information System
ICT	Information Communication Technology
ICU	Intensive Care Unit
IOA	Institutional and Organizational Assessment
ISA	Informatics Society of Australia
IT	Information Technology
ITI	Information Technology Integration
KES	Kenya Shillings
KHSSP	Kenya Health Sector Strategic Plan
MES	Managed Equipment Services
MFI s	Micro Finance Institutions
MHRA	Medicines and Healthcare products Regulatory Agency
MOH	Ministry of Health
NGOs	Non-Governmental Organizations
NHIF	National Health Insurance Fund
PAHO	Pan American Health Organization
ROE	Return on Equity
ROI	Return on Investment

SBSC	Strategic Balanced Score Card
SDGs	Sustainable Development Goals
TAM	Technology Acceptance Model
THE	Total Health Expenditure
TOE	Technology-Organization-Environment
TOE	Technology-Organization-Environment
TRA	Theory of Reasoned Action
USA	United States of America
WHO	World Health Organization

OPERATIONAL DEFINITION OF TERMS

Customer	:	A patient and hospital staff.
Financial Viability	:	Ability of an organization to be financially sustainable.
Hospital	:	An institution that provides medical, surgical treatment and nursing care for sick or injured people.
Human IT integration	:	The placement of personnel and extension of human capabilities with hardware and software technologies in an organization.
Information Technology	:	Use of computers and other electronic devices to collect, process, store or disseminate information.
Integration	:	Linking IT to organization operations by use of computers and telecommunications networks.
ITI Infrastructure Flexibility:		The degree to which organizations adapt to users' needs, business processes design and unexpected changes in IT- related requirements.
IT Integration	:	Advancement and reconfiguration of IT to support organizational operations.
Organizational Characteristics:		Distinguishing features or attributes of an organization that can influence its performance such as size, number of employees and CEO innovativeness.
Organizational effectiveness:		Degree to which an organization achieves its immediate objectives or produces its desired outcomes.
Organizational efficiency	:	Optimal conversion of inputs into outputs.
Organizational IT integration:		Combination of IT resources and management support in an organization's operations strategies.
Organizational Performance:		Degree to which an organization achieves its objectives that are unique to its mission. This is measured by effectiveness, efficiency, relevance and financial viability.

- Organizational Relevance** : Organization's ability to innovate and create new and more effective situations as a result of new knowledge.
- Public Hospital** : Health institution owned and operated by government. In this study, public hospital includes level 4,5 and the national referral hospitals in Kenya
- User Perception** : A subjective belief of an individual on IT integration.

ABSTRACT

Kenya's health sector is faced by inefficiencies and ineffectiveness that deters the achievement of its citizens goals of universal health, fairness, cost effectiveness, acceptance and sustainable development. Kenya's Vision 2030 outlines provision of healthcare as key to improving the quality of life for all Kenyans while public hospitals guarantee improved citizens' wellbeing. Universal health coverage is one of the pillars in the Big Four Agenda to be achieved by the Government of Kenya by the year 2022. The Ministry of Health has underlined Information Technology Integration as one of its reform strategies to ensure public health institutions perform better. Despite the increasing demand and need for healthcare, performance of public hospitals has been crippling. Therefore, this study investigated the effect of information technology integration on performance of selected public hospitals in Kenya. The specific objectives were to: establish the effect of human-information technology integration on performance of selected public hospitals; determine the effect of organizational information technology integration on performance of selected public hospitals; analyze the effect of information technology infrastructure integration on performance of public hospitals; analyze the moderating effect of organizational characteristics on the relationship between information technological integration and performance of selected public hospitals; analyze the mediating effect of user perception on the relationship between information technological integration and performance of selected public hospitals in Kenya. This study was anchored on Technology-Organization-Environment Model, Technology Acceptance Model, Diffusion of Innovations Theory as well as Dynamic Capabilities Theory. The study was guided by positivism research. An explanatory and cross-sectional survey research design were utilized. The target population of the study included ninety-eight, public hospitals in Kenya which have integrated managed equipment services, comprising ninety-four from the forty-seven counties and four national referral hospitals. A sample size of 294 respondents was drawn using proportionate stratified random sampling. The study used primary data collected using self-administered structured questionnaire. To analyze the features of the surveyed public hospitals and the respondents, descriptive statistics were used. Multiple regression analysis was carried out to determine the effect of information technology integration, organizational characteristics and user perception on performance. Results from the study showed that integration of human-information technology, organizational information technology integration and infrastructure flexibility had a significant positive impact on the performance of public hospitals in Kenya. The study further found that the characteristics of the organization and the perception of the users respectively moderated and mediated the relationship between the integration of information technology and the performance of public hospitals in Kenya. The study concluded that the integration of information technology in public hospitals plays an important role in increasing hospital efficiency, relevance, effectiveness and financial viability. The study recommends enhanced use of integrated information technology by public hospitals in Kenya for improved performance hence better service delivery.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Public institutions in developing nations are characterized by poor performance, among other organizational challenges (Munduga, 2014). A focus on performance issues in public organizations remains a topic of current policy and reforms in most governments around the world. In particular, government reforms seek to improve organizational performance in both developed and developing countries (De Waal & Tan Akaraborworn, 2013). To resolve this, governments have increased investments in Information Technology (IT).

Hospitals play a significant role in a country's social and economic vibrancy across various regions. Healthcare is a crucial part of the growth and management of any economy. Improved health results in improved productivity, increased educational performance, improved quality of life, continued investment and savings, lower healthcare costs and debt expenditure (Kaseje, 2006). Public sector organizations' performance has been and remains under intense and close public scrutiny (Aluvanze, Hudson & Senaji, Thomas, 2017). Likewise, citizens are increasingly demanding public institutions that are more efficient and performance - oriented.

With the continuing digital revolution ushered by the Internet, institutions are moving towards IT Integration (ITI) in order to reduce their operating costs, increase productivity and performance, and respond quickly to the needs of their customers and other partner organizations (Jardim-Goncalves, Popplewell & Grilo, 2012; Soto-Acosta, Popa & Palacios-Marqués, 2016).

The framework for Technology-Organization-Environment (TOE) conceives that ITI plays a key role in continuing to support organizational processes and thus the magnitude of IT use hinges on the ITI of organizations, that transforms prevalent technologies into capabilities successfully (Soto-Acosta & Merono-Cerdan, 2008; Malongo, Muathe & Waithaka, 2019).

Marshall (2015), and Song and Tucker (2016), noted that health infrastructure, education, incomes, and opportunities around the globe have improved steadily due to ITI. Economic and social developments have led to lower mortality and increased life expectancy. Regrettably, these developments have in no way been all-inclusive. The health gap between first, second and third world nations has broadened, perhaps because of imbalance in the assimilation of innovations and additionally unequal circulation of new and re-rising medical issues.

Hospitals are essential in ensuring the better well-being of the citizens as well as that of nations (World Health Organization - WHO, 2014). Not only do underperforming hospitals hamper social and economic development, they can also have unfavorable effect on the economic prospects of countries (WHO, 2014). The use of IT such as Medical record automation, electronic appointment scheduling, Internet use for communication purposes, and the use of magnetic cards in hospitals has been adopted by developed and third world countries. Despite the widespread use of IT, 90 percent of hospitals in United States of America still use pagers and overpay by 45 percent to maintain legacy paging services (Deidda, Villanueva, Codagnone & Maghiros, 2014).

The Kenyan government acknowledged the issues facing the public hospitals and underlined healthcare as one of the elements of the social pillar of Kenya's Vision 2030 blueprint (Republic of Kenya, 2008). Healthcare has been devolved to get closer to the

people in the wake of the new 2010 constitution. Both national and county governments shall provide the highest affordable standard of inclusive and affordable healthcare for people. Improved health care is projected to play an important role in boosting economic growth, alleviating poverty and achieving social goals (Republic of Kenya, 2008).

Health facilities often concentrate on a single process with solitary or intervention approaches in an attempt to improve quality of treatment. While important, this strategy is iterative; an institution may ignore the actual opportunity to lay the basis for improved healthcare. ITI links the key foundations of innovation in manpower, software, hardware, data management, information, feedback and policies and procedures to improve service delivery quality (Harris, Mishra & Koehler, 2009; Malongo, Muathe & Waithaka, 2019).

Stand-alone medical systems have had tendencies to encounter errors, communication breakdowns and inefficiency. It is evident that ITI of medical equipment and computer systems are required to drive health institutions to a better level of healthcare delivery (Cutler, 2010; Martínez-Pérez, Torre-Díez, López-Coronado, Sainz-De-Abajo, Robles & García-Gómez, 2014).

1.1.1 Organizational Performance

Performance is an essential and critical practice to the success of any organization. Management of organizational performance has elicited a lot of interest from researchers from different fields since this topic is not specific to bookkeepers, financial analyst, business strategists, human resource managers or marketers (Magutu, 2013; Mutuku, Muathe & James, 2019). Understanding the basic decision-making process such as planning, coordinating and controlling that affects organizational performance is crucial because performance is a key element in evaluating organizations (Burstin, Leatherman & Goldmann, 2016).

Researchers have differed on the best measurements of hospital performance that has therefore prompted suggestions for different healthcare performance measurement approaches (Sheshinski, 2003). The choice of indicators of performance are based on organization's targets, a specified measurement technique to think about; this ought to be chosen through individuals who are involved in running the organization (Bourne, Neely, Mills & Platts, 2003). Organizations around the globe have been utilizing financial measurements such as profitability, cash flow, return on equity (ROE), net operating income, market share and return on investment to determine their performance (Kumar, 2016).

Al-Najjar and Kalaf (2012), argue that financial measures pass on the financial results of the actions that the organization has already made and emphasis on the measures relating to profitability upon which investors check the lucrativeness of their business. Subsequently, under this viewpoint, managers are required to create measures for performance evaluation. Performance estimations have revolved around the utilization of accounting information to measure the organizational performance.

With the surge of the computer age in the previous century, the primary proliferation of financial information as a premise for assessing performance was not satisfactory to manage organizational performance (Al – Najjar & Kalaf, 2012). This is more so amidst global financial integration, described as integrated supply and demand chains. Non-financial measures are routinely utilized for performance assessment; particularly, they are the subject of principles like Balanced Scorecard-BSC (Liang & Yao, 2005).

Al-Hosaini and Sofian (2015), asserted that non-financial measures could be of value in light of the fact that any mix of costless performance measures that reduce the risk forced on the operator through a motivator contract is helpful to the organization. Moreover,

combining diverse performance measures may help organizations in integrating some services in a manner to reduce operational costs. Non-financial measures including customer satisfaction, item quality, or employee turnover are particularly applicable in situations where market-based execution measures demonstrating the aggregate organizational value are not accessible.

Generally, non-financial metrics do not provide an intrinsic economic incentive to the organization. Furthermore, they are key indicators not provided for future performance information by conventional financial measures. Doherty, Misener and Cuskelly (2014), classify non-financial performance metrics as efficiency, effectiveness, relevance and financial viability. The performance of non-profit organizations such as hospitals takes place at the organization's aggregate level, impacts on society and is generally estimated by theoretical models. Theoretical models are management instruments that are normally used in program evaluation in the non-profit sector.

The theoretical models are developed for particular types of programs to connect particular quantifiable inputs to quantifiable particular impacts (McLaughlin & Jordan, 2010). Logic models usually specify how system inputs, such as funds and man hours, generate operations and outputs, resulting in effects. One of the standout models for measuring the performance of an organization is the Institutional and Organizational Assessment (IOA) Model (Kinyua-Njuguna, 2013).

Shih and Schoenbaum (2007), Silverman (2008), Marta (2008) and Kinyua-Njuguna (2013), suggest that IOA model is a multidimensional approach that blends efficiency, financial viability, relevance and effectiveness. Therefore, performance for non-profit organizations such as public hospitals should be assessed using metrics such as

efficiency, financial viability, relevance and effectiveness. Consequently, these variables were adopted for this study.

1.1.2 Information Technology Integration

The public hospitals' healthcare quality has not benefited from Hospital Management Information System (HMIS). Past studies have pointed to the need for ITI in public hospitals to mitigate the urban-rural gap and cross-border variation, lack of adequate staff, and deteriorating quality of public hospital healthcare (Macharia & Maroa, 2014). Kim, Shin, Kim and Lee (2011), conceptualized ITI as the advancement and reconfiguration of IT to support organizational operations. This involves the use of IT resources in organizations' operations strategies so as to positively impact on performance.

Park, Im and Kim (2011), posit that ITI concerns the technical and management capabilities in the field of information systems. Their study suggested three dimensions for ITI: human ITI, Organizational ITI and infrastructure ITI. IT human integration is concerned with IT assets management capabilities. Park et al. (2011), argues that ITI is established over time through experience, which tends to be organizational-specific. Similarly, Hsu, Kraemer and Dunkle (2006) identified two constructs for organizational ITI: organizational resources and top management support. Organizational resources relate to the financial and human resources allocated for ITI programs by organizations.

Kim (2017) argues that there is substantial empirical evidence to enhance the importance of supportive top management in organizational ITI. Their active participation enhances the importance of technology integration. Further, integration of information technological innovation in firms requires wide-ranging resources. These must be

sanctioned by the top management and technological innovations which are viewed more favorably by them as being more likely to receive the required organizational resources.

Bharadwaj (2000), specifically connected IT to organizational performance. Utilizing Grant (1997) grouping model, he classified ITI as: IT infrastructure (tangible resources), intangible assets such as information resources, user alignment and human IT assets. ITI was observed to be directly correlated to organizational performance. Mwithiga, Njihia, and Iraki (2017) contend that superior organizational performance is accomplished through the integral impacts of complex interactions between tangible, intangible and human IT assets. They also assert that these measurements are associated with organizational performance.

Bhatt, Emdad, Roberts and Grover (2010) describes IT infrastructure integration as the ability to link an expansive assortment of hardware and software in order to support organizational operations. IT infrastructure integration is considered to be a crucial component of organizations' resources that contribute to organizational performance (Fink & Neumann, 2009). Bhatt et al. (2010) identified four measures of IT infrastructure integration: competency, connectivity, compatibility and modularity.

Tallon (2008), and Zhang and Ziegelmayer (2009), underline that IT infrastructure integration increases the extent to which an organization anticipates customer demands, organizations operations and unplanned systems changes. This has been associated with improved organizational performance. Further, it has been noted that lack of IT infrastructure is associated with user dissatisfaction, high operational costs and poor performance. Human ITI is the placement of personnel and extension of human capabilities with hardware and software technologies (Madni, 2010).

Human capability is a component of IT management and personnel skills. Ravichandran, Lertwongsatien and Lertwongsatien (2005), assessed human ITI by manpower expertise and specific of personnel. Unsal and Cetindamar (2015), outline IT management capability is the dynamic ability of firms to reconfigure their Information technology base to shape and implement their strategic and operational objectives.

Organizations need to manage technological resources that enable them to have a more developed technological capability (Pufal, Zawislak, Alves & Gamarra, 2014). In that sense, IT management technological capability relates to absorption and transformation of an IT as a way of improving performance mainly through personnel skills. Skills, knowledge and experience are required to operate systems and to generate technical change from technological capability.

1.1.3 Organizational Characteristics

The value proposition of IT for organizations is complex (Fink, 2011). The effect of ITI on organizational performance has been explored by numerous studies. In so doing, they have identified some factors related to organizations' characteristics, for instance, size and age, considered to be moderators. Equally, Tian, Wang, Chen and Johansson (2010), point out to organization's size and age are pointers of past performance. Further, Ortega (2010), Lun and Quaddus (2011) support the argument that organizational characteristics can influence performance. For instance, bigger organizations, unlike small ones, tend to operate with a large pool of resources.

Identifying the organizations' characteristics that determine the effect of ITI on organizational performance is a management's fundamental responsibility (Malongo, *et al.*, 2019). Nevertheless, the important viewpoint is not generally the asset base. Rather, it is the resources that are bundled together to form distinct capacity for organization

such as ITI (Soto-Acosta & Meroño-Cerdan, 2008; Soto-Acosta, Popa, & Palacios-Marqués, 2016). The organization's life expectancy (age) provide better performance (Ortega, 2010), notwithstanding the lack of discovery by Wu et al., (2008) of the mediating impact of life expectancy on the relationship between performance of the organizational and IT capacities.

1.1.4 User Perception

The Technology Acceptance Model (TAM) postulates that a user's belief creates the intent to utilize a technological innovation. The intent to use results into the actual use decision. The importance of user perception towards IT has been widely recognized in various fields (Leng, Lada, Muhammad, Ibrahim, & Amboala, 2011). Moreover, Leng et al. (2011), postulates that the perceived usefulness and ease of use are significant dimensions in determining adaptation of innovations. Consequently, the greater the perceived usefulness and perceived ease of use of technological innovations, the more likely that it will be integrated into the organization's operations (Muathe, *et al*, 2019).

Davis *et al.* (1989), described perceived ease of use as the individual's belief that the effort required in utilizing an innovation or degree to which a client trusts that utilizing a specific innovation will be easy. Earlier studies have determined perceived ease of use to be an essential factor influencing client acknowledgment and use of IT (Osman *et al.*, 2016; Muathe, *et al.*, 2019). Perceived ease of use reflects the user's perception of the level of effort needed to use the technology.

Based on past research, perceived ease of use has been identified as a significant attribute influencing user acceptance and user behaviour. For example, Osman, Alwi and Khan (2016) argued that perceived ease of use consists of determinants of ease of use such as ease of reading, use of understandable terms, ability to search for relevant information

and ability to return to the previous page. This also involves support, intricacy and management of change.

Perceived usefulness describes the perception of the user as to how much technology will improve the performance of the work environment of the user (Davis *et al.*, 1989). This implies the user has a sense of how useful the innovation is in carrying out his tasks. This comprises reducing the time, efficiency and accuracy required to do the job. Users are therefore more likely to use a system or not to use it to the extent that they believe it will help them perform their duties better.

Proper IT integration is required for effective use of technology and to foster organizational performance (Erişti, Kurt & Dindar, 2012). Lombardi (2007), believes that user beliefs dictate the ability to access genuine information. While some users accept and use technology to enhance their performance. Others are unwilling to accept and use accessible technology skills and techniques (Lombardi, 2007).

1.1.5 Health Sector in Kenya

Kenyan Healthcare Sector Report (2016), points out that there are 9,696 hospitals registered in Kenya. Around 4,616 of the health facilities belong to the government, 3,696 are private hospitals and 1,384 belong to Non-Governmental (NGOs) and Faith-Based Organizations (FBOs). There exists an expansive disparity among these healthcare institutions, particularly in counties. As indicated in the report, the Total Health Expenditure (THE) ascended by around 33 percent to KES 234 billion in year 2012/13.

The Kenyan Healthcare Sector Report (2016), Noted that health funding is provided through National Health Insurance Fund (NHIF), private health insurance, Community Health Financing (CBHF), taxation, employer schemes user fees, NGOs and development partners.

The GoK's spending on social insurance was approximately 6 percent of Gross Domestic Product (GDP) in 2012/2013 that was low contrasted with different nations in the region (Kenyan Healthcare Sector Report, 2016). In addition, the public, private or community-based medical coverage scheme secures about 25 percent of Kenyans. Self-financing expenditure remains high, pushing many people into poverty and representing an obstacle to accessing healthcare services.

In the year 2013, healthcare was devolved in Kenya. From that point forward, the Ministry of Health (MOH) has been constrained to offering policy direction and specialized services in national referral hospitals. Kenya's Health Policy 2012-2030 and Kenya's Strategic Plan for health Sector (KHSSP) 2013-2017 guide the operations MOH. In view of this, healthcare personnel are overseen at both national and county levels (Kenya Health Sector Strategic Report, 2013).

Kenya has a high shortage of healthcare staff, affecting mostly rural areas. Most of the human capital in the healthcare sector is used in the private sector. Specialist competitiveness increases medical services provision costs. The difficulties lead to poor service preparation, reduced health workers productivity and brain-drain where qualified and experienced healthcare specialists search for better paying jobs in the private sector and abroad (KHSSP, 2013).

IT has continually been observed as having the potential to address the above stated health sector challenges particularly in Kenya and generally in Africa. ITI has empowered medical specialists to do remote consultations, obtain restorative data and facilitate inquiries more viably (WHO, 2016). In 2014, the GoK commenced ITI of 106 health institutions and 11 County Departments of Health in 12 counties. IT integration aimed at supporting decision making at the health institutions (GoK, 2014).

Implementation of ITI was accomplished in accordance with Vision 2030, Sustainable Development Goals (SDGs), and the MOH flagship project to digitize hospitals in order to improve access to dedicated healthcare through e-referral and telemedicine.

