ACTIONABILITY OF HEALTH MANAGEMENT INFORMATION SYSTEMS DATA WITHIN PRIVATE HOSPITALS IN KENYA

BY

MICHAEL NG’ANG’A NJOROGE

UNITED STATES INTERNATIONAL UNIVERSITY - AFRICA

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A Research Project Report Submitted to the Chandaria School of Business in Partial Fulfilment of the Requirement for the Degree of Masters in Business Administration (MBA)

UNITED STATES INTERNATIONAL UNIVERSITY - AFRICA

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STUDENT’S DECLARATION

I, the undersigned, declare that this is my original work and has not been submitted to any other college, institution or university other than the United States International University in Nairobi for academic credit.

Signed: ________________________ Date: ____________________

Michael Ng’ang’a Njoroge (ID 655270)

This project has been presented for examination with my approval as the appointed supervisor.

Signed: ________________________ Date: ____________________

Fred Newa

Signed: ________________________ Date: ____________________

Dean, Chandaria School of Business
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ABSTRACT

The purpose of this study was to establish the relationship between utilization of Hospital Management Information System and operational decisions within private hospitals in Nairobi, Kenya. This study had three specific research questions. That is to establish the relationship between HMIS utilization and operational financial decisions. Secondly, to establish the relationship between HMIS utilization and operational procurement decisions and finally to establish the relationship between HMIS utilization and human resources operational decisions in private healthcare organisations in Nairobi, Kenya.

The study conducted was a descriptive cross-sectional quantitative study utilising the survey technique. The intended population of this study were healthcare personnel in finance, human resource and procurement departments working within private facilities in Nairobi County. The facilities of interest were level 3 and above health facilities with hospital beds as categorised by the Kenya ministry of health. These facilities total 155 in Nairobi County. Sampling for the study was done via the random stratified sampling technique with stratification from the sampling frame based on bed capacity i.e. more than 50 beds and less than 50 beds. The sampled facilities totalled 31. The sample size targeted from these facilities was 62. A five point likert scaled questionnaire was used as the data collection tool. The data was collected over a two week period using both email and pick and drop research procedure with the help of two assistants.

Study findings on the relationship between HMIS utilization and financial decisions revealed a weak but positive correlation between the two. Regression for this relationship was done which revealed a positive but not statistically significant relationship between HMIS utilization and financial decisions.

In regards to the relationship between HMIS utilization and staffing decisions, the correlation analysis was the strongest of the three predictor variables at p<0.01 which is statistically significant. Regression analysis of this association was conducted with a resultant coefficient revealing a positive and statistically significant relationship between HMIS utilization and staffing decisions.

Findings on the relationship between HMIS utilization and procurement decisions found no correlation between HMIS utilization and procurement. Regression analysis for this relationship confirmed this finding.
This study concludes that the staffing decisions of performance appraisal, new recruitment and staff scheduling are strongly associated with HMIS utilization in healthcare organizations in private hospitals in Nairobi Kenya. The study finds no demonstrated association between the operational procurement decisions and HMIS utilization in private healthcare organisations in Nairobi Kenya. This study did not find any correlation between the financial functions of financial reporting, improving patient cash collections and claim adjudication with HMIS utilization.

From the study findings and discussions, the authors make the following recommendations. One, that the continued development of HMIS systems that incorporate financial modules will drive HMIS utilization in healthcare organizations. Two, that hospital information system design should incorporate more staffing related functionalities as this will drive HMIS utilization further and impact on human resource organisational decisions. This impact on decisions relates to the quality and promptness of decision making taking into consideration the human resource elements of organizational complement, contingent workforce available and skills available for specific responsibilities to be carried out effectively. Three, a strategic push by healthcare providers and healthcare suppliers towards developing a framework that will guide the process of systems integration will provide both parties with opportunities to reap the benefits of e-procurement.
ACKNOWLEDGMENT

I express my deepest gratitude to all people who offered their support in completing this work. In particular, I thank my supervisor professor Fred Newa, Chandaria School of Business for offering his time, assistance and guidance in coming up with this research report. I acknowledge my family for their encouragement, support and understanding during the many hours spent working on this report. I acknowledge the authors referenced in this study for their work which acted as a foundation from which I build my own. Lastly, i thank God for his encompassing presence in all things related to this report.
DEDICATION

This work is dedicated to my family and friends whose encouragement, support and understanding gave me the drive and inspiration to complete this work.
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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the Study

Information of good quality and that is relevant to the decision maker is necessary for the making of effective and timely decisions especially for an organisation. Karl Wieck’s organisational information theory (OIT) attempts to describe the process by which organisations collect, manage and use information they receive. (Wieck's, 1969)

OIT makes certain assumptions one of which is that of information equivocality. In their book, West and Turner describe it as follows, organizations receive information from multiple sources, and they must decode the information and determine whether it is comprehensible, which person or department is most qualified to deal with the information, and whether multiple departments require this information to accomplish their tasks. Without clarity in these areas, there is information equivocality. (Wieck's, 1969)

Wieck continues to describe equivocality as information ambiguity when first received and states that information received from different sources of the organisation may be ambiguous to individuals within the organisation if presented in a way not familiar to them. OIT then describes duration as one of the rules that seeks to reduce the time it takes to resolve information equivocality. West and turner describe the focus of OIT to be that of communication of information, they go ahead to assert that this is key in determining the success of an organisation. (West, 2000)

The world over, organizations are in the race for enhancing their capabilities in order to survive the competition in the global market. Therefore, organizations are attempting to advance their agility level by improving the decision making process to be more efficient and effective to meet the needs of their market. In an effort to achieve this, many modern organizations, either mid or large sized, have involved themselves in a cycle of progressive investments in and adopted new management information systems (MIS). (Karim, 2003)
(Liu & Young, 2007) Proved that global businesses are advancing due to the continued uptake and utilisation of modern information technology tools such as Enterprise Resource Planning (ERP), Knowledge Management Systems (KMS) and Customer Relations Management (CRM) to enhance the efficiency and effectiveness of the decision making process. They look at key information models and their relationships in business decision support.

The more available information is, the better the impact on both efficiency and accuracy of business decisions. (Handzic & Hasan, 2001) Study on the availability of information on people’s ability to make short and long term decisions reveals this. He continues to state that management information systems collect data from an organisations input, processes and outcomes activities. It then processes this information and presents it to different management levels in actionable form. MIS use in business has been widely utilised in operational units e.g. finance, human resource departments etc. With significant growth in the field of management information systems and its application for business, MIS have transformed into ‘business unit’ wide systems incorporating many operational units. Further to this, he elaborates, MIS have grown to encompass several business units or organisations, representing regional wide and country wide systems.