In 2015, Managed Equipment Services (MES) concept was operationalized. The aim of the concept was to enhance the facilities infrastructure of county hospitals. The MES project targeted two hospitals in each county comprising of one level four and one level five and four national referral hospitals to take advantage of specialized medical equipment supply, integration and management. It was envisaged that the MES project would help improve public hospitals performance in Kenya. Currently, all the 98 hospitals have been integrated (GoK, 2016). Nevertheless, there is a lack of scientific evidence on ITI's impact on performance.

1.2 Statement of the Problem

Kenya's Vision 2030 outlines provision of healthcare as key to improving the quality of life for all Kenyans (Republic of Kenya, 2008). Universal health coverage has also been identified as one of the pillars in the big four agenda to be achieved by the government by the year 2022 (Republic of Kenya, 2018). Towards this, the GoK has initiated several reforms to improve healthcare service delivery including devolution of services and introduction of Managed Equipment Services (MES) where the supply, installation, training and lifecycle management of healthcare technology is outsourced and managed by Original Equipment Manufacturers of the technology over an agreed long-term contract period (Republic of Kenya, 2016).

In addition, the operationalization of the Health Act 2017 has clearly defined how healthcare service provision shall be undertaken, with the national government playing more of a policy and regulatory role with the provision of patient care service delivery

limited to national referral hospitals (Republic of Kenya, 2016). However, due to the increasing demand and need for healthcare, performance of public hospitals has been crippling (Muiya & Kamau, 2013).

Information technology integration (ITI) has been recognized by the GoK as one of the pillars that will help create a prosperous country that provides its citizens with high quality of life (Republic of Kenya, 2014). It has further underlined ITI as one of its reform strategies to ensure health institutions perform better (Republic of Kenya, 2016).

Mwithiga, Njihia and Iraki (2017) found out that human-information technology integration (ITI), organizational ITI and physical ITI constructs explain financial performance and non-financial firm performance. This analysis, however, evaluated a direct link between the predictor and dependent variable and ignored the influence of mediating and moderating variables. Furthermore, the study was carried out on commercial banks and micro finance institutions (MFIs) using a cross-sectional survey design that is a weak design for cause and effect study. In addition, commercial banks performance is mainly measured in financial terms (Rahut, Castellanos & Sahoo, 2010).

The current study was conducted on selected non-profit public hospitals, hence the need to focus more on measures of non-financial performance such as efficiency, financial viability, relevance and effectiveness. Kinyua-Njuguna (2013) used similar measures in a different study. In addition, Mwithiga *et al.* (2017) found that ITI and organizational performance have a significant relationship, however the study failed to recognize the moderating effect of organizational characteristics and the mediation effect of user perception on organizational performance as noted in an earlier study by McDougall and Levesque (2000), and Hameed and Counsell (2012).

The current study incorporated the organizational characteristics of the relationship between ITI and performance as a moderator and user perception as a mediator. The study also adopted a combination of cross-sectional and explanatory research design best suited to identify the cause and effect of ITI on public hospitals' performance in Kenya.

Other previous studies have demonstrated that ITI is performance-related (Ngwenyama, Andoh-Baidoo, Bollou & Morawczynski, 2006; Bankole, Osei-Bryson & Brown, 2013). These studies were however conducted in West Africa where the operating environment is different from the Kenyan context, hence creating a contextual gap.

1.3 Objectives of the Study

1.3.1 General Objective of the Study

The general objective of the study was to investigate the effect of Information Technology Integration on performance of selected public hospitals in Kenya.

1.3.2 Research Objectives

- i) To establish the effect of human-information technology integration on performance of selected public hospitals in Kenya.
- ii) To establish the effect of organizational information technology integration on performance of selected public hospitals in Kenya.
- iii) To analyse the effect of information technology infrastructure integration flexibility on performance of selected public hospitals in Kenya.
- iv) To analyse the moderation effect of organizational characteristics on the relationship between information technology integration and performance of selected public hospitals in Kenya.

- v) To analyse the mediation effect of user perception on the relationship between information technology Integration and performance of selected public hospitals in Kenya.

1.4 Research Hypotheses

H₀₁: Human-Information technology integration has no significant effect on performance of selected hospitals in Kenya.

H₀₂: Organizational information technology integration has no significant effect on performance of selected public hospitals in Kenya.

H₀₃: Information technology infrastructure integration flexibility has no significant effect on performance of selected public hospitals in Kenya.

H₀₄: Organizational characteristics do not have significant moderating effect on the relationship between information technology integration and performance of selected public hospitals in Kenya.

H₀₅: User perception does not have significant mediation effect on the relationship between information technology integration and performance of selected public hospitals in Kenya.

1.5 Significance of the study

The research is crucial to public hospitals in Kenya and specifically to policy makers as it offers useful ITI and performance information. It will help in formulating strategies for guaranteeing enhanced performance of public institutions. The study is equally significant to the GoK in policy formulation especially on ITI in public institutions as this study's findings prove beneficial for policy devising processes. The study findings, through the contribution of the researcher, enrich both theoretical and empirical literature on ITI and organizational performance. Finally, the study provides suggestions on other

fields for further research where knowledge can be acquired and therefore act as reference material.

1.6 Scope of the Study

This study focused on determining ITI's effect on the performance of selected Kenyan public hospitals. The study was limited to level 4 and 5 county hospitals and national referral hospitals in Kenya. All these hospitals have been identified by the national government as beneficiaries of the MES programme and have all been equipped with same equipment and same technology hence have common units of comparison. Data was collected from heads of departments which cut across all the hospitals. The study was carried out between March and August in 2018.

1.7 Limitation of the Study

The research was restricted to primary data, which sometimes may be difficult to guarantee its authenticity and may result to inaccurate information. However, care was taken during the data collection process to ensure that data collected was accurate and could be relied upon in making inferences and conclusion about the study population. Some of the respondents had very busy schedules hence it was difficult to obtain information from them. Constant follow ups through the hospital management and reminders were effectively used to enhance response rates.

Self-reporting, as observed by Muathe (2010), may establish self-generated credibility and therefore inflate causal connection. In addition, informants were skeptical of the researcher's purpose because the data was gathered at the time when there were many political concerns about the MES project implementation. Nevertheless, the researcher succeeded in convincing the respondents by explaining the intent of the study to them and also maintaining privacy in the use of the given data.

1.8 Organization of the Study

There are five chapters in the thesis. Chapter One revolves around the background, problem statement, study objectives, research, hypotheses, study significance, the study scope, study limitations and organization of the study. Chapter Two deals with theoretical and empirical review of literature, summarizing the gaps in literature and the conceptual framework. Chapter Three deals with the research methodology adopted to respond to the research objectives. Chapter Four focuses on the findings and analysis. Finally, the summary, conclusions, recommendations and suggestions for further research are presented in the Chapter Five.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter explores sub-topics including theoretical review of literature, empirical review of literature, summary of literature review, and conceptual framework.

2.2 Theoretical Literature Review

This section discusses the theories on which the study is anchored. Various theories were utilized in explaining ITI and performance in public hospitals including Technology Acceptance Model (TAM), Diffusion of Innovations (DOI) Theory, Technology-Organization-Environment (TOE) model and Dynamic Capabilities Theory (DCT).

2.2.1 Technology Acceptance Model

TAM is an extension of Ajzen and Fishbein 's Theory of Reasoned Action -TRA (Priyanka & Kumar, 2013). It was a theory that Davis introduced in 1986. Therefore, TAM as developed by Davis, Bagozzi and Warshaw (1989) is one of the most commonly used and influential models in the area of information systems, technology and services. It has been verified as a potent framework for predicting the acceptance of new technology by users. TAM's goal is to estimate acceptance of the information system, diagnose design issues before users have any substantial system understanding. TAM model is relevant to this study as it explains the factors influencing new technology acceptance.

TAM postulates that user perception of new technologies has two dimensions that indirectly affect acceptance, perceived usefulness, and perceived ease of use. Researchers used TAM to explain why consumers may or may not accept specific systems (Davis *et al*, 1989)

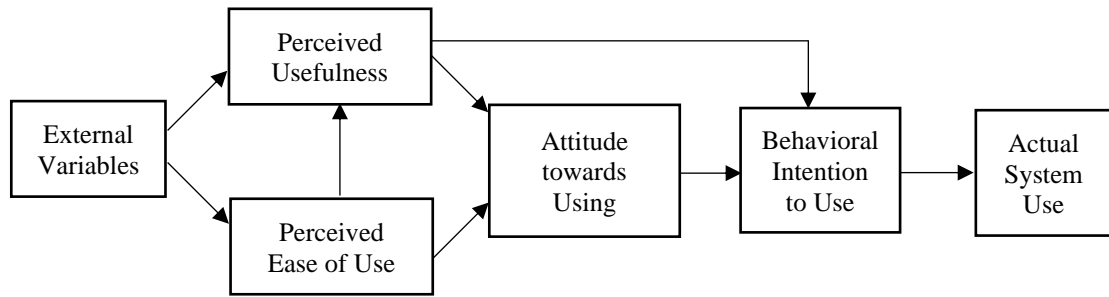


Figure 2.1 Technology acceptance Model (TAM)

Source: Davis, Bagozzi and Warshaw (1989).

TAM is presented in figure 2.1. Perceived usefulness is the extent to which a user perceives that there will be some advantages in using a given technology. In addition, the degree to which a person believes that a system will be easy to use is perceived to be ease of use (Davis *et al.*,1989). The model postulates that perceived ease of use has a direct influence on the perceived usefulness. In this research, TAM was used to evaluate how ITI and performance in the health sector were affected by perceived ease of use and perceived usefulness.

2.2.2 Diffusion of Innovations Theory

Rogers (1995) developed the principle of DOI. The theory suggests that acceptance of technology is determined by relative advantage, compatibility, trialability, observability, and complexity. The theory argues that relative advantage, reliability, trialability, and observability correlate with the rate of adoption of technology, while complexity correlates negatively with the rate of adoption of technology.

Rogers (1995), outlines that relative advantage is how much a technology is seen as being better than the thought it supersedes. The moment the organization establishes that the technology will improve their performance, it is likely to deploy the technology

faster. Rogers 1995 intimate that relative advantage might have a positive impact on an innovation's adoption.

Rogers (2010) sees compatibility as the degree to which the current functional needs of future implementers can be complimented by a technology and found a positive relationship between compatibility and adoption of innovation. Furthermore, complexity is the level at which an innovation is considered to be quite difficult to grasp and use. The difficulty of an invention has a negative impact on the level of acceptance as viewed by people in society (Rogers, 2010).

Furthermore, complexity is the level at which an innovation is considered to be quite difficult to grasp and use. The difficulty of an invention has a negative impact on the level of acceptance as viewed by people in society (Rogers, 2010) Past studies have found a negative correlation on the effect of complexity on ITI (Mourad, 2010; Alamgir & Quaddus, 2011). Thus, it is anticipated that the more challenging ITI is perceived to be, the more difficult it is to be adopted.

The model's robustness includes; the ability to recognize possible future barriers and facilitators in evaluating, perceiving, and embracing new concepts; the ability to control intended change efforts via a broad view that espouses the importance and effect of system and characteristics of individual, system, and communication patterns. Other conceptual models of change, social science, and behavioral theories are also addressed. It does, however, include a comprehensive model that can be easily and efficiently used. In practice, it creates strategic initiatives based on science and theory. Consequently, it

has been widely used successfully across different fields, with a simple set of core concepts, making it more relevant in research.

2.2.3 Technology-Organization-Environment Theory

Founded by Rocco DePietro, Wiarda and Fleischer (1990), Technology-Organization-Environment Theory (TOE) explains the process by which a company adopts and deploys innovations. Within an entity, TOE defines three structures consisting of technical, organizational and environmental contexts.

Technological defines all internal and external technologies applicable to a particular company, and the technological scope involves existing software and hardware in a company (Hage, 1980). Organizational context entails the organization's descriptive features such as size of scope and structure of management. Environmental dimension refers to the organization's operating environment including business rivals and legal framework (Tornatzky & Fleisher, 1990). The initial TOE framework was adapted severally and widely used in IT adoption studies as it provides a useful way to study the adoption and assimilation of various IT innovations in organizations (Hsu et al, 2006).

Tornatzky and Fleisher (1990) state that there are elements explained within the TOE model under each of the three constructs. They identify the relative advantage for the technological aspect as referring to the degree to which innovation is perceived as being better than the idea to be replaced. Furthermore, they link compatibility to the extent to which innovation is considered to be consistent with established values, previous perspectives and needs for implementation. It also involves the rate of understanding of creativity as being fairly challenging to understand and use.

The TOE framework identifies five aspects for the organizational structure. First, it's top management support. This is the support for the information system implementation. Secondly, is the organization's readiness in terms of size, cost/financial and technical resources. They point out that small businesses are most likely to face some form of resource poverty than the much larger firms. In effect, this greatly affects the innovation adoption. Resource poverty manifests also in the form of budget limitations constraints and ignorance.

Thirdly, are information intensity and product characteristics which refer to the extent of product information details. The fourth aspect to note under organizational construct is the managerial time which refers to the time required to be invested in the planning and adoption of technology. As for environmental construct, Tornatzky and Fleisher (1990) note the industry pressure element which denotes the high degree of business rivalry and competition which increases the likelihood of innovation adoption for purposes of gaining the much-needed competitive edge in a given industry.

Fifthly, is government pressure or support which basically points towards the government strategies and initiatives aimed at encouraging small and medium enterprises to adopt new information systems. Lastly, is consumer readiness. Lack of it adversely affects implementation and acts as a detriment to information systems use.

In this analysis, the TOE model is significant because it integrates both human and non-human factors in the implementation of information technology; a strength that supersedes other models. It also acknowledges that successful IT integrations are influenced by the top management capabilities and CEO innovativeness (Eze, Awa, Okoye, Emecheta & Anazodo, 2013). In addition, the framework materializes as a broad theoretical point of view specific to the field of information systems as its constructs have

been extensively tested for the adoption of other technologies such as e-business, enterprise resource planning and e-procurement.

2.2.4 Dynamic Capabilities Theory

Pisano and Teece (1995) advanced the DCT and Teece, Pisano and Shuen (1997) later extended it. The word dynamic specifies an organization's ability to rely on its capabilities in a changing business environment. The DCT underlines the significance of management in modifying, assimilation and realignment of the assets within and outside the firm to achieve improved organizational performance. Crook, Combs, Woehr and Ketchen (2011) considered the DCT as an advancement of the Resource-Based View (RBV) theory, addressing the resource origin issue that the RBV theory failed to address.

Kaur and Mehta (2017), maintains that DCT explains the important role of capacities to reconfigure an organization's current resources in order to cope with business operating environment changes. Dynamic capacities seek to provide a consistent framework for the understanding of organizational performance driven by organizational capabilities. Kaur and Mehta (2017), contend that organizational performance is measured on efficiency aspects rather than market positions. The theory provides a systematically structured view and stipulates that successful players cannot restrict the variables they consider performing well; they have to continuously seek which other variables come to play jointly with others for the best results and within their current and future business strategies.

The concept of DCT is significant in the study as it points out that organizations should be able to regenerate their resource base in the context of tangible and intangible

resources, including IT infrastructure, human resources, hardware and software. Such tools will be the origin of sustainable competitive advantage and superior organizational efficiency if different and difficult to replicate (Zaidi & Othman, 2014; Mutuku, *et al.*, 2019).

Comprehending how to improve the organization's performance by recognizing future needs, making quality, timely and impartial investment decisions requires well designed technology and business models. This helps organizations in implementing decisions, making productive transformations, promoting learning and reengineering systems that are nearly outdated and implementing good management practices (Teece, 2007). The theoretical review is summarized in the Table 2.1.

Table 2.1 Summary of theoretical Review

Theory	Proponent	Argument	Contribution to the current study
Technology Acceptance Model (TAM)	Davis, Bagozzi & Warshaw (1989)	Hypothesizes two beliefs, perceived usefulness and perceived ease of use that are variables that primarily affect user acceptance	Determine how perceived usefulness and ease of use influence ITI and performance
Diffusion of Innovation (DOI)	Rogers (1995)	Rate of innovation adoption influenced by relative advantage, compatibility, trialability, observability, and complexity	Explains the factors influencing adoption of innovations
Technology-organization-Environment (TOE)	DePietro, Wiarda and Fleischer (1990)	The process by which an organization adopts and implements technological innovations is influenced by the context of	Identifies the technological innovation challenges and opportunities. The three elements influence how a company sees the

		technology, the organization and the environment	need, seeks and adopts new IT
Dynamic Capabilities Theory (DCT)	Teece, Pisano and Shuen (1997)	Focuses on the ability of an organization to adapt to changing market environment by recognizing its dynamic capabilities.	Accounts for digital, information and network economics.

Source: Author (2017)

2.3 Empirical Literature Review

This segment addresses the literature related to the research objectives on human integration, organizational integration, infrastructure flexibility integration, organizational characteristics and user perception. The section concludes by summarizing the prevailing gaps and issues relevant to the current study.

2.3.1 Human IT Integration and Performance

Mwithiga, Njihia, and Iraki (2017) sought to develop a model for the relationship between ITI and Kenya's firm performance. The study was conducted using a cross-sectional survey model on commercial banks and MFIs / banks. The study findings revealed that human ITI, organizational ITI and physical ITI variables explain 57.6 percent of non-financial firm performance and 44.1 percent of financial firm performance results. However, the current study also used explanatory research design to determine the effect of ITI on the performance of Kenya's public hospital.

Hwang, Chang, LaClair and Paz (2013) conducted literature analysis to establish the relationship between integrated healthcare delivery systems and changes in cost and

quality. A total of 21 peer-reviewed articles and four non-peer reviewed manuscripts were considered in the study. The analysis results revealed a strong positive correlation between increased system integration and quality of healthcare. The results of the study also showed a weak positive relationship between integration of systems and reduced care costs, which is a conflicting outcome. The study lacked a clear research design. This study therefore empirically tested the relationship between ITI and organizational performance in general.

Gualandris and Kalchschmidt (2014) have established a relationship between the integration of the supply chain and firm performance. Individual organizations within the supply chain system improve their robustness and agility through integration. Exchange of information and knowledge, on the one hand, reduces the likelihood of disruption. On the other hand, overall effects should be curtailed due to the rapid flow of information, allowing for faster and more meaningful reactions.

Kwak and Kim (2016) conducted a study to assess whether there is a correlation between the service integration strategy and performance of industrial firms in Korea. The study analyzed company data on system integration in the machinery and equipment market. Study findings showed a significant correlation between business integration and firm profitability. The study focused on companies in the machinery and equipment market. The researcher employed exploratory research design, the findings of which should be considered preliminary. The current study was conducted in Kenya's public hospitals. It used explanatory design since it is best suited in explaining variable characteristics and cause-effect.

2.3.2 Organizational IT Integration and Performance

Zehir, Muceldili, Akuz and Celep (2010) found that ITI enhances operational skills by empowering inter-organizational linkages and enhancing coordination between organizations. In spite of the unmistakable points of interest offered by the innovation execution, there is extension for additionally understanding this issue from the viewpoint of a developing country. Drawing upon the TOE Model, this study distinguishes five variables that influence organizational decisions to pursue integration procedures. In light of information gathered from 253 firms in the Malaysian food industry, the findings recommended that ITI is connected to more organizational performance. The current study was based in Kenya.

Pham, Pham and Pham (2016) sought to identify and analyze the factors leading to Hai Phong manufacturing companies' organizational performance. The study used purposive sampling techniques, administering 600 questionnaires to 120 companies. The data was analyzed using structured equations. The study findings showed that organizational performance is significantly influenced by top management support. Specifically, top management support influenced employee satisfaction. The study utilized purposive non-probability technique that is characterized by uncontrolled variability and bias in the estimates. The current study used probabilistic sampling techniques that are highly representative of the population.

Otte-Trojel, Rundall, Bont, Klundert and Reed (2015) carried out a quantitative survey to promote awareness of the firm dynamics affecting the patient portal and organizational performance. Structured interviews with a purposeful sample of key organizational members were used by the researchers to collect data. The findings of the study revealed

that the online portal facilitates access to information, information transparency, patient-physicist interaction, patient connection and operational efficiency. Nevertheless, the study was conducted on a single organization; the findings would be hard to generalize. Because these results come from a particular integrated system, direct generalization of the findings may be restricted to other forms of hospital systems. The current study was carried out on many organizations using a representative sample. Thus, it was possible to generalize the findings.

2.3.3 IT Infrastructure Integration and Performance

Ness (2005) has established an association between integration of IT infrastructure, strategic alignment and efficiency in IT. Ness (2005) also used the Tallon and Kraemer (2003) model to measure the integration of IT infrastructure. Ness (2005) provided questionnaires to 3,080 Chief Information Officers and senior IT managers at large corporations for profit in the US. The findings revealed that IT infrastructure integration is strongly correlated with organizational performance. Drastic technological changes have occurred since this study was conducted. The present study centered on Kenya's public hospitals.

Although Fink and Neumann (2007) found a connection between implementation of IT technology and organizational efficiency, there is a lack of evidence on the effects of IT-based technologies on organizational performance. Bhatt *et al.*, (2010) revealed that organizations that rely on IT resources to innovate, perform better than those that do not use IT. The current study empirically evaluated the ITI-organizational performance relation. It also tried to assess the effect of ITI on the performance of Kenya's public hospital.

Karungami and Ochiri (2017) conducted a study to assess the impact of ICT support on the Nairobi county government's performance. The study employed purposive sampling techniques to examine 87 county employees. The study reported that ICT infrastructure enhances communication, improves efficiency, monitoring and control as well as delivery of services. The study focused on county government. Purposive sampling may result in misjudgment due to low reliability and high biasness and inability to generalize scientific findings. The current study focused on hospitals. It used simple random sampling and cluster sampling techniques.

2.3.4 IT Integration, Organizational Characteristics and Performance

Thong (1999) survey found that business organizations' characteristics such as the Chief Executive Officer's (CEO's) innovativeness, knowledge of information systems (relative benefit, flexibility, and IT complexity), and organizational features, including company size and IT knowledge of employees, are more likely to adopt IT. In addition, the researcher found that the innovativeness of the CEO was an important determinant of the decision to adopt IT, but it did not affect the extent of IT adoption. Nevertheless, the level of implementation of technology is largely determined by characteristics of the company. The study by Thong (1999) has been underlined by Muathe, Wawire and Ofafa (2013), who established adopter characteristics such as organization size, geographic location, age, management support, CEO's IT skills and experience as key determinants of adoption and IT use. The current study aimed to determine the extent to which these characteristics influence ITI and performance of the company.

Dholakia and Kshetri (2004) found that IT adoption and use are affected by internal organizational features such as firm strategy, past experience and attitudes toward

technology and external factors such as infrastructure, business factors and the competitive environment. The study was based on a New England (USA) sample of 45 SMEs. The study also showed that size of the company, self-efficacy, previous use of technology and perceived competitive pressure had a correlation with increased use and adoption of IT.

Shankar and Kasturi (2006), built up a conceptual model that grouped ICT adoption factors into internal factors that small and medium sized businesses have control over. The identified factors include lack of time or resources, lack of awareness of the CEO's organizational factors, and return on investment. The second category comprises external factors that cannot be settled by the business organization. These include lack of infrastructure, deficient bandwidth, social and cultural variables, and lack of legislation and regulatory framework. However, this model ignored factors such as the innovativeness of the CEO and the IT level of knowledge of the employee. These variables are considered by the current study.

Hameed and Counsell (2012) identified an important relationship between the creativity of the CEO and IT adoption. The CEO's IT knowledge is a key element in achieving the full benefits of technological innovation. However, the study of meta-analysis found the variable to have a weak relationship with IT adoption. The study sought to examine the moderating effect on the relationship between IT adoption and effectiveness of the CEO. These results were consistent with findings of Thong (1999).

2.3.5 IT Integration, User Perception and Performance

Mustapha and Obid (2015) conducted a study in Malaysia to assess the impact of perceived ease of use on the relationship between the performance of tax services and the use of the online tax system. The findings of the study revealed that ease of use perceived had a significant mediating effect on the relationship between the quality of tax services and the online tax system. Further, the findings of the study showed that perceived ease of use is a mediating factor with an efficient service provided by the tax manager, resulting in increased consumer use of the online tax system. The study was conducted in Nigeria and surveyed 206 respondents, using structured questionnaires. The data collected were analyzed using simulation of the structural equation.

The study, however, focused only on the electronic aspects of service quality, not on the non-electronic, as those who used the system were the respondents of the study. Because of a specific group of users, these results could not be generalized. Therefore, the current study considers perceived usefulness variable, carried out on numerous public hospitals, thus enhancing the generalizability of the findings.

Osman, *et al.* (2016) found that perceived ease of use leads to the use of digital technology. The study also found that up to 15 percent of the variation in behavioral use was explained by the perceived ease of use. Nevertheless, perceived ease of use of the software did not contribute solely to behavior prediction when perceived usefulness was taken into consideration, indicating a mediation effect.

Using the partial least squares method, the survey used questionnaires to analyze the relationships between the major variables. However, the study focused on only one user

perception variable, the perceived ease of use; it ignored perceived usefulness, thus creating a conceptual gap. Further, the study used survey design to study a single learning organization in Malaysia hence the findings cannot be generalized.

2.4 Summary of Literature Review and Research Gaps

Table 2.2 below summarises the literature review and gaps identified.

Table 2.2 Summary of Literature Review and Research Gaps

Author	Title	Objective	Findings	Gaps	Focus of the current study
Kwak and Kim (2016)	Effect of the strategy for service integration on the performance of industrial firms	Examining the relationship between service integration and profitability of manufacturing firms	The relation between integration of services is positive. Outsourcing of process operations and technical consultation make a significant contribution to profitability.	The study focused solely on determining whether a relationship exists between service integration and profitability. The study was done on manufacturing firms	The current study focuses on the performance effects of technological integration. The study factors in the mediation effect of customer satisfaction. The study's context is hospitals
Karungami and Ochiri (2017)	Effect on organizational performance of ICT infrastructure support: Nairobi county, Kenya	To establish the impact on organizational performance of ICT infrastructure support.	Robust procurement ICT infrastructure improves communication, improves efficiency, improves monitoring and control, facilitates work and improves service delivery.	The study focused on county government. Purposive sampling may result to researcher judgment errors, Low reliability and high bias levels and inability to generalize study results.	The current study focused on County and National Referral hospitals; uses multi-stage sampling
Zanfei and Seri (2016)	ICT's role, skills and organizational change in performance of the public sector	To solve the empirical issue of evaluating public sector performance. Secondly, it is important to determine and analyze the specific role of ICT in revamping the public sector.	ICT has no impact on public sector results, but its combination with institutional change and expertise tends to have a positive impact on public sector performance.	No clear methodology	The current study uses explanatory and cross-sectional research design
Pham, Pham & Pham, (2016).	Top Management Support for Manufacturing Companies in	Identify a set of variables that would contribute to	Top management support positively influences	The study used purposive non-probability sampling	The current study used multi-stage sampling

Author	Title	Objective	Findings	Gaps	Focus of the current study
	Hai Phong, as well as Organizational Learning, Innovative Behavior, Employee Engagement and Organizational Performance	company performance.	organizational performance. Precisely, top management support has significantly affected employee satisfaction		

Source: Author (2017)

2.5 Conceptual Framework

The dependent variable in this study is the performance of Kenya's public hospitals while the independent variable is ITI. The conceptual framework is shown in figure 2.2 below.

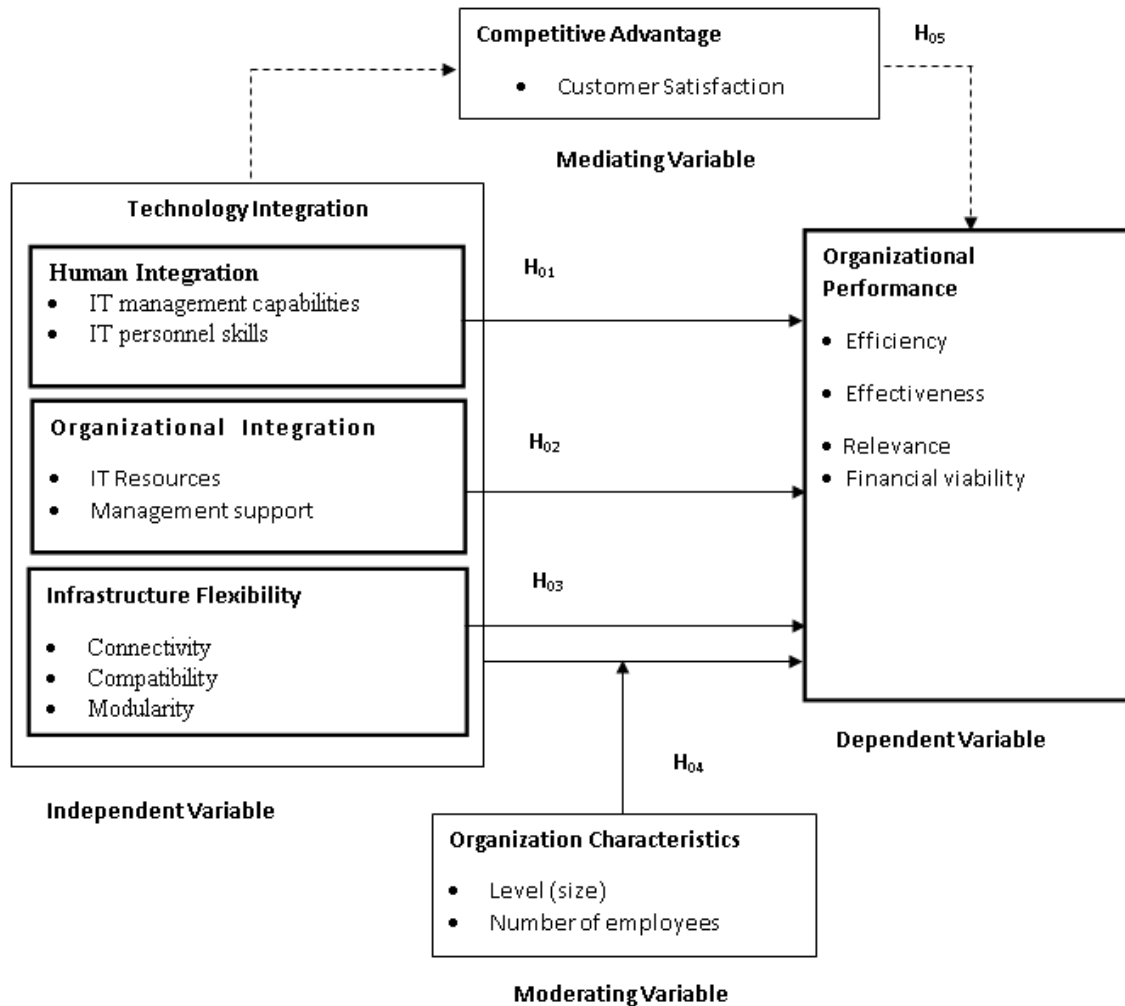


Figure 2.2 Schematic diagram on the Conceptual Framework

Source: Author (2017)

The conceptual framework illustrates the relationship between the independent variable (human integration, organizational integration and physical IT integration), the mediating variable (user perception) and the moderating variable (organizational characteristics) and their effect on the dependent variable (performance).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the overall strategy that was adopted to address the research problem and the research objectives. It is divided into different sections: philosophy of research, design of research, empirical models, target population, method of sampling, tools and instruments of data collection, validity and reliability, data analysis and presentation. The chapter ends with ethical considerations.

3.2 Research Philosophy

Social research can be associated with a number of different philosophies. The most commonly used are the realism, interpretivism and positivism research philosophies. A philosophy may affect the design and interpretation of the findings of the study at hand (Saunders, Lewis & Thornhill, 2007). Realism as a research philosophy is based on the presumption of a scientific approach to the development of knowledge. Interpretivism claims that only through subjective interpretation and direct action can reality be fully understood.

Further, interpretivism and realism paradigms are central to qualitative research approaches. The subjective nature of these approaches provide room for biasness. This study adopted positivism research philosophy since it includes the use of the existing theory to develop hypotheses in the research process to be tested (Saunders et al., 2007). Easterby-Smith, Thorpe and Jackson (2008) claim that the philosophy of positivism is based on the principles of reason, truth and validity. Focus on empirically measured observations using statistical and mathematical techniques. The present study was based on testing hypotheses, the theories of the study that already exist.

3.3 Research Design

Wahyuni (2012), observe that the most common research designs are exploratory, explanatory and descriptive research designs. An exploratory research tries to determine whether an existing theory can explain what is being observed; it lays the groundwork for future studies. Once the groundwork has been established, through descriptive survey research design, the newly explored field will require more information.

Descriptive survey design provides the researcher with an opportunity to capture features of the population and test hypotheses (Cooper & Schindler, 2011; Mugenda & Mugenda, 2010). The researcher has no control over the variables in the sense that they can be manipulated, thus avoiding any bias. There are two kinds of research designs that are descriptive, namely longitudinal and cross-sectional. Longitudinal survey encompasses repeated observations over long periods of the same parameters; cross-sectional survey includes data collected at a single point in time for the study population (Cooper & Schindler, 2011).

Explanatory study design is used when a phenomenon requires an interpretation of cause and effect (Saunders *et al*, 2007). An explanatory research work for Blatter and Haverland (2012), seeks to obtain the cause and effect between variables of the study. This type of study can test the influence of change on existing standards most social scientists are looking for causal explications reflecting tests of hypothesis. Causal effect (nomothetic perspective) occurs when the dependent variable results in or results in variation in one phenomenon, an independent variable, on average, in variation in another.

This study used explanatory and cross-sectional surveys as recommended by Saunders *et al*. (2009). Kothari (2008) and Saunders *et al*. (2007), assume that explanatory study

layout defines the degree and existence of cause-and-effect relationships between variables. The same authors assert that cross-sectional survey seeks to evaluate the relationship between variables at a particular time to explain the relationship patterns between variables. This research aimed to establish how ITI influences the performance of public hospitals in Kenya.

3.4 Empirical model

Quantitative data analysis can be carried out using various models such as regression analysis, discriminant analysis, logit, tobit and probit (Field, 2013). Muathe (2010), argues that when independent variables are continuous, discriminant analysis can be used to predict binary dependent variables. However, it is preferred to use Logit, Tobit or Probit models in cases where the independent variables are categorical or a mix of continuous and categorical. Different researchers choose among them on the basis of convenience, thus, the one to use is a matter of personal preference (Muathe, 2010)

In addition, multiple regression analysis is preferred when dealing with continuous variables. Organizational performance is considered as a continuous variable in this study, so as recommended by Field (2013), multiple linear regression model was preferred.

The aggregate equation of the effects of independent variables on Performance was:

$$PPH = \beta_0 + \beta_1 HIT_1 + \beta_2 OIT + \beta_3 IFI + \epsilon \dots\dots\dots 3.1$$

Where,

PPH - Performance of Public Hospitals

β_0 - Constant coefficient

β_1 - β_3 - Parameters to be estimated

HIT - Human ITI

OIT - Organizational ITI

IFI - Infrastructure Integration

ϵ - Error term

3.4.1 Testing for Moderation

Whisman and MacClelland (2005), describe a moderating variable as a third variable influencing the intensity of the relation between the independent and dependent variables. Moderation effect testing entails determination of whether the co-efficient of interaction term is statistically significant or assessment of whether it is simply an explanatory variable. To evaluate the moderation effect of organizational features on the relationship between ITI and the performance of the public hospital. Model (I) that contains organizational characteristics as the moderating variable was predicted to give the direction and effect of the moderator on the independent variables and its overall effect on the dependent variable.

$$PPH = \beta_0 + \beta_1 ITI + \beta_2 OC + \beta_3 OC * ITI + \epsilon \dots \dots \dots 3.2$$

Where,

ITI - Composite index of independent variable ITI and,

OC - Composite index for organizational characteristics.

To obtain the composite index for the variables being used, the harmonic mean equation was used (Gupta, 2011).

$$C_i = \sum f_i w_i \div \sum f_i$$

Where

C_i = Variable composite index

f = Respondents sum total

W_i = Component relative weighting

Whisman and MacClelland (2005), argues that if the relationship between the predictor variable (ITI) and the moderator (OC) variables is not statistically significant ($p > 0.05$), then the organizational characteristics variable is not a moderator, but an explanatory factor. On the other hand, it is supported if the coefficient of the interaction term is statistically significant.

3.4.2 Testing of Mediation

As Baron and Kenny (1986) suggest, a four-step technique has been used to perform multiple regression analyses and evaluate the significance of the coefficients at each step. The Baron and Kenny (1986) model as suitable model since it takes into account both linear and non-linear variables effects.

The schematic diagram of the model that guided the test for mediation is shown in Figure 3.1.

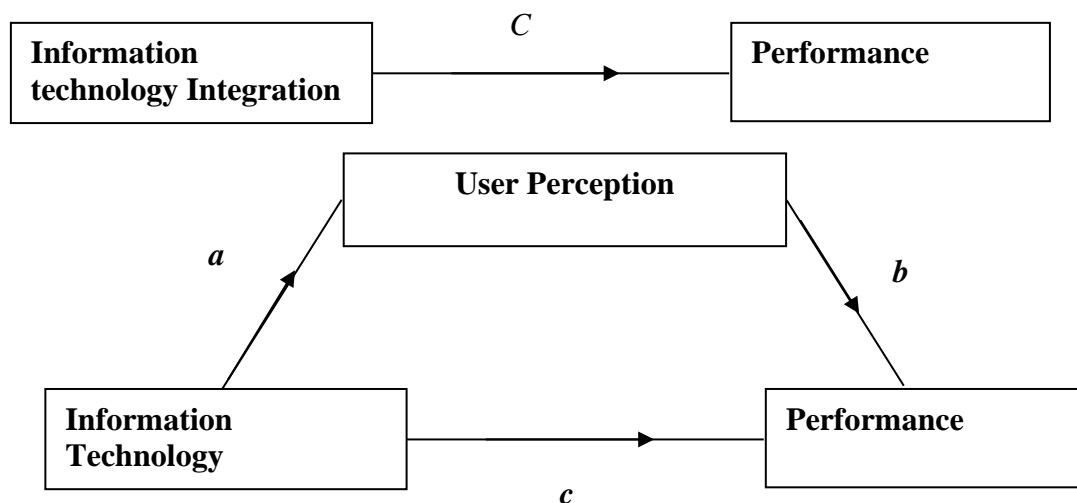


Figure 3.1 Mediation Model

Source: Baron & Kenny (1989)

In Figure 3.1, C is the total effect of independent variable (ITI) on dependent variable (performance). Then c is the direct effect of ITI on performance after controlling User

Perception. Further, a is the effect of ITI on User Perception, whereas b is the effect of User Perception after controlling ITI (Rucker, Preacher, Tormala & Petty, 2011).

Model 3.3 analyzed as the base model for assessing the effect of ITI on performance. Model 3.4 analyzed the mediating effect of user perception on the independent variable, ITI.

Model 3.5 estimated to establish whether there was complete, partial or no mediation between the independent and dependent variables.

$$PPH = \beta_0 + \beta_1 ITI + \varepsilon \dots\dots\dots 3.3$$

Regression equation of independent variable predicting Mediating variable.

$$UP = \beta_0 + \beta_1 ITI + \varepsilon \dots\dots\dots 3.4$$

Where,

PPH = Composite Index for Hospital Performance

UP = Composite Index for User Perception

ITI = Composite Index for IT Integration

Regression equation of independent variable and mediating variable predicting dependent variable.

$$PPH = \beta_0 + \beta_1 ITI + \beta_2 UP + \varepsilon \dots\dots\dots 3.5$$

Where,

PPH = Composite Index for Hospital Performance

ITI = Composite Index for IT Integration

UP = Composite Index for User Perception

A table adopted by Baron and Kenny (1986) was used to make a decision on the type of mediation.

Table 3.1 Mediation Decision

	OUTCOME	CONCLUSION
1	β_1 significant in model 3.3	Complete Mediation
	β_1 significant in model 3.4	
	β_1 significant in model 3.5	
	β_1 insignificant and β_2 significant model 3.5	
2	β_1 significant in model 3.3	Partial Mediation
	β_1 significant in model 3.4	
	β_1 significant in model 3.5	
	β_1 significant and β_2 significant model 3.5	
3	β_1 significant in model 3.3	No Mediation
	β_1 significant in model 3.4	
	β_1 significant in model 3.5	
	β_1 insignificant and β_2 insignificant model 3.5	

Source: Baron and Kenny, (1986)

3.5 Target Population

The target population included ninety-eight public hospitals in Kenya that have integrated managed equipment services, comprising ninety-four level 4 and 5 hospitals from the forty-seven counties and four national referral hospitals (Republic of Kenya 2017). The distribution of the target population is shown in Table 3.2 below.

Table 3.2 Distribution of Target population

Hospital Categories	Frequency	Percentage
Level 4 Hospital	47	48
Level 5 Hospitals	47	48
National Referra Mackinnon and Fairchild (2009) 1 Hospitals	4	4
TOTAL	98	100

Source: Republic of Kenya (2017)

As indicated in Table 3.2 Level 4 hospitals are 47 (48%) of the total population while Level 5 hospitals and national referral hospitals are 47 (48%) and 4 (4%) respectively.