Information is not an end in itself, but a means to better decisions (Theo lippeveld, 2000). Accordingly, the stored information must then be recalled and distributed for the use of an organization management to make effective long term (strategic) and short term (Tactical) decisions. MIS is deemed to be a system which provides an organisation with information from both internal and external sources, to allow them to make effective and timely decisions that best achieve their organization goals and satisfy stakeholder requirements (Argyris, 1971)

If the relevant information required in a decision-making process or in organization planning is not available at the appropriate time, then there is a good chance to be poor organization planning, inappropriate decision-making, poor priority of needs, and defective programming or scheduling of activities (Adebayo, 2007). He also noted that the existence of MIS is necessary to improve and enhance decision making on the issues affecting human and material resources.
Organisations that do not have formal Information sharing practices will fail to leverage their managers’ intellectual capital for business innovation and growth. (Bonnie O, 2007) Organisational MIS enables the exchange of experiences, which transfers the required information to the management to sustain competitive advantage through enhancing decision making improving the quality of services provided. It is therefore important to motivate organisations employees to continually use MIS to generate data that is accurate, reliable, and relevant to them so that their intellectual capital can be leveraged. (Barachini, 2007)

The implicit assumptions underlying information systems are twofold first, that good data, once available, will be transformed into useful information which, in turn, will influence decisions; second, that such information-based decisions will lead to a more effective and appropriate use of scarce resources. This appropriate use will then lead to a new set of data which will then stimulate further decisions and so forth. These two assumptions invite questions that deal with the relevance of MIS in organisations. These are the perceived usefulness of the data that MIS generates to the intended decision makers which is primarily driven by beliefs and whether the MIS in organisations in question in this study are actually fulfilling the need of providing such actionable information. Are the management information systems of the target organisations designed with the end users in mind? If so are the end users aware of the length and breadth of the information available to them within their MIS in helping them make decisions? (Theo lippeveld, 2000)

Health care provision is an increasingly expensive business. There is pressure to improve clinical outcomes from patients and healthcare stakeholders alike. Health care facilities worldwide have had to look at ways to be more efficient and judicious with their available resources. Improving efficiency in hospitals has been a way most healthcare providers have attempted to address this problem. Utilisation of hospital management information systems has largely come in to fill the efficiency gaps. As Kenya’s health sector wakes to the importance of a health Information System in planning, monitoring and implementation of operational matters, the need for correct and timely information on various health indicators for effective management cannot be overemphasized.

The Kenyan government has over the years undertaken numerous policy reforms to enhance the performance of the health sector. In the 2005 – 2010 Strategic Plan, Ministry
of Health articulates its strategy to strengthen coordination between private and public health facilities in proper design and implementation of integrated health information systems. (RCMRD, 2007) This Push by government through policy has led an increasing uptake of MIS in hospitals in Kenya. This it has done in an attempt to get health facilities to reap the benefits of efficiency and improved quality of clinical service to the Kenyans. This trend is expected to accelerate as more organisations seek to have a competitive edge.

With more and more Kenyans joined the insured population, privately owned health facilities are growing in size and number. Based on their increased agility level in decision making compared to government owned health facilities and reduced bureaucracy, private health facilities in Kenya have spear headed the adoption of health information systems in an attempt to gain efficiency advantages over their competition. With the significant resources expended by private hospitals in HMIS adoption, are these systems providing information that is actionable or are they storing/filing data with no processing or analysis involved? Information systems generate data elements for example number of patients seen in a week or number of nurses who have been on duty this same week. Taken in this ‘raw form’, this data is of little use to health managers in making decisions since its non-comparative/non-relational data. If this data can be related with for example revenue from lab tests done during the same week, then it can create an ‘indicator’ that is more actionable as it a measure of a particular service. (Sahay & Latifov, 2012)

1.2 Statement of the Problem

The Expanded health insurance coverage and changing health seeking behaviour in the Kenyan populous has led to more hospital visits. This has often led to high operational costs in hospitals and by extension skyrocketing costs of insurance both justified and fictitious. As a result profitability of health care institutions and healthcare providers has suffered. Reducing operating costs through efficiency has been a way to stem these costs. HMIS utilisation has been advocated as a way to help hospitals be more efficient in their use of scarce resources. Health care institutions have challenges in the area of revenue cycle management. From dealing with claims collection to revenue collection, management of a hospitals revenue cycle is one of the most important financial responsibilities of management to ensure service of good quality continues to be
available with increasing profitability. Deployment of information systems to this end has been widely taken up with hopes to efficiency and accuracy in decision making.

The implementation and utilisation of information systems in the areas of procurement in other industries has led to significant gains in efficiency. Their use in healthcare although low, investments in this regard is slowly increasing. Are these intended gains being realised to justify their cost? Human resources in the service industry that healthcare institutions operate are the lifeline of the organisation. Their judicious, efficient and appropriate deployment is essential to achieve increasingly better health outcomes as demanded by the populous. Information systems in staffing is utilised in a myriad of ways, the effectiveness of the decisions by unit managers in the deployment of their staff based on this information is constantly under trial especially with the fluidity of emergent staffing needs in the health sector.

Given the substantial albeit rarely specified resources that go in to developing and adopting health information systems, there is little proof from local studies that HMIS are designed with the end users in mind. The incessant push by market forces to retain competitive advantage especially in the private hospital sector has led to huge investments in health information systems. Whether the health management are reaping the benefits of better decisions and by extension better clinical and financial outcomes from the hospitals in question remains to be determined.

1.3 General Objective

To establish the relationship between utilization of Hospital Management Information Systems (HMIS) and operational decisions within private hospitals in Nairobi, Kenya.

1.4 Specific Objectives

1.4.1 To establish the relationship between the utilisation of HMIS within hospitals and financial decisions.

1.4.2 To establish the relationship between the utilisation of HMIS within hospitals and staffing decisions.

1.4.3 To establish the relationship between the utilisation of HMIS within hospitals and procurement decisions.
1.5 Importance of the Study

1.5.1 Private Hospitals

This study will be of benefit to private hospitals with operational health information systems or with intentions to implement as it will shed light on the real or perceived gains from its utilisation within the healthcare organisation.

1.5.2 HMIS Users

This study will be of use to the health care practitioners using HMIS systems as it will enlighten on the possibilities of the myriad of uses their systems can be put to, to enhance their productivity, efficiency and ultimately improve patient outcomes.

1.5.3 Healthcare Managers

This study is of value to health managers in health facilities utilising HMIS. The findings will seek to elaborate the cost benefit factor of investing in HMIS in its contribution to helping to make the decision making process faster, more accurate and appropriate to solving the challenges at hand. It will also help shine a light into the gaps of utilisation of HMIS already operational in private hospitals.