3.6 Sample Size and Sampling Technique

Most public hospitals have approximately ten departments (DeMan, Gemmel, Vleric & Dierchx, 2002). The study focused on ten departments of the hospitals including Admission, IT, Imaging, Pharmacy, Accident and Emergency, Medical Records, Laboratory, Wards, Surgery and Hospital Administration from the 98 hospitals (Appendix VI) which translated to 980 departments. The study used proportionate stratified random sampling technique to choose the required sample size since it is more reliable and cost effective while gathering primary data from geographically dispersed population (Saunders *et al*, 2007).

The researcher selected 294 respondents from 980 departments which translated to 30% of the total population. According to Mugenda and Mugenda (2010), with a population of less than 10,000, a sample size of 10 to 30 percent is recommended. Further, Saunders *et al*. (2007), emphasizes that a higher sample is a good population representation, thus minimizing types I and II errors. Table 3.3 represents the distribution of the sample.

Table 3.3 Distribution of Sample Size

Hospital Categories	Population of Hospitals	Total Departments	Sample Size (Minimum 30%)	Percent
Level 4 Hospital	47	470	141	48%
Level 5 Hospitals	47	470	141	48%
National Referral Hospitals	4	40	12	4%
TOTAL	98	980	294	100%

Source: Author (2017)

3.7 Data Collection Instruments

The researcher developed a structured questionnaire for data collection based on knowledge obtained from a literature review of studies related to ITI and organizational

performance (Kinyua-Njuguna, 2013; Mwithiga, Njihia & Iraki, 2017; Malongo *et al.*,2019).

3.7.1 Operationalization and Measurement of Variables

The dependent variable in this study is organizational performance while information technology integration comprising of Human ITI, Organizational ITI and IT infrastructure flexibility as independent variables. Table 3.4 presents a description of the study variables and how they were operationalized.

Table 3.4 Operationalization and Measurement of Variables

Variable	Nature	Operationalization	Indicator	Measure	Questionnaire
Performance	Dependent Variable	Degree to which an organization achieves its objectives that are unique to its mission	Effectiveness	5-point rating type scale	Q: Part E (a)
			Efficiency	5-point rating type scale	Q: Part E (b)
			Relevance	5-point rating type scale	Q: Part E (c)
			Financial viability	5-point rating type scale	Q: Part E (d)
Human Integration	Independent Variable	The placement of personnel and extension of human capabilities with hardware and software technologies in an organization.	Management capabilities IT Personnel skills	5-point rating type scale	Q: Part B (a)
Organizational Integration	Independent Variable	Combination of IT resources and management support in an organization's operations strategies	IT resources Management support	5-point rating type scale	Q: Part B (b)
Infrastructure Flexibility	Independent Variable	The degree to which organizations adapt to users' needs, business processes design and unexpected changes in IT- related requirements.	Connectivity Compatibility Modularity	Direct measure and 5-point rating type scale	Q: Part B (c)
Organizational Characteristics	Moderating Variable	Distinguishing features or attributes of an organization	Level (size) Number of employees &	Direct measure	Q: Part C

Variable	Nature	Operationalization	Indicator	Measure	Questionnaire
		that can influence its performance.	CEO innovativeness		
User Perception	Mediating Variable	A subjective belief of an individual vis-à-vis ITI	Perceived Usefulness Perceived Ease of Use	Direct measure and 5-point rating type scale	Q: Part D

Source: Author (2017)

3.7.2 Pilot Study

The researcher conducted a pilot test with five public hospitals in Kenya to determine the validity and reliability of the data collection tool. These public hospitals were not part of the final sample. Hair, Page and Brunsveld (2019), maintains that 1 to 1.5 percent of the population sample is adequate for a pilot study. Furthermore, Field (2013) states that the purpose of a pilot study is not so much to test research hypothesis, but rather to test protocols, tools for data collection, sample recruitment strategies and other aspects of the study in preparation for a larger and more effective study.

3.7.3 Validity Test

Pre-testing permits the researcher to refine their research work before the final test (Cooper , Schindler and Sun, 2006). The constructs for the independent variable was confirmed as appropriate by reviewing of literature and expert consultation. The basis for consideration of the dependent and mediating variables was on the literature review and all dimensions necessary for performance was included. Suggestions from healthcare industry experts and a careful alignment of the research instrument based on the literature reviewed enabled any necessary adjustment and modification of the research in order to improve the face and content validity.

Factor analysis was considered to determine the construct validity of all variables used in this study (Kerlinger & Lee, 2000). Hare and Neumann (2008) argue that factor

analysis helps to group variables together with similar attributes. This helps to reduce many variables for modeling purposes. It also helps select subset variables from a large set base on which the original variables have the highest factor correlations. All the variables' indicators were subjected to factor analysis and were expected to load in accordance with prior theoretical expectations.

3.7.4 Reliability Test

Hair, Celsi, Ortinau and Bush (2013), suggest that the Cronbach's Alpha is the most frequently used measure of reliability. The research tool's reliability was tested using the reliability coefficient of Cronbach Alpha. The higher the Alpha, the higher the consistency, hence higher reliability. By the rule of the thumb, $\alpha \geq 0.7$ indicates adequate reliability. Consequently, the researcher considered Alpha value equal or greater than 0.7 as the threshold for determining reliability.

Table 3.5 Results of reliability Test

	Reliability Statistics		
	No. of Items	Cronbach's Alpha	Remark
Human IT Integration	9	0.900	Reliable
Organizational IT Integration	5	0.788	Reliable
Infrastructure flexibility	4	0.862	Reliable
User Perception	12	0.958	Reliable
Organizational Performance	36	0.947	Reliable
Overall Reliability	66	0.89095	Reliable

Source: Study Data (2018)

Table 3.5 indicates that all variables had Cronbach's Alpha Coefficient between 0.788 and 0.958 which was above 0.7, as suggested by Hair, Celsi, Ortinau and Bush (2013). The implication of these findings was that the scale used was reliable and that the data collection tool was adequately designed to collect the information needed. The questionnaire therefore required no further modification.

3.8 Data Collection Procedure

The researcher delivered the questionnaires, including an explanation of its specific objectives of the study, to the office of each hospital administrator for distribution to the respondents identified from the departments. This was due to the difficulty in accessing all the departments of the hospital as a confidentiality, patient safety and infection control measures within the hospital. A central area was agreed on for the management to assist in distribution.

It was expected that the informants would voluntarily provide data and were promised confidentiality of the information provided. The informants were given four weeks at their own convenience to complete the questionnaire. Three days before the dateline, the researcher contacted the hospital administrators through mobile phone, to remind the informants to complete the questionnaires. The researcher collected the completed questionnaires from the hospital administrator of each hospital within seven-week period.

3.9 Data Analysis and Presentation

Data analysis was performed using descriptive and inferential statistics. Frequencies, percentages, means and standard deviations were used in descriptive statistics to summarize and present data. Regression models were used to conduct inferential statistics to predict the effect of ITI on performance. Based on the study objectives, multiple linear regression analysis model was used to derive a weighted estimate equation that was used to determine values (Cooper & Schindler, 2011; Hair, Page & Brunsveld, 2019).

3.10 Summary of Data Analysis

Table 3.6 Presents the summary of the research objectives, hypotheses, statistical approaches

Table 3.6 Summary of Data Analysis

	Objective	Hypotheses	Statistical Approach	Interpretation Basis
1	To establish the effect of human ITI on performance of selected public hospitals in Kenya.	H ₀₁ : Human integration has no significant effect on performance of selected public hospitals in Kenya.	Multiple regression analysis PPH = $\beta_0 + \beta_1HI + \beta_2OI + \beta_3 IF + \epsilon$	P ≤ 0.05
2	To determine the effect of organizational ITI on performance of selected public hospitals in Kenya.	H ₀₂ : Organizational integration has no significant effect on performance of selected public hospitals in Kenya.		
3	To analyse the effect of IT infrastructure integration on performance of selected public hospitals in Kenya.	H ₀₃ : Infrastructure flexibility has no significant effect on performance of selected public hospitals in Kenya.		
5	To analyse the moderation effect of organizational characteristics on the relationship between technological integration and performance of selected public hospitals in Kenya.	H ₀₄ : Organizational characteristics do not significantly moderate the relationship between IT Integration and performance of selected public hospitals in Kenya.	Regression analysis PPH = $\beta_0 + \beta_1ITI + \beta_2OC + \beta_3OCE.ITI + \epsilon$	P ≤ 0.05 Change in β
6	To analyse the mediation effect of user perception on the relationship between technological integration and performance of selected public hospitals in Kenya.	H ₀₅ : User Perception does not significantly mediate the relationship between ITI and performance of selected public hospitals in Kenya.	Regression analysis PPH = $\beta_0 + \beta_1ITI + \epsilon$ UP = $\beta_0 + \beta_1ITI + \epsilon$ PPH = $\beta_0 + \beta_1ITI + \beta_2UP + \epsilon$	P ≤ 0.05 Change in β

Source: Author (2017)

3.11 Diagnostic Tests

Various diagnostic tests were carried out prior to data analysis in order to detect, confirm and rule out the presence of the conditions that violate the assumptions of Ordinary Least

squares Model (OLS). The relevant diagnostic tests for this study were sample adequacy test, confirmatory factor analysis, normality, test for multi-collinearity and test for heteroskedasticity.

3.11.1 Sample Adequacy Test

Keiser-Meyer-Olkin (KMO) measurement of sampling appropriateness and Bartlett's sphericity test will be subjected to data on the different variables measured using multiple items (Hill, 2011). The obtained KMO values must surpass a threshold of 0.5 (Moutinho & Hutcheson, 2010)). This will be an indication that the test is adequate and that underlying factors cause the observed variability in the research variables.

3.11.2 Confirmatory Factor Analysis

Factor analysis serves as a measure of basic significance of a particular item to the factor. It is utilized to find and eliminate items that are not part of the study objectives and do not pertain to the analysis (Kline (2014). Communalities were used to show the fundamental significance of variable factors where, a threshold of 0.7 is considered satisfactory. However, a factor load of 0.4 level is adequate due to the apparent problems of meeting the 0.7 criterion (Levine, 2015).

3.11.3 Normality Test

Normality test is used to establish if data set has been drawn from a normally distributed population. Normality test was conducted by use of Kolmogorov-Simonov and Shapiro-Wilk test. Under Kolmogorov-Simonov and Shapiro-Wilk test of normality test, the null hypothesis H_0 : data is normally distributed while the H_a : Data is not normally distributed. A p value of greater or equal to 0.05 implies that data is normally distributed while a p value less than 0.05 indicates that data is not normally distributed (Thode, 2002).

3.11.4 Heteroskedasticity Test

One of the critical ordinary least squares model assumptions is that the error term has a constant variance. If this assumption is violated, then we have a problem of heteroskedasticity, implying that the variance of the error term is no longer constant. The presence of heteroskedasticity was measured using levene test for homogeneity. The null hypothesis was that the error term is homoscedastic; the alternate claim was that the error term is heteroskedastic. If the null hypothesis is rejected, then it implied there is presence of heteroskedasticity. The researcher may therefore use logarithmic transformation to reduce heteroskedasticity (Gastwirth, Gel & Miao, 2009; Vynck, 2017).

3.11.5 Multi-collinearity Test

Multi-collinearity was tested to determine the likelihood for the predictor variables to have some predictive power over one another. Field (2013) asserts that multi-collinearity is measured by the variance inflation factor (VIF) greater or equal to 10. However, Garson (2012) asserts that the rule of thumb is that $VIF > 4.0$.

Multi-collinearity is a problem and other scholars use more lenient cut off of $VIF > 5.0$ O'Brien (2007) suggests that this rule of thumb should be assessed in contextual basis considering factors that influence the variance of regression coefficient. Multi-collinearity poses a problem for multiple regression models as the standard error of the coefficients tends to increase as collinearity increases, rendering them less reliable.

3.12 Ethical Issues

The researcher considered different approaches to guarantee that the study adheres to research ethical standards. Approval was obtained from Kenyatta University (Appendix III), a permit to conduct the study was acquired from National Commission for Science, Technology and Innovation - NACOSTI (Appendix IV & V). An ethical approval was

sought from the Ethics and Review Committee of the Kenyatta University. Finally, confidentiality was ensured by requesting the respondents to fill an informed consent form (Appendix I).

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction

This chapter presents study findings and it is divided into two sections. Section one presents the findings using descriptive statistics that highlight the study sample characteristics while section two presents the findings by use of inferential statistics. These are used for the test of the hypotheses of the study.

4.2 Descriptive statistics

This section presents study findings that include response rate, background information about respondents, results on evaluating and analysing the extent of IT integration in public hospitals in Kenya. These include human IT integration, organizational IT integration and hospitals' infrastructure flexibility to IT integration. The chapter finally presented the findings vis-à-vis the research hypotheses using the regression analysis. Prior to running the regression, the study conducted diagnostics tests to ascertain if the data adhered to regression assumptions such as multicollinearity, normality and heteroskedasticity.

4.2.1 Response Rate

A total of 294 questionnaires were administered to the selected head of department in the sampled hospitals. As shown in figure 4.1 a response rate of 92 percent (270) was recorded. The response rate of 92 percent transcended the threshold suggested by Babbie (2004) and Mugenda and Mugenda (2010) of about 50 percent, accordingly, the data collected is adequate to interpret and generalize the results for the entire population.

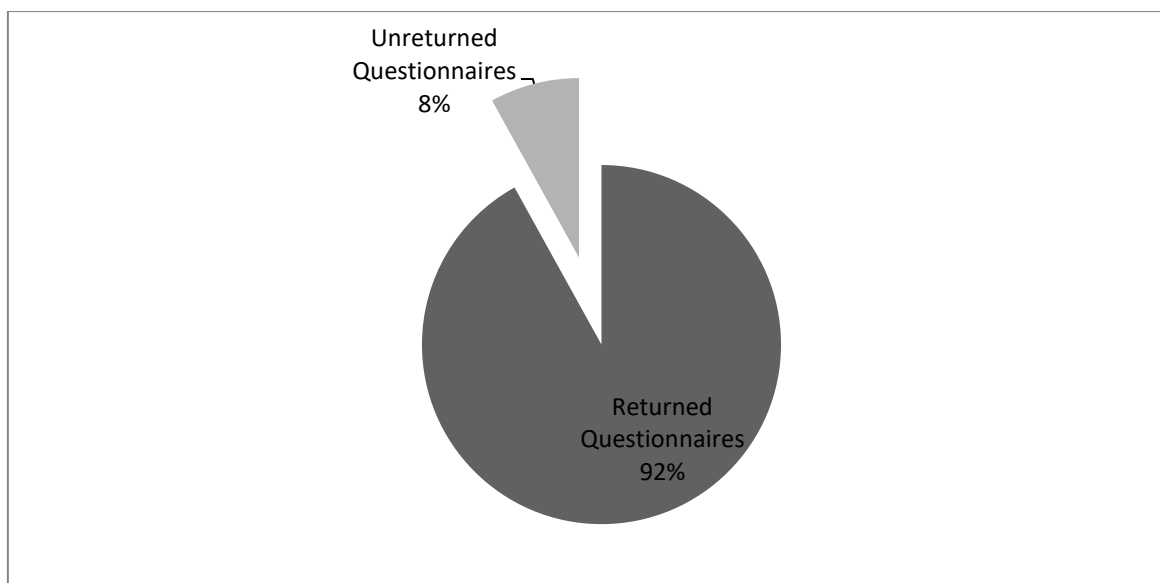


Figure 4.1 Response Rate

Source: Study Data (2018)

4.2.2 Respondents Characteristics

The characteristics of the respondents were divided in different categories including respondents' designations, highest level of education, years worked at the hospital and years worked within the health industry.

The characteristics of the respondents are summarized in table 4.1 below.

Table 4.1: Respondents Characteristics

Parameter	Description	Frequency	Percentage
Respondents Designation	Matron	16	6%
	Director Nursing Services	16	6%
	Biomed Engineers	18	7%
	Health Admin	38	14%
	ICT	38	14%
	Accountant	32	12%
	Health Information Management	32	12%
	Medical technologist	15	6%
	Supply Chain Management	35	13%
	Radiographer	30	11%
Level of Education	KCSE	0	
	Diploma	34	12.50%
	Bachelors	112	41.30%
	Masters	85	31.30%
Years Worked in Hospital	PhD	27	10%
	1 to 2	44	16.20%
	2 to 4	51	18.80%
	over 4	176	65%

Experience	1 to 2	33	12.40%
in Health	2 to 4	51	18.80%
Sector	over 4	186	68.80%

Source: Study Data (2018)

Table 4.1 shows the designation/title of the respondents. The finding indicated that the study sample included individuals with different job titles from non-medical staff to medical staff. However, majority of the respondents were health administrators, ICT officers, accountants, health information management heads, radiographers and supply chain managers. The findings implied that the study included heads of major departments in the selected hospitals hence data collected was diverse and represented opinions from various hospital quarters.

The research sought to establish the respondent's highest level of education. Findings are also presented in table 4.1. The findings show that 31.3 percent of the respondents had master's degree, 41.3 percent had bachelor's degree as their highest level of education, 12.5 percent had diploma level of education while 10 percent had doctorates. 13 respondents representing 4.9% did not include their level of education in the questionnaires. These findings confirmed that public hospitals in Kenya have highly educated staff. The level of education is argued to be highly correlated to individuals' competence (Massing & Schneider, 2017). Persons with a high level of education are therefore deemed to be highly competent to carry out their mandate.

The study further sought to establish the period worked by the respondents in their current hospitals. As captured in Table 4.1, 65 percent of the respondents had worked in their hospitals for more than 4 years, 18.8 percent had worked for between 2 and 4 years while another 16.2 percent had worked for less than 2 years. Study findings show that the study sample included employees with different tenures at the hospitals hence their

perspective of ITI could be different. However, the inclusion of many respondents who had worked for the longer period was desirable since majority understood the extent of ITI in their hospitals and were well placed to provide such information.

The study further sought to establish respondents' experience as far as working in the health sector was concerned. Similarly, most respondents indicated that they had been working for more than four years in the health sector. The results also implied that majority of the respondents were in good position to understand the relationship between ITI and the performance of the public hospitals in Kenya.

4.3 Assessment of Information Technology Integration in Public Hospitals

This section presents findings on assessment of the level of ITI in selected public hospitals in Kenya. The study assessed the extent of human ITI, organizational ITI and finally infrastructure flexibility to ITI among the selected public hospitals in Kenya. The study used custom tables, percentages, mean and standard deviation for analysis and presentations of the findings.

4.3.1 Analysis of Human-Information Technology Integration in Selected Public Hospitals

To measure the human ITI, the study assessed IT management capabilities on various aspects of ICT and personnel IT skills of the respondents that participated in the survey. Table 4.2 shows how respondents responded on statements on the Likert Scale provided, the mean score and standard deviations.

Table 4.2 Human-Information Technology Integration

	Not at All	Less Extent	Moderate Extent	High Extent	Great Extent	Mean	Std. Dev
IT Management Capabilities							
ICT hardware management	6.2%	31.2%	12.5%	37.5%	12.5%	3.19	1.19

ICT software management	18.8%	25.0%	6.2%	31.2%	18.8%	3.06	1.44
ICT security management	18.8%	18.8%	31.2%	25.0%	6.2%	2.81	1.19
Digital Internet and Mobile	0.0%	25.0%	25.0%	31.2%	18.8%	3.44	1.07
Personnel IT skills							
I am able to confidently use integrated system	12.5%	12.5%	18.8%	31.2%	25.0%	3.44	1.33
I have the knowledge to use integrated system	6.7%	0.0%	40.0%	26.7%	26.7%	3.67	1.08
I have the resources to use integrated system	6.7%	0.0%	46.7%	20.0%	26.7%	3.60	1.09
I have the ability to use integrated system	6.7%	0.0%	33.3%	26.7%	33.3%	3.80	1.12
I have control over using integrated system	6.7%	13.3%	40.0%	20.0%	20.0%	3.33	1.14

Source: Study Data (2018)

The study required respondents to indicate their level of skills in ICT hardware management, ICT software management, ICT security management and digital internet and mobile devices connectivity. Some 37.5 percent and 12.5 percent of the respondents indicated they were skilled in ICT hardware management to high and great extent respectively; 31.2 percent indicated less extent and 6.2 percent indicated were not skilled at all in ICT hardware management. The mean and standard deviation of 3.19 and 1.19 respectively indicates varying level of skills in ICT hardware management among departments in public hospitals.

The results also indicate that 31.2 percent and 18.8 percent reveal great and moderate skills in ICT software management while 25.0 percent and 18.8 percent imply less and lack of skills in ICT software management respectively. The findings also indicate that whereas some departments in public hospitals had highly skilled ICT software managers, others lacked individuals with such skills. On if respondents were skilled in ICT security

management, 25.0 percent indicated high extent, 16.2 percent great extent, 18.8 percent less extent and another 18.8 percent not at all. Those who had moderate level of understanding of ICT security management were 31.2 percent. The mean of 2.81 indicated that majority of the respondents lacked skills in ICT security management.

On the extent to which respondents were skilled in digital internet and mobile, 31.2 percent and 18.8 percent indicated to have high and great skills while 25 percent indicated that they had less skills in that area. Another 25.0 percent of the respondents indicated they were moderately knowledgeable in terms of digital internet and mobile. However, compared to other ICT aspects, majority of the managers had skills in digital internet and mobile devices connectivity as shown by the mean response of 3.44. Overall, findings implied that management capabilities on IT were still very low in Kenya's public hospitals. This may be among the factors limiting integration of IT in public hospitals in Kenya. The study findings concur with Wanjiru (2014) who cited insufficient skilled personnel, technical inefficiencies and difficulties in identifying and reaching the most vulnerable citizens as among major challenges in Kenya's public hospitals.

The study also assessed the level of personal IT skills of the respondents. The respondents were asked if they were able to confidently use the integrated system. Some 31.2 percent and 25.0 percent indicated to high and great extent respectively whereas 12.5 percent and 12.5 percent indicated to less extent and not at all respectively. On whether they had the knowledge to use integrated system, 40 percent indicated moderate extent, 26.7 percent high extent and 26.7 percent great extent. Those that indicated not having knowledge at all were 6.7 percent. On whether the department had the resources to use integrated system, 46.7 percent indicated moderate extent, 20.0 percent high extent and 26.7 percent great extent. Similarly, on if they had the ability to use integrated system and control over

using integrated system, majority of the respondents ranked between moderate extent and great extent.

The study findings indicated that personal IT skills among the head of departments in public hospitals were above average however, some hospitals still had department heads without personal IT skills as shown by those who indicated they completely lacked or had less personal IT skills. These findings imply that the level of ITI in hospitals without IT competent head of department was bound to be very low hence such public hospitals lacked the ability to leverage on the benefits on ITI.

In the same vein, Macharia and Maroa (2014) argue that ITI is crucial to resolve the urban-rural divide and regional disparity in public hospitals, the shortage of health workers, and the decreasing quality of public health care service delivery. The finding concurs with that of Kim (2017) who argues that there is substantial empirical evidence underlining the importance of supportive top management in organizational ITI. Their active participation enhances the importance of technology integration. Similarly, Bharadwaj (2000) specifically connected IT to organizational performance.

4.3.2 Analysis of Organizational IT Integration in Selected Public Hospitals

This section presents the findings on the assessment of the organizational ITI in selected public hospitals in Kenya. The study sought to establish the extent to which the hospitals used the vendor suppliers as shown in Table 4.3 below.

Table 4.3 Organizational IT Integration

	Not at All	Less Extent	Moderate Extent	High Extent	great extent	Mean	Std Dev
IT hardware vendors/suppliers	6.7%	20.0%	46.7%	26.7%	0.0%	2.93	0.86
IT software vendors/suppliers	6.7%	20.0%	46.7%	26.7%	0.0%	2.93	0.86
IT security vendors/suppliers	6.7%	26.7%	46.7%	20.0%	0.0%	2.80	0.84

Networking hardware	6.7%	20.0%	60.0%	6.7%	6.7%	2.87	0.89
Digital Channels – Internet & Mobile	13.3%	26.7%	53.3%	0.0%	6.7%	2.60	0.96

Source: Study Data (2018)

The findings show that 46.7 percent of the departments in the selected public hospitals moderately used IT hardware vendors/suppliers and IT software vendors/suppliers, 26.7 percent highly used IT hardware/software vendors/suppliers while 20.0 percent indicated using them to a less extent while 6.7 percent indicated never used them at all. The finding also indicated that 46.7 percent moderately used IT security vendors/suppliers while 20 percent used them, with 26.7 percent and 6.7 percent indicating they used them to some less extent and not at all respectively. The findings further showed that majority (60 percent) moderately used networking hardware and digital channels – internet and mobile (53.3 percent) vendor’s supplies. These findings point to the fact that there was moderate organizational ITI among public hospitals in Kenya.

Table 4.4 IT Budget Allocated to Hospital Budget

	Minimum	Maximum	Mean	Std. Deviation
IT Strategy Plan	0%	40%	11.54%	13.018
IT disaster recovery plan	0%	15%	4.62%	4.752
IT security plan	0%	20%	7.77%	5.35
Networking Hardware	0%	20%	7.38%	5.355
Digital Channels (Internet and Mobile)	0%	40%	6.38%	10.915

Source: Study Data (2018)

The study respondents were requested to indicate the approximate percentage of IT budget allocated to the items in Table 4.4 against the total hospitals budget. The study finding indicated that on average, selected public hospital allocated 11.54 percent of the total budget to IT strategy plan, 4.62 percent on IT disaster recovery, 7.77 percent on IT security plan, 7.38 percent on networking hardware and finally 6.38 percent on digital

channels (internet and mobile). However, the findings showed that whereas some hospitals allocated up to about 40 percent of the budget to various IT components; some of them failed to allocate a budget for ITI. This means that some hospitals are yet to recognize the importance of ITI budgeting.

The findings implied that the level of organizational ITI varied from one hospital to another. However, on average, organizational ITI among public hospitals was still moderately low as shown by the small budget allocated for ITI. Similarly, Hsu, Kraemer and Dunkle (2006) identified two constructs for organizational ITI; organizational resources and top management support. Organizational resources relate to the economic and human resources available to organizations for ITI programs. Munduga (2014) argued that public institutions in developing nations are characterized by poor performance among other organizational challenges. Therefore, it can be concluded that support for management and allocation of resources are key to organizational performance.

4.3.3 Analysis of IT Infrastructure Flexibility in Selected Public Hospitals

In this section, the study assessed the level of infrastructure flexibility in terms of the hospitals IT components in allowing addition of new and better improved systems. The study asked the respondent to rate the flexibility of the IT components in Table 4.5 in allowing new modules. The findings are presented in Table 4.5.

Table 4.5 IT Infrastructure Flexibility

	Not at all	To less extent	Moderate Extent	High Extent	Great Extent	Mean	Std Dev
IT hardware	13.3%	40.0%	20.0%	26.7%	0.0%	2.60	1.03
IT software	6.7%	40.0%	33.3%	20.0%	0.0%	2.67	0.88
IT network	6.7%	33.3%	46.7%	13.3%	0.0%	2.67	0.79
Digital internet and Mobile	13.3%	46.7%	26.7%	13.3%	0.0%	2.40	0.89

Source: Study Data (2018)

From the study findings, the mean for IT hardware is 2.60, IT software 2.67, IT network 2.67 and finally digital, internet and mobile, 2.40. The finding implied that IT components used by public hospitals in Kenya were not flexible and did not allow addition of new and improved systems. Mwithiga, Njihia and Iraki (2017) and Malongo, Muathe and Waithaka (2019) identified ITI infrastructure flexibility as an essential component for competitive advantage and improved organizational performance. This lack of infrastructure flexibility could be a major hindrance to ITI among public hospitals in Kenya.

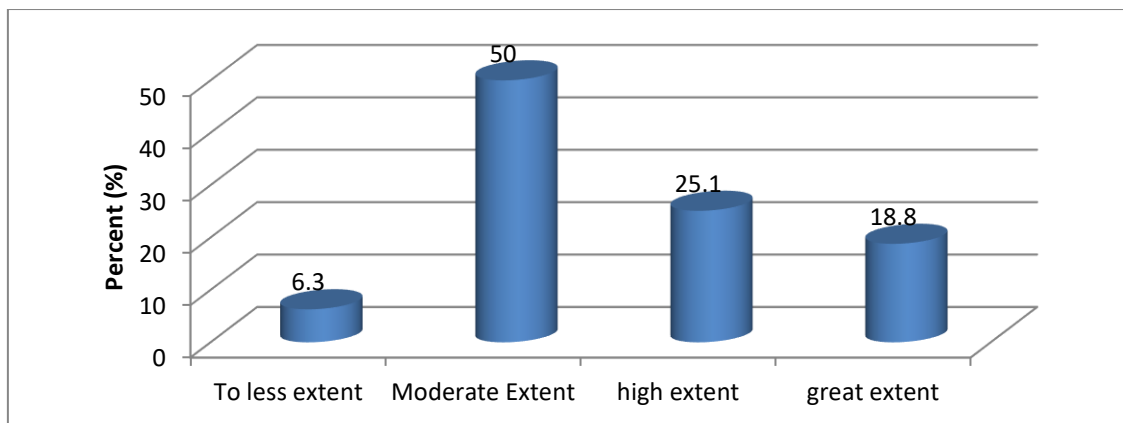


Figure 4.2 Effect of IT Integration on Operational Agility and Better Quality

Source: Study Data (2018)

The study attempted to determine the viewpoint of the respondents on if ITI had the ability to offer operational agility and better quality. The finding presented in Figure 4.6 shows that half (50%) indicated to a moderate extent; 25.1 percent and 18.8 percent indicated high and great extent respectively. Only 6.3 percent indicated less extent. The results indicated that most of the respondents were of the view that ITI led to operational agility and better quality even though the extent varied from one respondent to another.

The study finding concur with Bhatt, Emdad, Roberts and Grover (2010) who describes IT infrastructure integration as the ability to link an expansive assortment of hardware and software in order to support organizational operations. The finding also agreed with

Tallon (2008) and Zhang and Ziegelmayer (2009) who argued that IT infrastructure integration increases the extent to which an organization anticipates customer demands, organizations operations and unplanned systems changes which has been associated with improved organizational performance.

4.3.4 Overall Level of Information Technology Integration in Public Hospitals

This section presents findings on the overall ITI among different types of public hospitals in Kenya. The findings show on average Organizational IT integration was lowest while Human IT integration was highest across all types of hospitals from level four to national referral hospitals. The findings also showed that level 5 public hospitals performed better in terms of information technology integration compared to other types of the public hospitals.

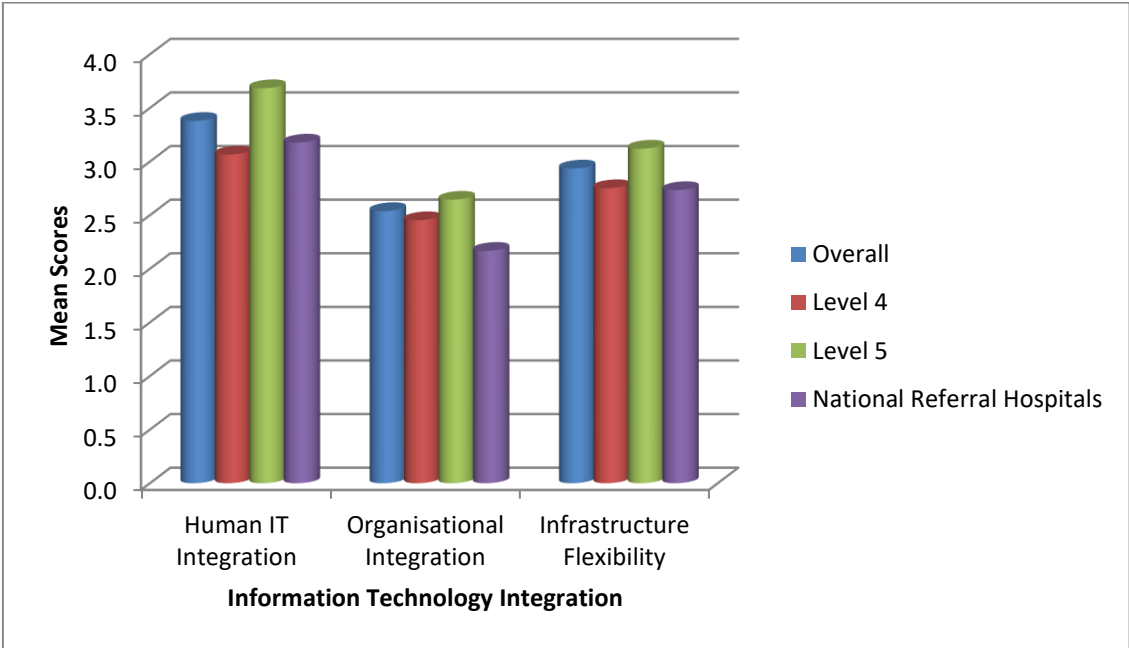


Figure 4.3 Combined effect of Information Technology Integration on Selected Public Hospitals

Source: Study Data (2018)

4.4 Assessment of Performance indicators of Selected Public Hospitals in Kenya

This section presents the analysis and assessment of the performance of selected public hospitals. The performance was categorized into four major aspects: hospitals' effectiveness, efficiency, relevance and financial viability. Findings are presented in the following subsections.

4.4.2 Level of Efficiency in Public Hospitals in Kenya

This second section on performance of public hospitals measured the level of hospitals efficiency. Likewise, in assessing efficiency among selected public hospitals, the analysis used percentages, mean and standard deviation.

Table 4.6 Efficiency of Selected Public Hospitals

	Not at all	very small extent	small extent	large extent	very large extent	Mea n	Std Dev
Staff members are used by the hospital to the best of their abilities	0.0%	13.3%	13.3%	26.7%	46.7%	4.07	1.07
The hospital makes maximal use of its facilities such as buildings and equipment	0.0%	6.7%	20.0%	46.7%	26.7%	3.93	0.86
The hospital makes optimal use of its financial resources.							
High quality administrative systems are in place to support efficient service delivery	0.0%	20.0%	26.7%	33.3%	20.0%	3.53	1.03
The hospital compares progress and achievement made in the organization from time to time	0.0%	13.3%	40.0%	26.7%	20.0%	3.53	0.96
Hospital's programmes are evaluated on the basis of the cost	6.7%	13.3%	26.7%	33.3%	20.0%	3.47	1.15

The hospital delivers its services and products promptly without delay	0.0%	20.0%	33.3%	20.0%	26.7%	3.53	1.09
The hospital always achieves its objectives within the set time frame.	0.0%	33.3%	13.3%	26.7%	26.7%	3.47	1.21
The organization controls overhead costs.	6.7%	6.7%	20.0%	53.3%	13.3%	3.60	1.03

Source: Study Data (2018)

The findings summarized in Table 4.6 show that selected public hospitals were efficient in terms of the staff members being used by the hospital to the best of their abilities (mean=4.07). The efficiency was also with regard to the organization controlling overhead costs (mean score= 3.60) and the hospital making maximal use of its facilities such as buildings and equipment (mean = 3.93).

The level of efficiency was noted in other aspects. These included making optimal use of its financial resources, high quality administrative systems to support efficient service delivery and comparing progress and achievement made in the organization from time to time. Further, efficiency was viewed with regard to the hospital's programmes being evaluated on the basis of the cost, the hospital delivering its services and products promptly without delay and the hospital always achieving its objectives within the set time frame varying from one hospital to another. Many respondents used the rating to a large extent or to a very large extent in describing the efficiency of many of the hospitals.

4.4.1 Level of Effectiveness in Public Hospitals in Kenya

This section presents the analysis of the effectiveness of the selected public hospitals. The study used similar metrics in Table 4.7 as measures of effectiveness; percentages, mean and standard deviation were used in the analysis.

Table 4.7 Effectiveness of Selected Public Hospitals

	Not at all	very small extent	small extent	large extent	very large extent	Mean	Std Dev
The hospital ensures that it gives timely, understandable information about the patient's condition, diagnosis and prognosis	0.0%	0.0%	26.7%	60.0%	13.3%	3.87	0.62
The hospital ensures accurate administration of medications	0.0%	0.0%	26.7%	13.3%	60.0%	4.33	0.88
The hospital advises patients about the costs of the different care options	0.0%	6.7%	26.7%	26.7%	40.0%	4.00	0.97
The hospital provides patients with explicit information about when to expect discharge	6.7%	6.7%	13.3%	13.3%	60.0%	4.13	1.27
The hospital provides patients with information about community resources available to the caregiver, such as caregiver support groups, financial assistance, respite services	6.7%	0.0%	13.3%	46.7%	33.3%	4.00	1.04

Source: Study Data (2018)

The study sought to establish the extent to which a hospital ensured that it gave timely and understandable information about the patient's condition, diagnosis and prognosis. The mean of 3.87 indicates that there was a significant and very large degree shown by the majority of respondents. Similarly, as reflected by the average of 4.33, most respondents indicated to a large extent whether the hospital provided accurate medication administration.

The results also show that the selected public hospitals in Kenya were effective in terms of advising patients about the costs of the different care options, providing patients with explicit information about when to expect discharge. This was likewise in terms of the hospitals' providing patients with information about community resources available to the caregiver. Such information included caregiver support groups, financial assistance and respite services, as shown by the mean score of 4.00, 4.13 and 4.00 respectively. The findings in this section indicate that majority of the selected hospitals scored highly in term of effectiveness in executing their responsibilities.

4.4.3 Relevance of Public Hospitals in Kenya

The study analysed the third aspect of performance of the public hospitals, namely, relevance. Such relevance assessed the hospitals' programs and systems being modern and able to meet the ever-changing demands from the patients. The findings on assessment of public hospitals relevance are presented in tables 4.8 (a) and (b).

Table 4.8 (a) Respondents view on Relevance of Selected Public Hospitals in Kenya

	Not at all	very small extent	small extent	large extent	very large extent	Mean	Std Dev
Hospital's equipment and systems are well maintained to avoid unnecessary delay in service delivery resulting from breakdown	0.0%	13.3%	13.3%	33.3%	40.0%	4.00	1.04
Programmes run by the hospital are regularly reviewed to reflect changing environment	0.0%	14.3%	35.7%	7.1%	42.9%	3.79	1.15
Programmes run by the hospital are regularly reviewed to reflect changing capacities	0.0%	7.1%	42.9%	7.1%	42.9%	3.86	1.07

Beneficiary-needs assessments are conducted regularly	0.0%	21.4%	21.4%	50.0%	7.1%	3.43	0.91
Services offered by hospital are constantly reviewed to reflect changing customer needs	0.0%	7.1%	21.4%	50.0%	21.4%	3.86	0.84
Services offered by hospital are constantly reviewed to reflect changing customer type	0.0%	7.1%	21.4%	50.0%	21.4%	3.86	0.84
The hospital regularly reviews the environment to adapt its strategy	0.0%	21.4%	21.4%	14.3%	42.9%	3.79	1.21

Source: Study Data (2018)

The study asked the respondents if their hospital's equipment and systems were well maintained to avoid unnecessary delay in service delivery resulting from breakdown. The statement had a mean of 4.00. This implied that majority of the respondents indicated to a large extent and very large extent respectively. On if programmes run by the hospital were regularly reviewed to reflect the changing environment, the results show that majority (reflected by a mean of 3.79) indicated to large extent. The mean of 3.86 further shows that respondents concurred that programmes run by the hospital were regularly reviewed to reflect changing capacities. Some 50 percent of the respondents felt that to a large extent beneficiary-needs assessment were conducted regularly.

The study also sought to establish if services offered by the hospital were constantly reviewed to reflect the changing customer needs. The statement had a mean response of 3.86, implying that majority indicated to a large extent and very large extent. On whether services offered by hospital were constantly reviewed to reflect changing customer type, a mean response of 3.86 was posted, showing that majority of respondents indicated to large extent. The study finally sought to establish if a hospital regularly reviewed the

environment to adapt its strategy. The statement had a mean response of 3.79, confirming that majority indicated to a large extent.

Table 4.8 (b) Respondents view of Public Hospitals in Kenya as measured by performance

	Not at all	very small extent	small extent	large extent	very large extent	Mean	Std Dev
The hospital's partners have changed their attitude towards the organization from negative to positive	14.3%	7.1%	21.4%	28.6%	28.6%	3.50	1.36
The funding that the hospital has been receiving from the stakeholders has increased over the last five years	0.0%	7.1%	42.9%	35.7%	14.3%	3.57	0.83
There has been increased number of new funders to the organization over the last five years	0.0%	28.6%	14.3%	21.4%	35.7%	3.64	1.24
Peer organizations value their relationship with the hospital	0.0%	7.1%	35.7%	28.6%	28.6%	3.79	0.95
The hospital always achieves its objectives within the set time frame	0.0%	21.4%	28.6%	35.7%	14.3%	3.43	0.99
The hospital controls overhead costs	0.0%	14.3%	21.4%	35.7%	28.6%	3.79	1.02

Source: Study Data (2018)

The study also sought to establish if the hospital's partners had changed their attitude towards the organization from negative to positive. Findings show that 28.6 percent and 28.6 percent indicated large extent and very large extent respectively. On if the funding that the hospital had been receiving from the stakeholders had increased over the last five years, 42.9 percent indicated to a moderate extent, 35.7 percent a large extent while 14.3

percent indicated to a very large extent. Those who indicated very small extent were merely 7.1 percent. The mean of 3.79 indicated that majority of the respondents indicated to a large extent on whether peer organizations valued their relationship with the hospital. On whether the hospital always achieved its objectives within the set time frame, 35.7 percent indicated to a large extent, 28.6 percent moderate extent and 14.3 percent very large extent. On the other hand, 21.4 percent of the respondents indicated to a very small extent. The study further asked respondents if the hospital controlled overhead costs. Results show a mean response of 3.79, implying that majority of the respondents indicated to a large extent.