1.5.4 HMIS Information Technology Designers

The designers will also benefit from this study as it will elucidate the gaps in design of HMIS systems in terms of analysis gap and provision of relevant data to health managers. Defining this gap will hopefully help in the designing of better HMIS systems with their intended users in mind or better still in partnership with their intended users.

1.5.5 Researchers

This study will help build on the knowledge of HMIS studies in Kenya. Many of the studies focus on percentage of uptake of these systems and challenges of rolling out the systems. Studies of whether the systems already in place are designed to augment the decision making processes are scarce. In their study (Maroa, 2014) described the need of addressing the functionality and proportionate usefulness of the data generated from HMIS systems as an area of further study. This study will seek to build on knowledge in this area.
1.6 Scope of the Study

This study will focus on private hospitals within Nairobi County. The target respondents in this survey will be health facility managers at low, middle and top management including departmental/section heads making tactical decisions on a day to day basis. Data for this study will be collected in the month of May 2018. This study limits itself to the actionability of the data produced from HMIS although it is appreciated that other factors affect the decision making process. It will focus on financial, human resource and procurement decisions appreciating that there are a myriad of other decisions that rely on HMIS data.

This survey will use questionnaires as the data collection tool. To mitigate against low response rate, the researcher will describe the importance of the study to the target respondents and study findings will be shared to them. Weekly email and telephone reminders will also be made to help reduce non response.

1.7 Definition of Terms

1.7.1 Management information systems: is an arrangement of groups, data, processes and technology that act together to accumulate, process, store and provide information output needed to enhance and speed up the process of decision making. (Whitten et al. (2004)

1.7.2 Health management information system: The application of a management information system within a healthcare institution. (WISN, 2010)

1.7.3 Actionability: Usability of data in the decision making process. It’s a term related to actionable insight which in data analytics and big data describes information that can be acted upon or information that gives enough insight into the future that the actions that should be taken become clear for decision makers. (Karim, 2003)

1.7.4 Enterprise Resource system: Business management software that integrates all the core process in an organization. (Andries, 2002)

1.7.5 Electronic Medical Records: Digitized version of all of a patient’s health information as a result of seeking health services. (Ineza, 2015)
1.7.6 Revenue Cycle Management: The financial process of managing and tracking claims and revenue in a healthcare organisation. (Greenwayhealth, 2016)

1.8 Chapter Summary

In this chapter an introduction on the use of management information systems in organisations has been done. Its evolution into analysis of organisational data and its subsequent use in the decision making process has been presented. The organisation information theory describing the usefulness of information in the decision making process in organisation forms a backbone of the study and other studies has fortified this. The study objectives both general and specific have been stated and the scope defined. The importance of the study has been elucidated and definitions relevant to the chapter defined.

Chapter two will further describe literature relating to use of MIS in finance, human resource and procurement. It will attempt to provide contrasting views of literature and define a place for the study amongst literature.

Chapter three will discuss the research methodology of this paper, the specific procedures that will be used for data collection as well as the data analysis. Chapter four will discuss the findings from the data received from the population sample. Chapter five will provide a discussion on the findings of the research, the summary and recommendations for improvement based on study findings and further research of the objectives.
CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter will provide the literature review on the use in management information systems in organisations delving specifically into its use in the financial, human resource and procurement decisions within a health facility. Health facilities, whether in business or not, need to understand and have firm control of their financial position. In the current private health sector market place in Kenya, competition is stiff. Having a strong bottom line means a better offering than your competitor in terms of quality and diversity of services. The operational intricacies of hospitals in the area of human resource and procurement are unique but can also borrow from other service and manufacturing industries on ways of gaining efficiency. There are lessons to be learnt and adopted if the hospitals of today are to remain effective in providing impactful health care to the Kenyan populous whilst remaining true to their responsibility to maximise their shareholders wealth.

2.2 The Relationship between HMIS Utilisation within Healthcare Organisations and Financial Decisions.

2.2.1 MIS Utilisation within Healthcare Organisations

An information system is an arrangement of groups, data, processes and technology that act together to accumulate, process, store and provide information output needed to enhance and speed up the process of decision making. (Whitten & Bentley, 2007)

A digital firm is one in which nearly all of the organization’s significant business relationships with customers, suppliers, and employees are enabled and mediated through and information system. Core business processes are accomplished through digital networks spanning the entire organization or linking multiple organizations. Kenneth laudon adds that digital firms sense and respond to their environments far more rapidly than traditional firms, giving them more flexibility to survive in highly competitive business environments. (Laudon & Laudon, 2012)

He adds that digital firms offer extraordinary opportunities for more flexible global organization and management. Most companies are not fully digitized, but they are
moving toward close digital integration with suppliers, customers, and employees. For the developing world, adopting and utilising information systems have not only become a game of catch up but an exercise in business survival.

He describes a growing interdependence between a firm’s ability to use information technology and its ability to implement corporate strategies and achieve corporate goals. What a business would like to do in five years often depend on what its systems will be able to do now and in the future. Business firms invest heavily in information systems to achieve a number of strategic business objectives. These include operational excellence, new products and services, business models, customer and supplier intimacy, improved decision making and competitive advantage. (Laudon & Laudon, 2012)

These aforementioned points of view are in line with a study on the significance of management information systems for enhancing tactical and strategic planning that reveals that MIS utilisation has a strong and positive correlation on enhancing strategic but not tactical decision making. While most literature agrees on the importance of management information systems for long-term decisions, there are different points of view on whether it offers any significant and relevant advantages on operational decisions. (Karim, 2003) The consolidation of information within organisations, its analysis and presentation for the purposes of decision making has led to development of information systems that plug in the decision making process to aide companies remain relevant and succeed in the competitive market place. (Whitten & Bentley, 2007)

Despite significant advancements in the field of business management, many managers operate in an information fog bank, never really having the right information at the right time to make an informed decision. Instead, managers rely on forecasts and best guesses. Businesses pushing a profit objective continuously seek to improve the efficiency of their operations. Information systems and technologies are some of the most important tools available to managers for achieving higher levels of efficiency and productivity in business operations, especially when coupled with changes in business practices and management behaviour. (Laudon & Laudon, 2012)

A study conducted in Kigali Rwanda health facilities on the perceived benefits of electronic medical records (EMR) in healthcare facilities presents results indicating that
the majority of users of HMIS perceived several benefits from its use and affirmed that the EMRs have significantly improved the quality of care in their facilities. The study also reveals that despite the benefits in some organisations, use of EMR had no impact and in fact curtailed certain processes within the health facilities due to duplication of responsibilities and lack of knowledge of its utilisation. (Ineza, 2015)