4.4.4 Analysis of Financial Viability of Public Hospitals in Kenya

The study further measured the performance of the selected public hospitals in terms of financial viability. The study used percentages, mean and standard deviation in assessing the financial viability among the selected public hospitals.

Table 4.9 Results on Financial Viability of Public Hospitals

	Not at all	very small extent	small extent	large extent	very large extent	Mean	Std Dev
Hospital's existing funding sources offer sustained support	6.7%	6.7%	26.7%	40.0%	20.0%	3.60	1.09
The hospital consistently obtains new funding sources	13.3%	6.7%	33.3%	33.3%	13.3%	3.27	1.19
The hospital has sustainable financial resources for continuity of programmes even with the exit of key donors	6.7%	13.3%	46.7%	26.7%	6.7%	3.13	0.96
The hospital has more revenue than expenses	13.3%	13.3%	40.0%	26.7%	6.7%	3.00	1.10
Hospital's assets are greater than liabilities	13.3%	6.7%	40.0%	33.3%	6.7%	3.13	1.09
The hospital keeps surplus financial resources to use	13.3%	6.7%	46.7%	26.7%	6.7%	3.07	1.07

during economic depressed periods							
The hospital has wide sources funds including new players from the community and private sector	13.3%	13.3%	53.3%	20.0%	0.0%	2.80	0.92
The amount of resources mobilized from the local partners and the community have increased over the last five years	13.3%	20.0%	40.0%	26.7%	0.0%	2.80	0.99
The hospital monitors finance, capital assets and depreciation on a regular basis	6.7%	6.7%	40.0%	46.7%	0.0%	3.27	0.86

Source: Study Data (2018)

The study sought to establish whether the hospital’s existing funding sources offered sustained support. In response, 40.0 percent indicated to a large extent, 20.0 percent to a very large extent and 26.7 percent, to a moderate extent. The mean of 3.60 implied that most public hospitals had sustained funding. On whether the hospital consistently obtained new funding sources, the results show that 33.3 percent and 13.3 percent indicated to a large extent and very large extent respectively, with 33.3 percent indicating, to a small extent. The finding implies that most public hospitals feebly obtained new funding sources. The mean score of 3.13 shows that respondents indicated to a small extent on whether the hospital had sustainable financial resources for continuity of programmes even with the exit of key donors.

Respondents were convinced that the hospital had more revenue than expenses with a mean of 3.00. Cumulatively, those who felt the hospital’s assets were greater than liabilities had a mean score of 3.07. With a mean score of 3.07, some respondents were of the view that the hospital kept surplus financial resources to use during economic depressed periods.

Respondents who intimated that the hospital has wide sources of funds including new players from the community and private sector had a mean response of 2.80. A similar mean of 2.80 was realized on those who felt the amount of resources mobilized from the local partners and the community had increased over the last five years. Finally, those who were convinced that the hospital monitored finance, capital assets and depreciation on a regular basis had a mean of 3.27. These findings regrettably point out that majority of the sampled public hospitals had poor financial viability, especially in terms of mobilizing resources and having sustained sources of funds.

4.5 Characteristics of Public Hospitals in Kenya

The study assessed organizational characteristics to establish whether they moderated the relationship between ITI and performance of public hospitals. The organizational characteristics assessed include the level of the hospitals, number of employees and number of ICT innovations initiated by the CEO. The study findings showed that majority of the respondents were from the Level Five hospitals.

On the number of employees, the average hospitals had 259 employees. The hospitals with the highest number of employees had 700; the one with the minimum number of employees had 100. The study further asked respondents to indicate the number of ICT innovations initiated by CEO; averagely, the CEO in the selected public hospitals had initiated two ICT innovations. The CEO with the highest number of innovations had ten while other hospitals had no ICT innovation from their CEOs.

Table 4.10 Respondents perception of Organizational Characteristics on Selected Public Hospitals

	Minimum	Maximum	Mean	Std. Deviation
Level of the hospitals	4	6	5.08	0.269
Number of employees	100	700	259.23	171.64

Number of ICT innovations initiated by the CEO	0	10	2.46	2.728
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Source: Study Data (2018)

4.6.1 Assessment of Perceived Ease of Use of IT in Public Hospitals in Kenya

This section presents the findings on perceived ease of use of IT in public hospitals in Kenya. The study used percentages, mean and standard deviation to assess the respondent perceived ease of use of ITs in selected public hospitals.

Table 4.11 Perceived Ease of Use of IT in Public Hospitals

	Strongly Disagree	Disagree	Slightly Disagree	Agree	Strongly Agree	Mean	Std Dev
The integrated system enables me to accomplish tasks more quickly	7.1%	7.1%	7.1%	14.3%	64.3%	4.21	1.27
The integrated system has improved my quality of work	7.1%	7.1%	14.3%	7.1%	64.3%	4.14	1.31
The integrated system makes it easier to do my job	7.1%	7.1%	14.3%	7.1%	64.3%	4.14	1.31
The integrated system has improved my productivity	7.1%	14.3%	7.1%	7.1%	64.3%	4.07	1.40
The integrated system gives me greater control over my job	7.1%	14.3%	0.0%	21.4%	57.1%	4.07	1.34
The integrated system enhances my effectiveness on the job	7.1%	7.1%	7.1%	14.3%	64.3%	4.21	1.27

Source: Study Data (2018)

The respondents were asked whether an integrated system enables them to accomplish tasks more quickly; the statement had a mean response of 4.21 which implied that majority of the respondents agreed and strongly agreed with the statement. The mean score of 4.14 also indicated that respondents agreed and strongly agreed that integrated system had improved their quality of work. On whether, integrated system makes it easier to do their job, the findings showed that the statement had a mean of 4.14 that also

confirmed that majority of the respondents agreed integrated system makes it easier to do their job.

The study sought to establish whether the integrated system had improved respondents' productivity; the study findings showed that majority of the respondents agreed and strongly agreed as indicated by the mean response of 4.07. Similarly, a mean of 4.07 showed that majority of the respondents agreed that the integrated system gave them greater control over their job. The study finally sought to establish whether the integrated system enhanced effectiveness on the job. The mean of 4.21 indicated that majority of the respondents agreed.

The findings generally implied that respondents considered the IT in selected public hospitals to be easy to use. These findings implied that integration would be easy; there was a perception of ease in use by users. Davis *et al.*(1989), found that perceived ease of use had a direct influence on the behavioral intention of adoption of technologies.

4.6 Assessment of User Perception on IT Integration in Public Hospitals in Kenya

The study assessed the users' perception on IT integration in public hospitals in Kenya. The study sought to test whether users' perception mediated the relationship information technology integration and performance of public hospitals. The study measured user perception by conducting the assessment on respondents' perceived ease of use and perceived usefulness of information technology.

4.6.2 Assessment of Perceived Usefulness of IT in Public Hospitals in Kenya

This section presents the findings on perceived usefulness of IT in public hospitals in Kenya. Perceived usefulness is among user perception about the information technology

adoption that enhances its level of integration. The study used percentages, mean and standard deviation to assess the respondent perceived usefulness of information technologies in selected public hospitals.

Table 4.12 Perceived Usefulness of IT in Public Hospitals

	Strongly Disagree	Disagree	Slightly Disagree	Agree	Strongly Agree	Mean	Std Dev
My interaction with the integrated system has been clear and understandable	7.1%	7.1%	14.3%	42.9%	28.6%	3.79	1.15
Overall, the integrated system is easy to use	7.1%	7.1%	14.3%	28.6%	42.9%	3.93	1.23
Learning to operate the integrated system was easy for me	0.0%	14.3%	21.4%	35.7%	28.6%	3.79	1.02
I rarely become confused when I use the integrated system	7.1%	14.3%	21.4%	28.6%	28.6%	3.57	1.25
I rarely make errors when using the integrated system	7.1%	14.3%	14.3%	50.0%	14.3%	3.50	1.13
I am rarely frustrated when using the integrated system	0.0%	14.3%	14.3%	50.0%	21.4%	3.79	0.95

Source: Study Data (2018)

The study sought to test if respondents' interaction with the integrated system had been clear and understandable. The findings showed that 42.9 percent and 28.6 percent of the respondents agreed and strongly agreed. The statement had a mean of 3.79, further confirming that majority of the respondents agreed. On whether overall, the integrated system is easy to use, the finding showed that 28.6 percent and 42.9 percent of the respondents agreed and strongly agreed respectively. The mean response of 3.79 further

indicated that majority of the respondents agreed that learning to operate the integrated system was easy for them.

The study also sought to establish if respondents rarely become confused when they use the integrated system; 28.6 percent agreed, similar 28.6 percent strongly agreed, and 21.4 percent slightly disagreed. Further, 14.3 percent and 7.1 percent of the respondent disagreed and strongly disagreed respectively. The study also sought to establish if respondents rarely made errors when using the integrated system. Some 50.0 percent and 14.3 percent of the respondents agreed and strongly agreed respectively. The mean of 3.79 further indicated that majority of the respondents rarely got frustrated when using the integrated system.

The study findings implied that majority of the respondents considered ITI to be useful to them in carrying out their duties at the hospitals. These findings further showed that users of information technology among the selected public hospitals in Kenya had positive perception. Leng et al. (2011), conclude the perceived ease of use and usefulness are important factors in determining adaptation of innovations. Consequently, the greater the perceived ease of use and perceived usefulness of technological innovations, the more likely that it would be integrated into the organization's operations. Osman *et al.* (2016) also argued that perceived ease of use consists of determinants of the ease to use, ease of reading, using understandable terms, ability to link, to search for related information and ease of returning to previous page. This includes support, complexity and change management.

4.7 Regression Analysis

This section presents the findings of inferential statistics that were used to test the hypotheses. However, before conducting regression analysis, a set of diagnostic tests

were carried out to ascertain the suitability of the data in using the regression model. Since the current study used linear multiple regression analysis, the study carried out various diagnostic tests to establish if the assumption of linear regression is adhered to.

4.7.1 Diagnostic Tests

The study conducted sample adequacy test for sample size, factor analysis test to establish the construct validity of the data collected. A normality test was done to establish if the data was normally distributed. There was also a test for heteroskedasticity to assess the homogeneity of variances. Finally, was the multicollinearity test to examine the association of independent variables. The presence of multicollinearity implies that one of the variables that has a high multicollinearity must be dropped from the regression analysis (field, 2013)

4.7.1.1 Sampling Adequacy Test

Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was conducted to determine adequacy of the sample size. According to Hill (2011) KMO is an index used to examine and justify the appropriateness of application of Factor Analysis; values between 0.5-1.0 indicate that a factor is significant. Moutinho and Hutcheson (2010), suggested that values between 0.7 and 0.8 are good for factor analysis and it was used in the study.

Table 4.13 KMO (Kaiser-Meyer-Olkin) and Bartlett's Test of Sphericity

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.696
Bartlett's Test of Sphericity	Approx. Chi-Square	197.313
	df	15
	Sig.	0.000

Source: Survey data (2018)

The results show that the KMO test of the variables of this study generated a sufficient value of 0.923 which is more than 0.7 implying that the sample size was adequate for further analysis. This was supported by the Bartlett's test of sphericity which had a chi-square value of 6975.135 with a p value of 0.000 which is less than 0.05. Since the p value is less than 0.05 this shows that there is a strong relationship among the study variables under investigation and hence the Bartlett's test is highly significant.

4.7.1.2 Factor Analysis

It was necessary to perform a factor analysis to simplify the data in a number of variables into a smaller number of factors without losing much information. Gorsuch (1990), claims that the newly created variables should represent the basic variables underlying the factor of the original variables. Loadings are a sign of how much a factor in factor analysis helps explain a variable. Kline (2014), states that the threshold for acceptable factor loading applied is 0.40 or higher. Hair, Page and Brunsveld (2019), assert that for further study only factors above 0.4 should be retained.

Table 4.14 Factor Analysis of Human IT Integration Constructs

Indicators of Human IT Integration	Factor Loadings
ICT hardware management	0.923
ICT software management	0.921
ICT security management	0.868
Digital Internet and Mobile	0.765
I am able to confidently use integrated system	0.906
I have the knowledge to use integrated system	0.961
I have the resources to use integrated system	0.934
I have the ability to use integrated system	0.925
I have control over using integrated system	0.781

Extraction Method: Principal Component Analysis.
Source: Study Data (2018)

Summarized results in Table 4.14 above show that the factor loading of the construct used to measure human ITI ranged from 0.765 to 0.961. For all variable items, this

implies satisfactory factorability. It implies that in their considerations the variables match well with other variables. Examination of the parameter showed that none of the variables were omitted because they all met the 0.4 threshold by a factor greater than 0.4 (Rahim & Magna, 2005).

Table 4.15 Factor Analysis of Organizational IT Integration Constructs

Indicators of Organizational IT Integration	Factor Loadings
IT hardware vendors/suppliers	0.962
IT software vendors/suppliers	0.962
IT security vendors/suppliers	0.784
Networking hardware	0.829
Digital Channels – Internet & Mobile	0.641

Extraction Method: Principal Component Analysis.

Source: Study Data (2018)

Similarly, the results collated in Table 4.15 show that the factor loads used in the measurement of organizational ITI ranged from 0.641 to 0.962. This also showed satisfactory factorability for all variable items. This means that in their factors the variables fitted well with other variables in their factors. The factor analysis revealed that none of the variables were removed because all of them exceeded the 0.4 criterion by a coefficient greater than 0.4 (Wanjiru, Muathe & Kinyua, 2019).

Table 4.16 Factor Analysis of Infrastructure Flexibility Constructs

Indicators of Infrastructure Flexibility	Factor Loadings
IT hardware	0.850
IT software	0.751
IT network	0.806
Digital internet and Mobile	0.665

Extraction Method: Principal Component Analysis.

Source: Study Data (2018)

Table 4.16 shows that the factor loads used for measuring Infrastructure Flexibility ranged from 0.665 to 0.850. This also showed satisfactory factorability for all variable items. This means that in their factors the variables fitted well with other variables. The factor analysis found that none of the factors used to measure infrastructure flexibility

were removed because they all had a coefficient greater than 0.4, which exceeded the 0.4 criterion (Wanjiru, Muathe & Kinyua, 2019).

Table 4.17 Factor Analysis of User Perception Constructs

Indicators of User Perception	Factor Loadings
The integrated system enables me to accomplish tasks more quickly	0.951
The integrated system has improved my quality of work	0.974
The integrated system makes it easier to do my job	0.974
The integrated system has improved my productivity	0.910
The integrated system gives me greater control over my job	0.852
The integrated system enhances my effectiveness on the job	0.979
My interaction with the integrated system has been clear and understandable	0.862
Overall, the integrated system is easy to use	0.832
Learning to operate the integrated system was easy for me	0.935
I rarely become confused when I use the integrated system	0.791
I rarely make errors when using the integrated system	0.768
I am rarely frustrated when using the integrated system	0.797

Extraction Method: Principal Component Analysis.
Source: Study Data (2018)

Table 4.17 shows that the factor loadings of construct used in measuring user perception were ranging from 0.665 to 0.850. This also demonstrated satisfactory factorability for all variables items. It means that in their factors the variables fitted well with other variables. Factor analysis found that none of the factors used to measure flexibility in infrastructure were removed, reason being that all of them had a coefficient of greater than 0.4, exceeding the criterion of 0.4 (Wanjiru, Muathe & Kinyua, 2019).

Table 4.18 Factor Analysis of Hospitals Performance Constructs

Indicators of Hospitals Performance	Factor Loadings
Effectiveness	
The hospital ensures that it gives timely, understandable information about the patient's condition, diagnosis and prognosis	0.793
The hospital ensures accurate administration of medications	0.901

Indicators of Hospitals Performance	Factor Loadings
The hospital advises patients about the costs of the different care options	0.901
The hospital provides patients with explicit information about when to expect discharge	0.931
The hospital provides patients with information about community resources available to the caregiver, such as caregiver support groups, financial assistance, respite services	0.836
Efficiency	
Staff members are used by the hospital to the best of their abilities	0.945
The hospital makes maximal use of its facilities such as buildings and equipment	0.949
The hospital makes optimal use of its financial resources. High quality administrative systems are in place (financial, human resources, programme, strategy, etc.) to support efficient service delivery	0.942
The hospital compares progress and achievement made in the organization from time to time	0.921
Hospital's programmes are evaluated on the basis of the cost	0.919
The hospital delivers its services and products promptly without delay	0.937
The hospital always achieves its objectives within the set time frame.	0.934
The organization controls overhead costs.	0.901
Relevance	
Hospital's equipment and systems are well maintained to avoid unnecessary delay in service delivery resulting from breakdown	0.879
Programmes run by the hospital are regularly reviewed to reflect changing environment	0.973
Programmes run by the hospital are regularly reviewed to reflect changing capacities	0.982
Beneficiary-needs assessments are conducted regularly	0.976
Services offered by hospital are constantly reviewed to reflect changing customer needs	0.955
Services offered by hospital are constantly reviewed to reflect changing customer type	0.990
The hospital regularly reviews the environment to adapt its strategy	0.947
The hospital's stakeholders have expressed their satisfaction with how the hospital is running its affairs	0.987
The hospital's partners have changed their attitude towards the organization from negative to positive	0.965
The funding that the hospital has been receiving from the stakeholders has increased over the last five years	0.886
There has been increased number of new funders to the organization over the last five years	0.912
Peer organizations value their relationship with the hospital	0.992

Indicators of Hospitals Performance	Factor Loadings
The hospital always achieves its objectives within the set time frame	0.920
The hospital controls overhead costs	0.956
Financial Viability	
Hospital's existing funding sources offer sustained support	0.829
The hospital consistently obtains new funding sources	0.958
The hospital has sustainable financial resources for continuity of programmes even with the exit of key donors	0.873
The hospital has more revenue than expenses	0.978
Hospital's assets are greater than liabilities	0.944
The hospital keeps surplus financial resources to use during economic depressed periods	0.854
The hospital has wide sources funds including new players from the community and private sector	0.927
The amount of resources mobilized from the local partners and the community have increased over the last five years	0.832
The hospital monitors finance, capital assets and depreciation on a regular basis	0.848

Extraction Method: Principal Component Analysis.

Source: Study Data (2018)

Table 4.18 shows that the factor loadings of construct used in measuring the performance of hospitals were ranging from 0.793 to 0.992. This indicated that there was satisfactory factorability for all items adopted to measure performance of selected public hospitals. This means that in their factors the variables harmonized with other variables. The factor analysis found that none of the factors used to measure infrastructure flexibility in were removed because they all had a coefficient greater than 0.4, which exceeded the 0.4 criterion (Wanjiru, Muathe & Kinyua, 2019).

4.7.1.3 Normality Test

Thode (2002), assert that variables should be normally distributed, particularly if the findings beyond the sample are to be generalized. The study used the test of normality by Shapiro-Wilk since it rejects the null hypotheses using smaller sample sizes compared to other tests (Razali, & Wah, 2011). Under the Shapiro test, the null hypothesis H_0 was: data is normally distributed while the H_a : Data is not normally distributed.

Table 4.19 Normality Test Results

	Shapiro-Wilk	
	Statistic	Sig.
Human IT Integration	3.956	0.109
Organizational IT Integration	3.953	0.105
Infrastructure Flexibility	3.882	0.103
Organizational Characteristics	2.714	0.087
User Perception	2.841	0.075
Performance of Hospitals	2.891	0.089

Source: Study Data (2018)

Since the p-values were greater than 0.05 for all variables, the null hypotheses for all variables were not rejected, thus confirming that data was normally distributed and therefore suitable for linear regression analysis. Thode (2002), support these findings, arguing that the variables should be distributed approximately normally, particularly if the results are to be generalized.

4.7.1.4 Heteroskedasticity

Heteroskedasticity presence was tested using Levene's variance homogeneity test. The two variances are not significantly different. Accordingly, approximately equal if the test is not significant (Gastwirth, Gel & Miao, 2009; Vynck, 2017). The null hypothesis was that the term of error was homoscedastic; the alternative hypothesis was that the error term was heteroskedastic. If the null hypothesis was rejected, it meant that heteroskedasticity was present.

Table 4.20 Test of Homogeneity of Variances

Test of Homogeneity of Variances	Levene Statistic	df1	df2	Sig.
Human IT Integration	1.135	2	77	0.125
Organizational IT Integration	0.014	2	77	0.986
Infrastructure Flexibility	1.343	2	77	0.103
Organizational Characteristics	0.814	2	76	0.447
User Perception	0.073	2	77	0.930
Performance of Hospitals	1.813	2	77	0.170

Source: Study Data (2018)

Since the Levene Statistics had the p-values greater than 0.05 for all the variables, the null hypothesis was accepted. The study concluded that there was homoscedasticity in the data (that is, the data is not heterogeneous in variance), which satisfies the assumption of regression. A homoscedasticity test is performed to test for residual variance in the regression model used. If the error term varies equally, we have a normal distribution. Vynck (2017) also argued that ignoring the presence of this heteroscedasticity by fitting ordinary least squares regression models, was an approach that assumes homoscedasticity. It resulted in inefficient regression parameter estimators as well as a biased and inconsistent covariance matrix estimator.

4.7.1.5 Multicollinearity

Multicollinearity is said to exist between two independent variables when a strong relationship exists between them. Garson (2012) asserts that the threshold is that when $VIF > 4.0$ and $Tolerance < 0.1$ multicollinearity is a problem and other scholars use more lenient cut off of $VIF > 5.0$ when multicollinearity is a problem. However, O'Brien (2007) suggests that this threshold should be assessed in contextual basis taking into account factors that influence the variance of regression coefficient. Accordingly, this study adopted a VIF value of 5 as and $Tolerance < 0.1$ threshold.

Table 4.21 Test of Multicollinearity

	Collinearity Statistics	
	Tolerance	VIF
Human IT Integration	0.517	1.935
Organisational IT Integration	0.495	2.022
Infrastructure Flexibility	0.481	2.079
Organisational Characteristics	0.841	1.189
User Perception	0.637	1.570

a Dependent Variable: Performance of Hospitals

Source: Study Data (2018)

These results indicated that the VIF values of the variables were within the threshold of 5 and the Tolerance Values were greater than 0.1. This indicated that there was no significant threat of multicollinearity (Miles, 2014). Therefore, the study could include all the variables in linear regression analysis because there was no independent variable with a strong linear relationship with any other independent variable(s). Table 4.21 (b) presents the correlation table that further showed that there was no presence multicollinearity among the independent variables.

4.7.2 Hypotheses Testing

This section presents the findings of hypotheses testing. The study employed linear regression analysis to test the effect of ITI on the performance of public hospitals in Kenya. The hypotheses testing was done at the level of significance of 0.05, hence the study failed to reject the null hypothesis. If the p-value was less than the critical value of 0.05, it implied a significant effect; the null hypothesis was rejected if p-value was greater than 0.05. This means that there was insignificant effect between the variables. Tables 4.22 to 4.24 has the findings on model summary, ANOVA and regression coefficients of the regression model fitted.

Table 4.22 Multivariate Model Summary

Model	R	R-Square	Adjusted R-Square	Std. Error of the Estimate
1	.705 ^a	.497	.477	.75229

a. Predictors: (Constant), Infrastructure Flexibility, Organizational Integration, Human IT Integration
Source: Study Data (2018)

The adjusted R-square indicated that 47.7 percent of the variation in the performance of public hospitals in Kenya is accounted for by ITI. The results implied that ITI was a significant predictor of the performance of public hospitals in Kenya. Findings by Mwithiga, Njihia, and Iraki (2017), and Malongo, Muathe and Waithaka (2019), also

revealed that human ITI, organizational ITI and physical ITI variables explained 57.6 percent of non-financial firm performance and 44.1 percent of financial firm performance (ROA) results.

The findings of this study support those of Tallon and Kraemer (2003), Ness (2005), and Song and Tucker (2016). The studies established that health infrastructure, education, incomes, and opportunities around the globe had improved steadily due to ITI. Similarly, Kim, Shin, Kim, and Lee (2011) argued that the use of IT resources in the operational strategies of organizations brought a positive impact on performance. Bharadwaj (2000) also specifically connected IT to improved organizational performance.

Table 4.23 Multivariate ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	42.434	3	14.145	24.993	.000 ^b
	Residual	43.012	266	.566		
	Total	85.446	269			

a. Dependent Variable: Performance of Hospitals

b. Predictors: (Constant), Infrastructure Flexibility, Organizational Integration, Human IT Integration
Source: Study Data (2018)

To test the goodness of fit of the fitted regression model, the study used F-statistics. The null hypothesis states that the model had goodness of fit hence based on the $F=24.993$, $p=0.000$, the study failed to reject the null hypothesis and concluded that the model had a goodness of fit. The implication of these finding was that human ITI, organizational ITI and infrastructure flexibility significantly predicted performance of public hospitals in Kenya. The results also supported the finding of previous authors such as Kim, Shin, Kim, and Lee (2001), Bharadwaj (2000), Song and Tucker (2016), who found evidence of the significant relationship between ITI and performance of the organizations.

Table 4.24 Regression Coefficients

	β	Std. Error	Beta	T	Sig.
(Constant)	0.594	0.364		1.633	0.107
Human IT Integration	0.239	0.117	0.229	2.048	0.044
Organizational IT Integration	0.280	0.119	0.238	2.348	0.021
Infrastructure Flexibility	0.512	0.166	0.358	3.087	0.003

a Dependent Variable: Performance of Hospitals

Source: Study Data (2018)

Table 4.24 presents the findings of regression coefficients that the study adopted to test the effect of each independent variables on the dependent variable. The first hypothesis of the study sought to test if human ITI significantly affected the performance of public hospitals in Kenya. The finding of regression analysis presented in Table 4.23 indicates that human ITI had a beta coefficient of $\beta=0.239$, $p=0.044<0.05$. The findings implied that human ITI had a positive and significant effect on performance of public hospitals in Kenya. Based on these results, the study rejected **H01**: Human ITI has no effect on performance of selected hospitals in Kenya. The study findings further implied that increased human ITI would translate into positive performance of public hospitals in Kenya.

Findings by Mwithiga, Njihia, and Iraki (2017) also revealed that human ITI significantly affected both non-financial firm performance and financial firm performance (ROA) results of Organizations. The study findings disagree with Hwang, Chang, LaClair and Paz (2013) who showed a weak positive relationship between systems integration and reduced cost of care that is a conflicting result and lacked a clear research design.

The finding of the study agreed with Gualandris and Kalchschmidt (2014) who observed that individual organizations within the supply chain system could improve their robustness and agility through integration. They shared information and knowledge, on the one hand, which reduced the likelihood of disruption. On the other hand, overall

effects should be curtailed as information flows rapidly, allowing for faster and more meaningful reactions that are ingredients for better organizational performance.

Kwak and Kim (2016) also found out that there was a significant relationship between service integration and firm profitability. Therefore, based on the findings of this study and those of previous studies, the study concluded that improving human ITI is among the surest way public hospitals in Kenya can use to increase the performance in terms of effectiveness, efficiency, relevance and financial viability.

H₀₂: Organizational ITI has no effect on performance of selected public hospitals in Kenya.

In this hypothesis, the study sought to ascertain whether organizational information integration affected the performance of public hospitals in Kenya. Similarly, the study used regression analysis; the results showed that organizational ITI had a beta coefficients $\beta = 0.280$, $p = 0.021 < 0.05$; these findings demonstrate a significant and positive impact of organizational ITI on the performance of public hospitals in Kenya.

The findings indicated that a unit improvement in organizational ITI would result into positive increase of 0.280 units in performance of public hospitals in Kenya. The study therefore rejected the null hypothesis **H₀₂:** Organizational ITI has no effect on performance of selected public hospitals in Kenya.

Other authors that reported similar findings include Mwithiga, Njihia, and Iraki (2017) whose findings also revealed that organizational ITI significantly affected both non-financial firm performance and financial firm performance. Zehir, Muceldili, Akyuz and

Celep (2010) also found out that ITI enhances operational skills by empowering inter-organizational linkages and enhancing coordination between and among organizations.

Finally, the study finding concurs with Otte-Trojel, Rundall, Bont, Klundert and Reed (2015) who reported that online portal in organizations leads to ease of access to information, transparency of information, patient-physician interaction, connection with patients and operational efficiency. Therefore, public hospitals with improved ITI in operations have a high probability of better performance other factors held constant.

H₀₃: IT infrastructure integration has no effect on performance of selected public hospitals in Kenya.

The study also sought to test whether IT infrastructure integration which is referred to as infrastructure flexibility had an effect on performance of public hospitals in Kenya. Table 4.24 shows that infrastructure flexibility had a beta coefficient $\beta=0.512$, $p=0.003 < 0.05$. These findings show that infrastructure flexibility had a positive and significant effect on the performance of public hospitals in Kenya.

The findings implied that a unit improvement in infrastructure flexibility would result into positive increase of 0.512 units in performance of public hospitals in Kenya. Compared to other variables, infrastructure flexibility had the largest effect on performance of public hospitals in Kenya. The study therefore rejected the null hypothesis H₀₂: Information technology infrastructure integration has no effect on performance of selected public hospitals in Kenya.

The study findings concur with those of previous studies conducted in this area. For instance, the findings of Ness (2005) also revealed that IT infrastructure integration is strongly correlated with organizational performance. Fink and Neumann (2007)

established a correlation between IT infrastructure integration and organizational performance. Finally, a study by Fink and Neumann (2007) also revealed that ICT infrastructure improved communication, improved efficiency, monitoring and control and delivery of services. Based on the study findings and those of previous studies, public hospitals infrastructure flexibility to ITI plays a significant role in enhancing performance.

4.7.3 Test for Moderation effect of Organizational characteristic

H₀₄: Organizational characteristics do not moderate the relationship between ITI and performance of selected public hospitals in Kenya.

The study further tested whether organizational characteristics moderated the relationship between ITI and performance of selected public hospitals in Kenya. The study adopted a moderation regression model as suggested by Whisman and MacClelland (2005).

This test involved computation of composite variable for independent variables (ITI), interaction variables computed using product of ITI and Organizational characteristics (moderating variable). Then regression model was fitted with the product of ITI and OC, ITI, organizational characteristics as predictor variables of performance of public hospitals. If the interaction between the independent variable (ITI) and the variables of the moderator (OC) is not statistically significant ($p > 0.05$), then the variable of organizational characteristics is not a moderator but an explanatory variable. Contrarily, the effect of moderation is supported if the interaction is statistically significant.

Table 4.25 Model Summary for Moderated Regression Analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.797 ^a	.635	.620	.64080

a. Predictors: (Constant), ITI*OC, ITI, Organizational Characteristics

Source: Study Data (2018)

The model summary of the moderated regression model shows adjusted R-square = 0.620 which is larger than adjusted R-square of the model without the organizational characteristics. The findings implied that inclusion of organizational characteristics enhanced the explanatory power of information technology integration on performance of public hospitals in Kenya. However, the study used significance level to test whether organizational characteristics moderated the relationship between information technology integration and performance of selected public hospitals in Kenya.

Table 4.26 ANOVA for Moderated Regression Analysis

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	53.600	3	17.867	43.511	.000 ^b
	Residual	30.797	265	.411		
	Total	84.397	268			

a. Dependent Variable: Performance of Hospitals

b. Predictors: (Constant), ITI*OC, ITI, Organizational Characteristics

Source: Study Data (2018)

To test the goodness of fit of the fitted regression model, the study adopted analysis of variance of the predicted model and actual model. Based on the findings of ANOVA that shows $f=43.511$, $p=0.000$, the study failed to reject the null hypothesis and concluded that the moderation model had a goodness of fit. The implication of these finding was that the product of ITI and OC, ITI, organizational characteristics significantly predicted performance of public hospitals in Kenya.

Table 4.27 Regression Coefficients for Moderated Regression Analysis

	B	Std. Error	T	Sig.
(Constant)	0.009	0.342	0.026	0.979
ITI	1.164	0.116	9.993	0.000
Organizational Characteristics	1.810	0.344	5.269	0.000
ITI*OC	1.711	0.356	4.804	0.000

a Dependent Variable: Performance of Hospitals

Source: Study Data (2018)

In this study, the requirements for moderation were: if the interaction between the predictor variable and the moderating variable (ITI*OC) is not statistically significant ($p > 0.05$), then the variable organizational characteristics is not a moderating variable, but an explanatory variable. On the other hand, the effect of moderation is supported if the interaction is statistically significant. Since ITI*OC had $p = 0.000$, the study rejected the null hypothesis H_04 : Organizational characteristics do not moderate the relationship between ITI and performance of selected public hospitals in Kenya. Consequently, it concluded that organizational characteristics significantly moderated the relationship of ITI with performance of public hospitals in Kenya.

The findings implied that Level 5 and national referral hospitals benefit more from ITI compared to Level 4 hospitals. This may be so because such hospitals have many departments and structures that may work better with ITI unlike small hospitals which can run effectively and efficiently without IT.

These study findings mirror the findings of Thong (1999). This author found out that business organizational characteristics such as CEO innovativeness and IS knowledge and organizational characteristics such as business size and employees' IT knowledge were more likely to adopt IT. Muathe (2010) also established adopter characteristics such as organization size, geographic location, age, management support, CEO IT skills and experience as key determinants of adoption and use of IT. Similarly, Dholakia and

Kshetri (2004); Malongo, Muathe and Waithaka (2019) established that internal organizational characteristics such as firm strategy, past experience and attitudes toward technology and external factors like infrastructure, business-related factors and the competitive environment affect the adoption and use of IT.

4.7.4 Test for mediation effect of User Perception

H₀₅: User perception does not mediate the relationship between ITI and performance of selected public hospitals in Kenya.

The final hypothesis of the study sought to test if user perception was a mediator of the relationship between ITI and performance of selected public hospitals in Kenya. The mediation effect of user perception was measured using Baron and Kenny (1986) model by conducting multiple regression analyzes and assessing the significance of the coefficients at all the four steps. Tables 4.28 and 4.29 contain the summary of the four steps as recommended by Baron and Kenny (1986). Table 4.28 presents the model summary and goodness of fit of the model. Table 4.29 presents the regression coefficient and significance of the predictor variables.

Table 4.28 Model Summary and ANOVA for Test for Mediation

Step	Model	Model Summary	ANOVA
Step 1	$PPH = \beta_0 + \beta_1 ITI + \varepsilon$	R-squared =0.488 Adjusted R-squared=0.481	F=74.352 (p=0.000)
Step 2	$UP = \beta_0 + \beta_1 ITI + \varepsilon$	R-squared =0.340 Adjusted R-squared=0.331	F=40.122 (p=0.000)
Step 3	$PPH = \beta_0 + \beta_1 UP + \varepsilon$	R-squared =0.419 Adjusted R-squared=0.411	F=56.140 (p=0.000)
Step 4	$PPH = \beta_0 + \beta_1 ITI + \beta_2 UP + \varepsilon$	R-squared =0.575, Adjusted R-squared=0.564	F=52.110 (p=0.000)

Source: Study Data (2018)

The results of Step 1 show that ITI accounted for (Adjusted R-squared=0.481) 48.1 percent of the variation in performance of public hospitals and the model had a goodness of fit (F=74.352, p=0.000). The results of Step 2 show that ITI accounted for (Adjusted R-squared=0.331) 33.1 percent of the variation in user perception and the model had a goodness of fit (F=40.122, p=0.000). The results of Step 3 show that user perception accounted for (Adjusted R-squared=0.441) 44.1 percent of the variation in performance of public hospitals; the model also had a goodness of fit (F=56.140, p=0.000). The finding of the final step shows that ITI and user perception explained (Adjusted R-squared=0.564) 56.4 percent of the variation in performance of public hospitals and the model also had a goodness of fit (F=52.110, p=0.000). The findings implied that all the models fitted for mediation effect were statistically significant.

Table 4.29 Regression Coefficients for Models Used to Test for Mediation

Step 1		β	Std. Error	Beta	t	Sig.
PPH = $\beta_0 + \beta_1 \text{ITI} + \varepsilon$	(Constant)	0.704	0.348		2.026	0.046
	ITI	0.986	0.114	0.699	8.623	0.000
Step 2						
UP = $\beta_0 + \beta_1 \text{ITI} + \varepsilon$	(Constant)	0.589	0.5		1.177	0.243
	ITI	1.043	0.165	0.583	6.334	0.000
Step 3						
PPH = $\beta_0 + \beta_1 \text{UP} + \varepsilon$	(Constant)	1.742	0.265		6.573	0.000
	UP	0.51	0.068	0.647	7.493	0.000
Step 4						
PPH = $\beta_0 + \beta_1 \text{ITI} + \beta_2 \text{UP} + \varepsilon$	(Constant)	0.535	0.321		1.666	0.100
	ITI	0.687	0.129	0.487	5.327	0.000
	UP	0.286	0.072	0.363	3.972	0.000

Source: Study Data (2018)

Table 4.30 Summary for Mediation Analysis

	OUTCOME	CONCLUSION
	β_1 significant in model 3.3	Partial Mediation

β_1 significant in model 3.4	
β_1 significant in model 3.5	
β_1 significant and β_2 significant model 3.5	

Source: Study Data (2018)

Since all the variables were significant in all the four steps, the study concluded that there was partial mediation hence the study still rejected H_05 : User perception does not mediate the relationship between information technology integration and performance of selected public hospitals in Kenya. Therefore, user perception mediated the relationship between information technology integration and performance of selected public hospitals in Kenya.

The finding of this study echoes those of Mustapha and Obid (2015); Muathe, *et al.*, (2019) who also found that perceived ease of use had a significant mediating effect on the relationship between tax service quality and online tax system. The study finding also concurs with the finding of Osman *et al.* (2016) established that perceived ease of use contributes to use of electronic technology.

Table 4.31 Summary of the Hypotheses Testing

Hypotheses	Results	Decision
H₀₁ : Human ITI has no effect on performance of selected hospitals in Kenya.	$\beta=0.239$, $p=0.044<0.05$	Reject H₀₁
H₀₂ : Organizational ITI has no effect on performance of selected public hospitals in Kenya.	$\beta= 0.280$, $p=0.021 <0.05$	Reject H₀₂
H₀₃ : IT infrastructure integration has no effect on performance of selected public hospitals in Kenya.	$\beta=0.512$, $p=0.003 <0.05$	Reject H₀₃
H₀₄ : Organizational characteristics do not moderate the relationship between ITI and performance of selected public hospitals in Kenya.	Interaction variable (ITI*OC) was significant	Reject H₀₄
H₀₅ : User perception does not mediate the relationship between ITI and performance of selected public hospitals in Kenya.	Partial Mediation was achieved	Reject H₀₅

Source: Study Data (2018)

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

In this chapter, the study summarizes the major findings aligned to the set research hypotheses tested in the fourth chapter. This is followed by a conclusion streaming from the major findings then recommendations for improvement and policy formulation. The chapter closes with suggestions for further research.

5.2 Summary

The aim of this study was to investigate the effect of ITI on performance of public hospitals in Kenya. The specific objectives were: first, to establish the effect of human ITI on performance of public hospitals and second, to determine the effect of organizational ITI on performance of public hospitals. The third objective was to analyze the effect of IT infrastructure integration on performance of public hospitals and fourthly, to analyze the moderation effect of organizational characteristics on the relationship between ITI and performance of public hospitals. The final objective was to analyze the mediation effect of user perception on the relationship between ITI and performance of public hospitals.

The target population of the study included ninety-eight public hospitals in Kenya that had integrated managed equipment services, comprising ninety-four from the forty-seven counties and four from national referral hospitals. A sample size of 294 respondents was drawn using proportionate stratified random sampling technique. The study utilized primary data, collected using a structured questionnaire. To analyze the features of the surveyed selected public hospitals and the respondents, descriptive statistics were used.

Multiple linear regression analysis was used to determine the effect of ITI, organizational characteristics, user perception and performance as well as their effect on performance.

The study sought to establish if human ITI significantly affected the performance of public hospitals in Kenya. The findings indicated that human ITI had a positive and significant effect on performance of public hospitals in Kenya. Based on the results of the regression analysis, human ITI was found to influence the performance of public hospitals in Kenya. The study findings further implied that increase in human ITI would translate into positive performance of public hospitals in Kenya. Therefore, based on the findings of this study and those of previous studies, the study concluded that improving human ITI is among the surest way public hospitals in Kenya could use to increase performance in terms of effectiveness, efficiency, relevance and financial viability.