Information systems provide a bridge with which firms connect with customers and suppliers to improve these relationships and foster business growth. The basic operational management information provided by the HMIS data is the foundation for day-to-day management functions as well as strategic decision making and impact analysis. Many managers use HMIS performance indicators as components of balanced scorecards, or other quality reporting. Such data is vital for benchmarking activities, a valuable process for discovering best practices among peer organizations. (MIS, 2005)

2.2.2 Financial Decisions within healthcare organisations

Business reporting should essentially constitute a representation of a healthcare organisations business model by describing and understanding the health care business model, the relationships among the various input and outcome measures, and by linking the primary inputs to intermediate inputs and, ultimately to financial performance and other measures of total value creation. (Blair & Wallman, 2001)

Today’s healthcare revenue cycle remains as complex as ever. While cash is still and will always be king, there is growing need for an additional layer of high-performance KPIs(key performance indicators) that seek to better exploit potential areas of new business opportunity as well as expose areas where bottlenecking, inherent risk, or lagging performance exists. (Robertson, 2007) The challenge of improving operational efficiency in the face of increasing costs and stable revenues require finance and accounting professionals in healthcare organizations to deliver more innovation, creativity, and ideas to help control and balance efficiency and quality (Langabeer, 2010) By measuring the predefined performance indicators from information systems and comparing to objectives, healthcare executives can focus on how we are doing now, how much we have improved over time, what needs to be done next to sustain the improvement (Zeng & Zhang, 2013)
Healthcare revenue cycle management (RCM) is emerging to be very critical in assessing, improving and maintaining a health institution’s financial wellbeing. Hospital revenue cycle management processes track the organization’s financial health and efficiency from medical billing to clinical workflows. Rather than just gathering and reporting data for measures, performance indicators start with a historical performance benchmark and hospitals continue to gather and report data to compare their performance against the benchmark. (Belliveau, 2017) A hospital’s key revenue cycle goals are making sure claims are clean, analysing denials as soon as they are received and ensuring patient cash collections. As patients take on more financial accountability for their healthcare, hospitals may want to assess if their staff is effectively collecting patient out-of-pocket payments before overdue bills turn into hospital bad debt. (Richman & Bergantz, 2015).

Electronic data exchange (EDI) is a business information technology service that allows business to business transactional communication either between different departments or more commonly externally between supplier and businesses. They allow transfer of documents e.g. invoices, orders, and claims etc. in a secure environment allowing for fewer errors and faster turnaround times. Having an automated system that scans claims for errors before claim submission, such as incorrect member ID numbers, can go a long way toward improving clean claims rates and decreasing denials and rejections from insurance companies which improves an organization’s financial health in the long run. (Greenwayhealth, 2016)

A study done in South Korea on the impact of EDI utilisation between healthcare insurers and several multilevel hospitals reveals that this information system integration played a critical role in reducing heavy administrative workloads through automatic data processing. Although the return rate of the problematic claims to health providers and the error detection rate by the system were low, the role of IT will become increasingly important in reducing the workload of health insurance claims review process for both hospitals and insurance companies. (Park, 2012)
2.2.3 HMIS utilisation and Financial Decisions within healthcare organisations

Several intangible benefits that a company can benefit from the implementation of management information system incorporating finance, human resources etc. have been described by a study on business processes as including enhancing customer happiness, improving supplier performance, better flexibility in business operations and response to competition, reduction in costs, increasing the value of resources, and ensuring the correctness of enhanced information and improved decision-making capacity. (Siriginidi, 2000)

It is becoming increasingly clear that to prosper in these uncertain times, organizations need to automate their RCM as much as possible. The most successful forms of automation can help lower your staff costs, enhance clean claims rates, cut denial rates, improve patient collections and reduce bad debt, all contributing to enhanced profitability, improved financial outcomes and, potentially, improved patient satisfaction. RCM automation can help in organizing patient billing information to aid in collections and providing prompts to help staff prioritize their work. It can also provide editing solutions for automated claims helping an organisation identify and correct dirty claims, which reduces your claims denial rate. As such, management information systems that plug into an institutions revenue cycle management result in data that is more ‘actionable’ than those that don’t. (GEHealthcare, 2015)

Automation means you can constantly track key financial performance indicators so that you can identify and manage trends, compare performance and use the results to initiate improvement. Automated RCM can also significantly reduce the amount of time staff spends dealing with claims denials. Unfortunately, not all automated systems have the ability to span an organization, or provide a full suite of solutions to handle any RCM scenario. This presents challenges on the justification of their implementation and subsequent achievement of their desired objectives. (Greenwayhealth, 2016) To boost clean claim rates, hospitals should improve patient registration processes to ensure the correct information is captured before claims are submitted with avoidable errors. Claims denials and rejections may be a staple of the healthcare industry, but hospitals with higher profitability tend to closely monitor and improve claims denials rates to ensure money is not left on the table. (Belliveau, 2017)
HFMA (Hospital Financial Management Association) defines patient point-of-service payments as “patient cash collected prior to or at time of service and up to seven days after discharge. Many healthcare organizations struggle with increasing patient point-of-service collections because of a lack of staff education on collection strategies and financial terms of engagement. (Belliveau, 2017) The case study on Bayada healthcare, a privately held healthcare institution, brings out salient points on claims management. In this case, the hospital was able to achieve a 72 per cent reduction in claim denial rates over several years through the utilisation of a claim management automated platform and an eligibility verification information systems platform. The synergy from these two systems led to a reduction in payer days outstanding by 51 per cent and a doubling of submitted claims over the same duration of time. This in turn improved their bottom line and productivity levels in the institution. This study however also brings to light that implementation of synergistic systems is important to overall utilisation and impact to a hospital's revenue cycle process. (Sandler, 2015)

Despite the potential benefits discussed above however, organisational management systems also have a number of drawbacks. For example, systems tend to be large, complicated, and expensive to both implement and maintain (Soni, 2003) According to Shang putting a system in place requires new procedures, employee training, and both managerial and technical support. (Shang, 2012) A survey from the Healthcare Financial Management Association (HFMA) reveals similar drawbacks to the implementation and or the automation of management information systems. The results from a survey of 125 healthcare institution financial executives shows that despite budgets towards HMIS implementation being on the rise, these organisations are struggling to leverage the power of technology to drive process improvement and long-term success. The survey found 51 per cent said their organizations cannot keep up with system upgrades or fail to maximize functional, workflow, and reporting improvements. 41 per cent do not have a method to track the effectiveness of their technology enhancements. 21 per cent are having difficulty identifying the cost reductions. (Leventhal, 2017)
2.3 The Relationship between HMIS Utilisation and Staffing Decisions within Healthcare Organisations