The study also sought to establish if organizational ITI affected the performance of public hospitals in Kenya. Similarly, the study used regression analysis and the results showed that organizational ITI positively and significantly affected performance of public hospitals in Kenya. The findings implied that an improvement in organizational ITI would result into positive increase in performance of public hospitals in Kenya. The study finding further implied that public hospitals with improved ITI in operations had a high probability of better performance, other factors held constant.

Further, the study sought to analyze if IT infrastructure integration, referred to as infrastructure flexibility, affected performance of public hospitals in Kenya. Study findings show that infrastructure flexibility positively and significantly affected performance of public hospitals in Kenya. The findings implied that a unit improvement in infrastructure flexibility would result into positive increase in performance of public hospitals in Kenya. Compared to other variables, infrastructure flexibility had the largest

effect on performance of public hospitals in Kenya. Based on the study findings and those of previous studies, public hospitals infrastructure flexibility to IT integration plays a significant role in enhancing performance.

The study went further to analyze if organizational characteristics moderated the relationship between ITI and performance of selected public hospitals in Kenya. The corresponding hypothesis test involved computation of composite variable for independent variables (ITI), interaction variables computed using product of ITI and OC (moderating variable). The interaction variable was significant findings which implied that inclusion of organizational characteristics enhanced the explanatory power of ITI on performance of public hospitals in Kenya.

The finding implied that bigger public hospitals benefited more from ITI compared to smaller hospitals. This may be so because bigger hospitals had many departments and structures that could work better with ITI unlike small hospitals that could still run effectively and efficiently without ITI.

Finally, the study sought to analyze the mediating effect of user perception on the relationship between ITI and performance of selected public hospitals in Kenya. All the variables were significant in all the four steps of the hypothesis test, implying that user perception mediated the relationship between ITI and performance of selected public hospitals in Kenya.

5.3 Conclusion

The study established that human ITI, organizational ITI and infrastructure flexibility significantly affected the performance of public hospitals in Kenya. The study concluded that improving human ITI was one of the effective ways public hospitals in Kenya could

use to increase performance in terms of effectiveness, efficiency, relevance and financial viability. Public hospitals or any organization with better management of IT capabilities and personal IT skills have a higher probability of ensuring high organizational performance compared to organizational management that lack IT capability and personal IT skills.

The study also concluded that public hospitals with improved ITI in operations and all organizational structures have a high probability of better performance, other factors held constant. As a result, public hospitals' ITI infrastructure flexibility plays a significant role in enhancing performance. Public hospitals with infrastructure that can accommodate new and improved model of latest technologies have an advantage over those with rigid infrastructure in terms of leveraging on high performance technologies.

The study also concluded that organizational characteristics play a major role in an organization's adoption and utilization of ITs. For instance, bigger public hospitals benefit more from ITI than smaller hospitals. This may be so because bigger hospitals have many departments and structures that may work better with ITI unlike small hospitals that can effectively and efficiently work without ITI. Finally, the study concluded that user perception about ITI influences the adoption of the ITs. It determines whether or not the technology will improve the performance of the organization.

5.4 Recommendations of the Study

The study found out that majority of the selected public hospitals in Kenya had employees that were unable to confidently use integrated system due to limited knowledge on integrated systems. This was based on the analysis of the human IT integration. The study recommends that ICT departments in public hospitals should ensure proper human IT integration by ensuring that training is undertaken for all the

users of ITs before and during integration. This would go a long way in ensuring improved human ITI in public hospitals in Kenya.

The study further recommends that management should ensure seamless organizational IT integration in public hospitals and specifically departments of ICT must network closely with vendors in digital channels (Internet and Mobile), IT security and networking hardware to ensure there is full integration of IT to enhance efficiency and effectiveness of public hospitals in Kenya. The management of hospitals must also ensure that ITs are integrated in all the key departments in hospitals to increase efficiency in information sharing and overall performance of the hospitals.

Despite the important role played by flexibility of infrastructure to ITI, majority of the selected public hospitals in Kenya had poor IT infrastructure flexibility that hindered ITI. Therefore, management of the public hospitals in Kenya should do away with rigid infrastructure and make them more flexible for integration of new modules of better technologies to enhance efficiency. The study further recommends that the hospitals should procure more flexible IT systems to ensure ease of upgrade for better innovations in ITs.

The study also recommends that public hospitals should align the organizational characteristics to the type of ITs. Otherwise, the technologies should be customized to fit the type of organizational characteristics for better performance in line with the resource deployed. Further, the management of public hospitals should conduct awareness forums to enlighten users of the technologies and correct the misconceptions and wrong perceptions about technologies among the employees. This would increase utilization of IT. The Ministry of Health should come up with right policies and legal frameworks that

would ensure that public hospitals in Kenya adopted use of modern technologies and that hospitals allocated more budget to ITI.

5.5 Contribution to Knowledge

The present research endeavour has made significant contribution to the existing stock of knowledge. First, it has expounded on the existing knowledge on the effect of ITI on organizational performance in the context of public hospitals in developing countries. Existing literature focused a lot on private corporations and profit oriented organizations. Second, the study has provided knowledge to the management of the public hospitals on the need to adopt IT as one of the effective ways on enhancing efficiency, effectiveness, relevance and financial viability of the public hospitals in Kenya. Finally, the study has provided insights on the extent of human ITI, organizational ITI and infrastructure ITI in public hospitals in Kenya. Such knowledge can be used as a baseline for improvement.

5.6 Suggestions for Further Research

The current study focused on effect of ITI on performance of selected public hospitals in Kenya. The study relied on proportionate stratified random sampling techniques and included public hospitals comprising of level 4, 5 and national referral hospitals only. The study suggests further research on performance of both private and public hospitals that have ITI and those that do not have to find out if there is a significant difference. The study also suggests further research focusing on other factors that explain the remaining percentage in variation of performance of public hospitals since only 47.7 percent of the variation in performance of public hospitals in Kenya could be accounted for by Information Technology Integration.

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APPENDICES

Appendix I: Letter of Transmittal

Informed Consent

My name is **Iloka Kenneth Malongo** I am a PHD student from Kenyatta University. I am conducting a study on “**Information Technology Integration and Performance of Selected Public Hospitals in Kenya** “. The information will be used by the Ministry of Health in formulating strategies for guaranteeing enhanced performance of public hospitals. The study will equally be significant to the Government of Kenya in policy formulation especially on Information Technology Integration in public institutions as the findings from this study will act as a serve as a guide for policy formulation processes.

Procedures to be followed

You will be asked to answer some questions where you check off rating scales and provide answers about the Information Technology Integration and Performance of the hospital. It is estimated it will take 15 minutes for you to fill out the survey.

Discomforts and risks

Although there are no known risks in this study, some of the questions might be mentally challenging. This can be distressing to some people. You can stop the study at any time, though. You can choose not to answer any question you feel uncomfortable responding to. Benefits You are not directly involved in this research. There are no incentives available. The results will be of scientific interest to people who shop online that bay ultimately benefits.

Reward

If you agree to participate in this study, lunch will be provided and transport expenses will reimbursed

Confidentiality

The data collected in this study are confidential. Your name or personal information is not linked to data. Only the researcher in this study will see the data.

Contact information

We would be happy to answer any questions that may arise about the study. Please direct your questions or comments to:

Kenneth Iloka, email: kiloka2000@gmail.com, Tel +254 722 385 174; or

Dr. Stephen Muathe, email muathesm@yahoo.com, Tel +254 732 797 927.

Dr. Stephen Waithaka, email waithakast@gmail.com, Tel +254 722 222 260.

or the Kenyatta University Ethical Review Committee Secretariat on

chairman.kuerc@ku.ac.ke, secretary.kuerc@ku.ac.ke, ercku2008@gmail.com.

Participant's Statement (CONSENT)

The above information regarding my participation in the study is clear to me. I have been given a chance to ask questions and my questions have been answered to my satisfaction. My participation in this study is entirely voluntary. I understand that my

records will be kept private and that I can leave the study at any time. I understand that I will still get the same care and medical treatment whether I decide to leave the study or not and my decision will not change the care I will receive from the hospital today or that I will get from any other hospital at any other time.

Name of Participant.....

Signature or Thumbprint

Date

Investigator's statement

I, the undersigned, have explained to the volunteer in a language s/he understands, the procedures to be followed in the study and the risks and benefits involved.

Name of Interviewer.....

Interviewer signature

Date

Appendix II: Research Instrument / Questionnaire

PART A: GENERAL INFORMATION

Please tick the appropriate box.

1.1 Organizational Information

1. Type of the institution

(Tick) Type of Hospital

Level 4

Level 5

National Referral Hospitals

1.2 Respondent particulars

1. Title/designation

Hospital Superintendent CEO Other staff: State

department/Section:_____

2. Highest level of Education.

KCSE Diploma Bachelor's Degree Master's Degree PhD

3. How many years have you worked with this hospital?

1-2 years 2-4 years Over 4 years

4. How many years have you worked in the health sector?

1-2 years 2-4 years Over 4 years

PART B: INFORMATION TECHNOLOGY INTEGRATION

a) Indicate the level of your IT skills in the following areas (Human IT Integration)

Use the scale where 1= Not at all 2= To less extent 3=Moderate Extent 4= To high extent 5= To a great extent

	IT Management Capabilities	1	2	3	4	5
a	ICT hardware management					
b	ICT software management					
c	ICT security management					
d	Management Capabilities Digital Internet and Mobile					

IT Personnel Skills	1	2	3	4	5
I have the knowledge to use integrated system.					
I have the resources to use integrated system.					
I have the ability to use integrated system.					
I have control over using integrated system.					

b) To what extent does the hospital use the following vendors (Organizational Integration)

Use the scale where 1= Not at all 2= To less extent 3=moderately 4= To high extent 5= To a great extent

	IT Resources	1	2	3	4	5
A	IT hardware vendors					
B	IT software vendors					
C	IT security vendors					
D	Networking hardware					
E	Digital Channels – Internet & Mobile					

What was the approximate percentage of IT budget allocated to the following against the total hospital budget?

	Management Support	approximate percentage of IT budget allocated
A	IT strategy plan	
B	IT disaster recovery plan	
C	IT security plan	
D	Networking hardware	
E	Digital Channels – Internet and Mobile	

c) Rate the flexibility of the following IT components in allowing new modules (IT Infrastructure flexibility)?

Use the scale where 1= Not at all 2= To less extent 3=moderately 4= To high extent

5= To a great extent

	Indicator Statement(s)	1	2	3	4	5
A	IT hardware					
B	IT software					
C	IT network					
D	Digital internet and Mobile					

Rate the ability of IT Integration to offer operational agility and better quality, please indicate in the space provided below

Use the scale where 1= Not at all 2= To less extent 3=moderately 4= To high extent
5= To a great extent

Indicator Statement(s)	1	2	3	4	5
Does IT Integration offer operational agility and better quality					

PART C: ORGANIZATIONAL CHARACTERISTICS

Kindly indicate the firm characteristics in respect to the following

Firm characteristics	
Level of the hospital (Size)	
Number of employees	
Number of ICT innovations initiated by the CEO	

PART D: USER PERCEPTION

Please indicate how the following statements apply to your hospital (**TICK** the number that best represents your choice). 1= Strongly Disagree 2= Disagree 3= Slightly Disagree 4= Agree 5= Strongly Agree

Perceived Ease of Use	1	2	3	4	5
The integrated system enables me to accomplish tasks more quickly					
The integrated system has improved my quality of work.					
The integrated system makes it easier to do my job.					

The integrated system has improved my productivity.					
The integrated system gives me greater control over my job.					
The integrated system enhances my effectiveness on the job.					

Perceived Usefulness	1	2	3	4	5
My interaction with the integrated system has been clear and understandable.					
Overall, the integrated system is easy to use.					
Learning to operate the integrated system was easy for me.					
I rarely become confused when I use the integrated system.					
I rarely make errors when using the integrated system.					
I am rarely frustrated when using the integrated system.					

PART E: HOSPITAL PERFORMANCE

To what extent do you agree with the following statements relating to your hospital's performance (Please **TICK** the number that best represents your choice)

Where 1=Not at all 2=To a very small extent 3=To a small extent 4=To a large extent
5=To a very large extent

a) Effectiveness:

Indicator Statement(s)	1	2	3	4	5
The hospital ensures that it gives timely, understandable information about the patient's condition, diagnosis and prognosis					
The hospital ensures accurate administration of medications					
The hospital advises patients about the costs of the different care options					
The hospital provides patients with explicit information about when to expect discharge					
The hospital provides patients with information about community resources available to the caregiver, such as caregiver support groups, financial assistance, respite services, etc.					

b) Efficiency:

Indicator Statement(s)	1	2	3	4	5
Staff members are used by the hospital to the best of their abilities.					
The hospital makes maximal use of its facilities such as buildings and equipment.					
The hospital makes optimal use of its financial resources. High quality administrative systems are in place (financial, human resources, programme, strategy, etc) to support efficient service delivery.					
The hospital compares progress and achievement made in the organization from time to time.					
Hospital's programmes are evaluated on the basis of the cost.					
The hospital delivers its services and products promptly without delay					
Hospital's equipment and systems are well maintained to avoid unnecessary delay in service delivery resulting from breakdown.					
The hospital always achieves its objectives within the set time frame.					
The organization controls overhead costs.					


c) Relevance

Indicator Statement(s)	1	2	3	4	5
Programmes run by the hospital are regularly reviewed to reflect changing environment.					
Programmes run by the hospital are regularly reviewed to reflect changing capacities.					
Beneficiary-needs assessments are conducted regularly					
Services offered by hospital are constantly reviewed to reflect changing customer needs					
Services offered by hospital are constantly reviewed to reflect changing customer type.					
The hospital regularly reviews the environment to adapt its strategy.					
The hospital's stakeholders have expressed their satisfaction with how the hospital is running its affairs.					
The hospital's partners have changed their attitude towards the organization from negative to positive.					
The funding that the hospital has been receiving from the stakeholders has increased over the last five years.					
There has been increased number of new funders to the organization over the last five years.					
Peer organizations value their relationship with the hospital.					
The hospital always achieves its objectives within the set time frame.					
The hospital controls overhead costs.					

d) Financial viability:

Indicator Statement(s)	1	2	3	4	5
Hospital's existing funding sources offer sustained support					
The hospital consistently obtains new funding sources.					
The hospital has sustainable financial resources for continuity of programmes even with the exit of key donors.					
The hospital has more revenue than expenses.					
Hospital's assets are greater than liabilities					
The hospital keeps surplus financial resources to use during economic depressed periods.					
The hospital has wide sources funds including new players from the community and private sector.					
The amount of resources mobilized from the local partners and the community have increased over the last five years.					
The hospital monitors finance, capital assets and depreciation on a regular basis.					

Appendix III: Research Authorization


**KENYATTA UNIVERSITY
GRADUATE SCHOOL**

E-mail: dean-graduate@ku.ac.ke P.O. Box 43844, 00100
Website: www.ku.ac.ke NAIROBI, KENYA
Tel. 020-8704150

Internal Memo

FROM: Dean, Graduate School **DATE:** 13th February, 2018
TO: Mr. Iloka Kenneth Malongo **REF:** D86/CTY/31675/15
C/o Department of Management Science
SUBJECT: APPROVAL OF RESEARCH PROPOSAL

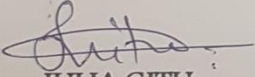
=====


This is to inform you that Graduate School Board, at its meeting on 13th February, 2018, approved your Research Proposal for the Ph.D. Degree entitled, **“Information Technology Integration and Performance of Selected Public Hospitals in Kenya.”**

You may now proceed with your Data collection, subject to clearance with the Director General, National Commission for Science, Technology & Innovation.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking Forms per semester. The form has been developed to replace the Progress Report Forms. The Supervision Tracking Forms are available at the University’s Website under Graduate School webpage downloads.

Thank you.


JULIA GITU
FOR: DEAN, GRADUATE SCHOOL



CC. Chairman, Management Science Department

Supervisors:

1. Dr. Stephen M.A. Muathe
C/o Department of Business Administration
Kenyatta University
2. Dr. Stephen Waithaka
Department of Computing and Information Technology
Kenyatta University

JG/cmw

Appendix IV: NACOSTI Research Authorization



NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471,
2241349,3310571,2219420
Fax: +254-20-318245,318249
Email: dg@nacosti.go.ke
Website : www.nacosti.go.ke
When replying please quote

NACOSTI, Upper Kabete
Off Waiyaki Way
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No. **NACOSTI/P/18/47328/21737**

Date: **27th March, 2018**

Kenneth Malongo Iloka
Kenyatta University
P.O. Box 43844-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on *“Information Technology Integration and performance of selected public hospitals in Kenya,”* I am pleased to inform you that you have been authorized to undertake research in **all Counties** for the period ending **12th March, 2019.**

You are advised to report to **the County Commissioners, the County Directors of Education and the County Directors of Health Services, all Counties** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit a **copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

DR. M.K. RUGUTT, PhD, OGW
DIRECTOR GENERAL

Copy to:

The County Commissioners
All Counties.

The County Directors of Education
All Counties.

National Commission for Science, Technology and Innovation is ISO9001:2008 Certified

Appendix V: NACOSTI Permit

THIS IS TO CERTIFY THAT:
MR. KENNETH MALONGO ILOKA
of **KENYATTA UNIVERSITY, 3496-506**
NAIROBI, has been permitted to conduct
research in *All Counties*

Permit No : **NACOSTI/P/18/47328/21737**
Date Of Issue : **27th March, 2018**
Fee Received : **Ksh 2000**

on the topic: **INFORMATION
TECHNOLOGY INTEGRATION AND
PERFORMANCE OF SELECTED PUBLIC
HOSPITALS IN KENYA**

for the period ending:
12th March, 2019




.....
**Applicant's
Signature**


.....
**Director General
National Commission for Science,
Technology & Innovation**

Appendix VI: List of Hospitals

	COUNTY	LEVEL V	LEVEL IV	NATIONAL REFERRAL
1	Garissa	PGH Garissa	Masalani	Kenyatta National Hospital
2	Tana River	Hola DH	Garsen Health centre	Moi Teaching and Referral Hospital
3	Lamu	Lamu DH	Faza	National Spinal Injury Hospital
4	Mandera	Mandera DH	El Wak SDH	The Mathari Hospital
5	Wajir	Wajir DH	Griftu SDH	
6	Busia	Busia DH	Kocholia SDH	
7	Vihiga	Vihiga DH	Emuhaya	
8	Kakamega	Kakamega PGH	Malava SDH	
9	Bungoma	Bungoma DH	Webuye SDH	
10	Muranga	Muranga DH	Muriranjias SDH	
11	Kirinyaga	Kerugoya DH	Kianyaga DH	
12	Nyeri	Nyeri PGH	Karatina DH	
13	Homabay	Homabay DH	Rachuonyo DH	
14	Kisii	Kisii DH	Gucha DH	
15	Kisumu	JOOTRH	Kisumu East DH	
16	Siaya	Siaya DH	Bondo DH	
17	Migori	Migori DH	Kehanacha SDH	
18	Nakuru	Nakuru PGH	Naivasha DH	
19	UasinGishu	Ziwa SDH	Burnt Forest SDH	
20	Nandi	Kapsabet DH	Nandi hills SDH	
21	Kericho	Kericho DH	Sigowet SDH	
22	Bomet	Longisa DH	Ndanai SDH	
23	Narok	Narok DH	Transmara SDH	
24	Embu	Embu PGH	Ishara SDH	
25	Kitui	Kitui DH	Mwingi DH	
26	Makueni	Makueni DH	Makindu SDH	
27	Machakos	Machakos level V	Kangundo DH	
28	Turkana	Lodwar DH	Lopiding SDH	
29	West Pokot	Kapenguria DH	Kacheliba SDH	
30	Trans Nzoia	Kitale DH	Endebes SDH	
31	Nyandarua	OlKallau	Engineer SDH	
32	Marsabit	Marsabit DH	Kulacha SDH	
33	Isiolo	Isiolo DH	Garbatulla SDH	
34	Meru	Meru level V	Nyambene SDH	
35	Tharaka- Nithi	Chuka DH	Tharaka SDH	
36	Nyamira	Nyamira DH	Keroka SDH	
37	Kwale	Kinango	Msambweni	
38	Kilifi	Malindi	Kilifi	

39	TaitaTaveta	Voi District Hospital	Taveta DH	
40	Laikipia	Nanyuki DH	Nyahururu DH	
41	Nairobi	Mama Lucy Hospital	Mbagathi Hospital	
42	Baringo	Kabarnet DH	Eldama Ravine SDH	
43	Elgeyo-Marakwet	Iten DH	Chebiemit DH	
44	Samburu	Maralal DH	Baragoi SDH	
45	Kiambu	Thika District Hospital	Kiambu Hospital	
46	Mombasa	Coast PGH	Likoni	
47	Kajiado	Kajiado District Hospital	Loitokitok Hospital	