2.3.1 Staffing Decisions in healthcare organisations

Given current fiscal constraints, recruitment and retention issues in many healthcare organisations, there is a growing interest in capturing more human resource related data through an organisation's management information system. MIS human resource entries can be used to provide information on the nature of activities that occur within an organisation from a complement point of view. The goal of human resource management is to have, the right number of people, with the right skills, in the right place, at the right time, with the right attitude, doing the right work, at the right cost, with the right work output. (WISN, 2010)

Healthcare providers traditionally grapple with staffing issues in the form of unfilled shifts and vacant positions, which they try to rectify using inefficient manual scheduling procedures. The cost of leaving a shift unfilled, or deploying the wrong combination of internal and supplemental staff can add up quickly. The concerns attached to health worker credentials and compliance issues are considerable (AMNhealthcare, 2015). Towards this end, hospitals need to understand their staffing needs from a complement, workload and skills mix point of view. Management information systems deployment towards this end is capable of providing insights on these human resource requirements (WISN, 2010). Organizations have been using information systems to manage their human talent more and more over the past few decades (Wat, 2006). These automations are implemented by introducing specialized systems that reduce the routine traditional human resource activities. Functionally, these systems can keep track of employees, new job applicants, and contingent workers, performance appraisal, professional development, payroll, recruitment, and retention (Troshani, 2011).

The Institute of Medicine’s (IOM) Committee report on the adequacy of nurse staffing in hospitals and nursing homes notes that nursing staffing is a critical factor in determining the quality of care in hospitals and the nature of patient outcomes. (Wunderlich & Sloan, 1996) If hospitals are to meet their patient care objectives then efficiency in staffing and specifically nursing staffing remains a crucial determinant of success as nurse staff forms the biggest percentage of human resource staff in a hospital. The Kenya health sector
human resources strategy 2014-2018 describes adequacy and equity in the distribution in the healthcare workforce in Kenya as a major outcome of its strategic plan. Adequacy encompasses healthcare worker numbers, skills mix, competence, and attitudes of the health workers required to deliver on the health goals. (Ministry of Health, 2014) Although information systems for staffing decisions are critical for evidence-based human resource practice in hospitals, there is a lack of information about these systems, including their current capabilities. This limits understanding of the availability and quality of information that can be used to support effective and efficient human resource strategies and puts to question their costs versus their benefits for hospitals willing to take the plunge and invest in them. (Alexandra, Neeru, & Nadine, 2011)

Health service managers around the world are faced with increasing challenges. Resources to respond to their populations’ demand for services are often inadequate. The distribution of human resources is generally poorly balanced between urban and rural areas and between primary, secondary and tertiary levels of care in state owned and private healthcare institutions. Concerns about balancing the workforce within and between service institutions rank high in seeking how best to respond to challenges. The health workers who actually deliver health services are the most costly accounting for 65-80% of operational costs and are the least readily available resource in a health system. They are also indispensable to the operations of a healthcare institution. (WISN, 2010)

According to the guidelines on design of organization structures in the public service of Kenya, complement is an establishment of the total number of posts and personnel in an organisation (Public Service Commission, 2015) Decisions on the necessary organisational complement needed to meet a healthcare institutions care objectives are based on the volume of services offered i.e. services activity statistics and case load statistics both of which are available from hospital management information system. The work performed by healthcare workers is essential to the wellbeing of patients and clients accessing the healthcare system. It is therefore essential that the work that they perform is understood. To date, workload measurement systems (WLMS) are the only mechanism whereby healthcare worker interventions are captured to reflect the work involved in healthcare delivery. (RNAO, 2005) The workload indicators of staffing need (WISN) method is a human resource management tool developed by the World Health Organisation (WHO)
that determines how many health workers of a particular type are required to cope with
the workload of a given health facility and assesses the workload pressure of the health
workers in that facility. WISN use within a health management system in a hospital can
help managers determine how best to improve your current staffing situation. Better
priorities can be set for allocating new staff or transferring existing staff. (WISN, 2010)

The allocation of human resources for health, however, requires the estimation of the
required number of professionals with specific skills enabling them to perform tasks
consonant to the principles and needs of health services (Bonfim, Pereira, & Pierantoni,
2015) There has been a focus on staff-mix, i.e. achieving a specific mix of different types
of personnel, with an increasing interest in evidence about the value and contributions of
different staff-mixes to patient and organisational outcomes. (Dubois & Singh, 2009)
This study contends that the current staff-mix focus of healthcare worker staffing
optimisation is both restrictive and static, and that it fails to account for staff members’
skills and their effective utilisation.

Skill management refers to an organisation's ability to optimise the use of its workforce.
The focus shifts here from achieving a specific mix of different types of personnel to
adapting workers' attributes such as knowledge, skills, attitudes and roles to changing
environmental conditions and demands. Skill management enables organisations to
optimise patient outcomes while ensuring the most effective, flexible and cost-effective
use of human resources. (Bamberg, 1989)

2.3.2 HMIS Utilisation and Staffing Decisions within Healthcare Organisations

A study on the impact of human resource information systems in Jordanian hospitals
revealed that there is a positive correlation between the utilisation of management
information systems for staffing and organisation performance through augmentation of
decisions on job analysis, new recruitments, and performance appraisals. (Khashman,
2015) In contrast, the impact of human resource systems in healthcare organizations are
poorly understood compared with other healthcare management information systems e.g.
clinical systems, this study points out that there isn’t enough literature to support the
implementation and utilisation of these systems. Although the obvious benefits are
apparent i.e. the reduction of manual administrative human resource tasks, the
contribution of these systems to the strategic human resource management in line with
overall organisational strategic goals is still debatable and its cost benefit analysis still lacking. (Tursunbayeva & Raluca Bill, 2016)

As the exploration of a management information system for staffing progresses, Hanson points out those hospital administrators will find the specific process of the information system utilisation for staffing valuable in interpreting and using information and data for effective management decisions and actions. But he points out that information systems need not be computerized to be effective. It can be argued that in the competitive space that hospitals operate in today, bearing in mind the pervasiveness of technology, computerization of MIS does offer an advantage over traditionally designed systems. (Hanson, 1982) Healthcare workload data is only meaningful when it can be linked to staffing data, patient demographics, diagnoses and outcomes and cost data, otherwise it is costly, time consuming and takes away critical efforts better utilised for patient care. The linkage of workload data to other data can only be enabled when standalone workload measurement tools are interfaced with other hospital systems or workload measurement systems are part of an integrated information system. Workload data will only be meaningful when these linkages are made. (RNAO, 2005)

The success of workload measurement tools is related more to the willingness of decision-makers to use this information for staffing decision making than the comparative merits of the system itself. (RNAO, 2005) In a study by (Meyer & O’Brien-Pallas, 2010), the interrelationships between a number of variables that influence patient, provider, and healthcare outcomes were explored. The findings suggest that costs will be reduced and quality of care improved with adequate full time nursing staffing and positive work environments that support employee health, safety, security, and satisfaction achieved through efficiency in staffing management systems.

In their study on developing hospital metrics for workforce allocation, (Shannon & Brand, 2007) notes that staffing, activity data and case mix analysis by hospital clinical department heads or as integrated services within a hospital wide MIS allows for comparison of costs and activity across a hospitals’ operations allowing for critical decisions on staffing to be made. This study in its discussion further states that, the fact that the correlation analysis suggests that the inpatient bed-days and number of outpatient presentations are closely associated with hospital medical staff complement is not surprising, confirming the “common sense” understanding of the work of hospital
doctors. This common sense understanding is expected but not completely representative of the human resource aspects that lead to improved patient outcomes. This study conclusions necessitate the bringing in of skills mix not just staff mix in the discussions on hospital staff complement within a healthcare organisation. The results of a study indicated no significant differences in occurrence of in hospital complications due to a system wide skills mix assessment and implementation model at a health facility in Taiwan. (Yang & Hung, 2012) This in contrast to several studies mainly in the United States demonstrating significant improvement in patient outcomes from skills mix optimisation through information system adoption and workload analysis. This disparity brings to the fore the reality that results from rigorous studies in the area of skills mix adopted systems may not be relevant in all health facilities i.e. of different sizes and in different operating economies. Skill mix is a determinant of, and determined by, organizational and system context. (Buchan & Poz, 2002)

2.4. The Relationship between MIS Utilisation and Procurement Decisions

2.4.1 Procurement decisions within health organisations

For procurement in an organisation to operate both efficiently and effectively, useful structures need to be created and suitable instruments put to use. Information technology can have an important function in this regard. Used appropriately it can offer, smoother and faster process flow, efficient distribution of information, decentralisation of tasks and decisions, increased transparency and better control (Tanner, Wölfle, & Quade, 2006). The management of drug and other supplies in hospitals is not only critical but fundamental to the business that is health. The Global supply chain forum defines supply chain management (SCM) as the integration of business processes from end-user through original suppliers that provides products, services, and information that add value for customers (Lambert, 1998).

(Siriginidi, 2000) Noted that the “effective integration of suppliers into product value/supply chains will be a key factor for organisations in remaining competitive in the market place. There is the beginning of an evolution in supply chain management towards online business communities according to (Lambert, 1998). This evolution has led to many business including health institutions to invest, to different extents, in
technology or processes that attempt to streamline the process of procurement of direct goods.

Timo Saarinen recommends that Systems that are company-specific and that involve high uncertainty have to be internally developed because they require both the specific knowledge and intensive interaction between developers and users. This applies directly to hospitals where user input from doctors, nurses and other health practitioners have a huge impact on what is procured (Saarinen, 2015). Without this involvement from the parties involved in the procurement process, significant opposition to the implementation and utilisation of these systems in a hospital setting is usually encountered.

In a study on the role of information technology in procurement in the top 200 companies in Switzerland (Tanner, Wölfle, & Quade, 2006), the highest priority for most of the companies in the use of information technology is for central coordination and demand aggregation. The study further reveals that the priority of information technology should be to provide support in the creation of process efficiency and cost/expenditure transparency as well as achieving reductions in the purchasing price. The study also reveals that modern instruments of e-procurement and supplier relationship management are only used consistently by a minority. According to this study, the high introduction costs for new solutions often stand in the way of efforts for further development. A further hurdle for a consistent and integrated roll-out of management information system solutions is the slow link-up of suppliers to the procurement system. This is a big challenge as health institutions may be willing and ready for e-procurement but their supplies may not.

(Kambaza, 2009) Study on bottlenecks of drug supply chains in Ugandan health facilities reveal that hospitals were mainly affected by lack of credible and accessible drug consumption information, poor planning, forecasting and logistics, inadequate procurement skills and collaborative linkages. These findings add to the literature of the increasingly complex drugs supply chains in developing countries. The healthcare environment in Uganda being similar to Kenya, these study findings could be assumed to apply in the Kenyan healthcare space. (Mungu, 2011) Paper on supply chain management practices in Bungoma County, Kenya, concluded that access and availability of essential drugs remains sub-optimal. Findings from this study indicate that
as currently practiced; procurement in health facilities is not effective in reducing the cost of drugs. Therefore there is need to evolve, for example to e-procurement which saves the costs of the preparation and transmission of paper purchase requests and invoices and thus eliminating costly, time consuming errors from manual data entry.

E-procurement in the healthcare sector remains unexplored. Healthcare institutions generally lack an efficient mechanism that will enable hospitals and healthcare suppliers interact seamlessly. This is despite extensive academic work extensively devoted to e-procurement in diverse industries. The paucity of studies in this area brings to the fore the justifications of doing one to assess the present situation in hospitals (Ketikidis, 2010).

2.4.2 HMIS Utilisation and Procurement Decisions in Healthcare Organisations

Supply chain management emphasizes the overall and long-term benefit of all parties on the chain through co-operation and information sharing. This signifies the importance of communication and the application of IT in SCM. Supply chain management in hospitals is particularly daunting largely because of variability of ordering (Yu et al., 2001). Information sharing between members of a supply chain using EDI technology should be increased to reduce uncertainty and enhance shipment performance of suppliers and greatly improve the performance of the supply chain system. (Tanner, Wölfle, & Quade, 2006) Define EDI as a completely automatic exchange of structured information between the information technology systems of two different institutions. This allows companies to engage in electronic Procurement which is the support of a company’s relationships and processes with its suppliers by electronic means.

In an impact assessment study conducted in a mental health hospital in Spain after successful implementation of an electronic supplies purchasing system over a 2 year period, revealed a 20 per cent reduction in supplies purchasing costs gained through system supported competitive assessment of possible suppliers and a possible reduction in the administrative costs from the procurement processes. This study links the contribution efficient purchasing management has on the overall financial results of a hospital. This study however also notes that it is a difficult task to measure improvement in the management and purchasing processes as a result of implementation of a HMIS incorporating procurement in economic terms. As such any improvement in processes sought from implementation of these systems in hospitals may not be obviously apparent.
or measurable in the short run. (Hidalgo, 2011) A supply chain system improves the performance level of a product value chain by helping to reduce drug purchase to drug use duration and resultant cycle (Gardiner & Foster, 2013)

Prevailing literature on the use of procurement systems in other industries is that it lowers costs, improves quality, and generally provides better information for all parties involved in the supply chain. However a case study done on four mid-sized Hospitals in the United States found this was not necessarily the case. Small to mid-sized hospitals have manual or standalone processes in place that are not integrated in any form of management information systems and that appear to be effective in managing their drug and other supplies needs. This study concludes that E-procurement may not have the future that is generally assumed if the healthcare industry is to follow other industries in the chase for cost reduction and efficiency. Its implementation and utilisation in small and mid-sized health facilities is debatable as the cost savings may not be achieved versus the more traditional procurement methods. (Andries, 2002)

A value based approach to healthcare procurement as described by Michael Porter is defined as improved health outcomes for patients divided by the cost to achieve these improved outcomes (porter & Olmsted, 2006). It focuses on shifting the procurement approach from the up-front purchase cost to true cost of care, incorporating cost of product life cycle and cost implications of product quality on the health services offered which is a value based perspective. A Survey in this regard done by the Boston Consulting Group (BCG) reveals that procurement manager doesn’t consider other budgets other than their procurement budgets when tendering. This doesn’t take into account how poor quality of purchased products, mainly driven by the up-front purchase price point of view, affects other budgets like the cost of care to patients due to breakages and repeat procedures. Utilisation of information systems for procurement and integration of a value based approach to procurement leads to the incorporation of the total cost of care consideration not just up-front cost of purchase to the tendering process (Best price quality ratio in procurement). (Gerecke, Clawson, & Verboven, 2015)

A case study done by the BCG on the Stockholm County Council which runs several hospitals reveal that an information system based procurement approach that is value based can yield a lower total cost of care over time. This is achieved by adoption of
procurement management information systems that demand tender applicants to calculate total cost of care and use this as the basis of evaluation of applicants. In this study, the chosen applicant had the highest up-front purchase cost but the lowest total cost of care to the patient. Such a system leads to better outcomes whilst still protecting the bottom line by ensuring hospitals are selling not just health services but value propositions. (Boston Consulting Group, 2012) A case study on the effects of e-procurement on Kisii Level Five hospital found that its utilisation led to a reduction in administrative costs of procurement, time to delivery of goods and services and overall reduction in price of procured goods and services. This reduction although present were minimal and begs the question of the cost benefit analysis of implementation of these systems versus their obtained benefits. The study identified improper change management processes and corruption to be the main barriers to the successful achievement of the objectives for implementation and utilisation of the procurement system. The use of information technology for the transformation of health facility procurement processes can provide useful advantages. Institutions can leverage on these advantages be it, efficiency in inventory control, improved availability of supplies, cost reduction of supplies and overall a better bottom line, to remain competitive and more importantly improve healthcare outcomes for their patient’s. (Matunga, 2013)

2.5 Chapter Summary

This chapter sought to shed light on management information systems use in finance, staffing and procurement in health facilities. It is evident from literature that management information systems have significantly evolved to be embedded in the decision making models of institutions. There exists guidelines and research on the best practices of the use of MIS in the financial decisions of health facilitates with a majority inclining towards the use of indicators for the financial tracking of a hospitals bottom line.

The calculation of workload data from MIS used by health care professionals is fundamental in the estimation of the human resource needs of a health care facility. It lends its use to the calculation of staff complement, staff and skills mix tasks of managers. It is also evident that data available from MIS used daily by healthcare workers is not used in this way favouring more traditional estimation methods. Procurement systems in health facilities are among the most crucial in any health
institution. Its efficient use can lead to improvements in the processes through the use of invoice management systems and EDI. The eventual goal is to provide the right cost efficient medication, at the right time, for the right patient, all the time.

Chapter three will discuss the research methodology of this paper, the specific procedures that will be used for data collection as well as the data analysis.
CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Introduction
This chapter will describe the specific procedures that will be used in data collection and analysis in order to come up with information relevant to satisfy the research objectives as discussed in chapter two. This chapter focuses on the research design, the population and sampling design, the description of research instruments, piloting information, data collection procedures, analysis of data and presentation of results. This study will apply quantitative research methods.

3.2 Research Design
This study's intention is to shed light on the relationships that exist between utilisation of health information systems and financial, staffing and procurement decisions. It will be descriptive research of a cross sectional nature. The research design involves a series of rational decision-making choices relating to purpose for the study, the type of design it should conform to, sample to be used, how the data will be collected, how variables will be measured, and how they will be analysed to test the hypotheses. In addition, decisions on its location, population, the extent to which it is manipulated and controlled by the researcher, its temporal aspects (time horizon), and the level at which the data will be analysed have to be made. The research design constitutes the blueprint of all these aspects (Serekan, 2003)

Descriptive research seeks to answer the questions who, what, when, where. The researcher attempts to describe or define a subject often by creating a profile of a group of problems, people or events. (Cooper, 2008) The technique for this cross sectional study will be a survey using questionnaires as the tool for data collection.

3.3 Population and Sampling Design
3.3.1 Population
Population refers to the entire group of people, events, or things of interest that the researcher wishes to investigate. (Serekan, 2003) It is the total collection of elements about which a researcher wishes to make inferences. The element is defined as the individual participant or object on which the measurement for the purposes of the study
is taken. Sampling is taking a number of representative elements of a population in attempt to draw conclusions about the entire population. (Cooper, 2008). The intended population of this study will be the healthcare institution personnel in finance, human resource and procurement departments working within private facilities in Nairobi County. The facilities of interest will be level 3 and above health facilities with hospital beds as categorised by the Kenya ministry of health. These facilities total one hundred and fifty five in Nairobi County.

3.3.2 Sampling Design
Sampling is selecting some of the elements in a population and using the findings from this selection to draw conclusions about the entire population. A sample is a subset of the population. It comprises some members selected from it; it is thus a subgroup or subset of the population. By studying the sample, the researcher should be able to draw conclusions that would be generalizable to the population of interest. The compelling reasons for sampling include low cost as it would be prohibitive in terms of monetary cost, and other human resources to study the whole population, greater accuracy of results because fatigue is reduced and fewer errors will therefore result in collecting data from a sample than from a population, greater speed of data collection and availability of population elements (Serekan, 2003)

3.3.2.1 Sampling Frame
The sampling frame is a listing of all the elements in the population from which the sample is to be drawn for the purposes of the study. (Serekan, 2003) The sampling frame for this study will be obtained from the Kenya master health facility list (KMHFL 2017) as developed by the Ministry of health Kenya in collaboration with development partner’s USAID( Unites States Agency for International Development), AFYA info (Kenya National HMIS program) and Savannah Informatics. The master list for Nairobi County privately owned, and non-public health facilities, that are rated level 3 and higher and that have inpatient bed capacity will be utilised as the sample frame.
3.3.2.2 Sampling Technique
The data collection for this research will apply the probability sampling technique. Probability sampling is based on the concept of random selection; a controlled procedure that assures that each population element is given a known non-zero chance of selection. Probability sampling techniques are used when the representativeness of the sample is of importance in the interests of wider generalizability of the findings. Of these techniques, simple random sampling within strata will be employed. Simple random sampling ensures that every element in the population has a known and equal chance of being selected as a subject. This method has the least bias and most generalizability. Because the population in question exists in distinct groupings based on health facility size and financial turnover, different strata will be utilised. Stratified random sampling involves a process of stratification or segregation, followed by random selection of subjects from each stratum. The target population will be segregated based on health facility bed capacity. This is relevant and meaningful in this study context as the characteristics of larger capacity health facilities may differ from smaller ones as described from previous studies in the literature review. Stratified random sampling enables the researcher to increase a sample’s statistical efficiency, provide adequate data for analysing the various subpopulations or strata and to enable the different research methods and procedures to be used in different strata. (Serekan, 2003)

3.3.2.3 Sample Size
A similar study looking at the implementation characteristics of HMIS that influence the quality of care in private hospitals in Kenya had a sample size of 60 employees drawn from a population of 600 employees. Stratification was done based on level of management i.e. top, middle and low levels. (Maroa, 2014) The target sample size for the proposed study is 62 respondents from the stratified 31 facilities. The unit of study in this exercise is the health facility with respondents being drawn from the finance, procurement and human resource departments. The total health facilities of interest are 155 with stratification based on bed capacity as illustrated below. With a sampled 31 facilities and targeting at least two respondents per facility working in these three departments the desired sample size will be achieved.
Table 1 Sample Stratification Table

<table>
<thead>
<tr>
<th>Stratification Criteria</th>
<th>Population</th>
<th>Sample proportions</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bed Capacity 50 and Above</td>
<td>19 health facilities</td>
<td>12% of population</td>
<td>5</td>
</tr>
<tr>
<td>Bed Capacity Below 50</td>
<td>136 health facilities</td>
<td>88% of population</td>
<td>26</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>31 facilities</td>
</tr>
</tbody>
</table>

3.4 Data Collection Methods
The study will employ a survey questionnaire as the data collection tool. The researcher will utilise research assistants to administer the questionnaires and contact some of the respondents via an online system to collect data. Primary data is collecting new data specifically for the purpose of a study. A questionnaire is an instrument delivered to the participant via person (intercept, phone) or non-personal (mail delivered) means that is completed by the participant (Cooper, 2008). A questionnaire will be developed for the purposes of this study to attempt and meet the three research objectives. It will employ a 5 point Likert scale. The coding for the scale will be as follows: 1 = Strongly Agree, 2 = Agree, 3 = neither agree nor disagree, 4 = Disagree, 5 = strongly disagree. Coding is a process of converting respondent responses to numerical codes (Sarantakos, 2005).

The questionnaire will be self-administered. They will be completed by the respondents and returned either electronically or collected in person. The questionnaire will be in three sections. Section one will define the demographics of the respondents and direct to the subsequent sections based on the targeted health facility departments namely finance, human resource and procurement. Sections two and three will be questions relating to finance, human resource and procurement decisions. Each of this sections will have questions relating to the current presence and use of health information systems for financial functions, human resource functions and procurement functions, the real or perceived usefulness or benefits of its use within these three areas in the health facility versus the cost of implementation of these systems, the experienced or expected advantages of integration of multiple systems within and/or without the health facility. The respondent will be required to answer by ticking the most appropriate answer in the Likert scale.
3.5 Research Procedure
On approval to conduct the research, the questionnaires were pre-tested via a pilot study to enable us to fine tune the questionnaire. This was done with the help of ten respondents.

3.5.1 Questionnaires Administered Via Email
Fifteen out of the total sixty two questionnaires we administered via email. Email reminders were sent every two days and a telephone call made on the fourth day after the email. This group of respondents represented the Heads of departments for the finance, procurement and human resource departments in the selected healthcare organisations. Only five out of the fifteen respondents replied with a filled questionnaire within two weeks of the email representing a poor responses rate of thirty three per cent. Attempts to follow up with a drop and pick questionnaires for the remaining ten were not fruitful due to scheduling constraints.

3.5.2 Self-Administered Questionnaires
Forty seven of the total sixty two questionnaires were self-administered. Two research assistants dropped and picked these questionnaires over a period of 10 working days. This group of respondents represented administrators working in the finance, procurement and human resource departments in the selected healthcare organisations. The expected response time for drop and pick questionnaire were within one week. Thirty nine of these questionnaires were picked in this period representing a response rate of eighty three per cent. Eight of the respondents declined a questionnaire pick up meeting after one week with the questionnaire for reasons not forthcoming.

3.6 Data Analysis
The data collected will be analysed using quantitative data techniques. The questionnaires that will be collected will be sorted to eliminate those that do not have valid responses and thereafter categorized. The data from the respondents will be checked, edited if necessary. The coded data will be transcribed into Statistical Package for Social Sciences (SPSS) and cleaned through normality tests. This data will be analysed using both descriptive and inferential statistics. Descriptive statistics enables you to describe and
compare sample variables numerically (Thornhill, 2009). The variables measured in this study are the utilisation of health management information systems (dependent variable), and financial, human resource and procurement decisions as independent variables. Inferential statistics is the mathematics and logic of how generalisations can be made from the sample to the population (Thornhill, 2009).

Correlation and regression analysis will be conducted. Correlation estimates the extent to which changes in one variable are associated with changes in the other variable. A positive correlation reflects a direct relationship while a negative correlation reflects an indirect or inverse relationship (Kruger, 2005). Correlation will be done to check the relationship between utilisation of HMIS and financial decisions, procurement decisions and human resource decisions. Regression analysis is used to check the extent to which independent variables influence the dependent variables (Thornhill, 2009). The study data will be presented in a form of a study report denoting narratives with relevant discussions of study results with appropriate tables and charts, conclusions and recommendations.

3.7 Chapter summary

This chapter describes the methods and procedures that will be adopted for this study. The study’s research design, population and sampling design are discussed. The data collection tools and procedure are also elucidated. Finally, the data analysis methods are outlined. Chapter four will discuss the findings of the study after data collection.
CHAPTER FOUR

4.0 RESULTS AND FINDINGS

4.1 Introduction

This chapter presents the findings of the secondary data collected from the field. The purpose of this study is to establish the relationship between utilisation of HMIS and operational decisions within private hospitals in Nairobi, Kenya. The findings are based on the responses from the questionnaires filled and information gathered in regards to the three specific objectives of the study. The first section provided the employees general information. The second section investigated utilization of MIS in healthcare organizations, its utilization for financial and procurement decisions. The third section examined its utilization for staffing decisions.

Out of a targeted 62 respondents, 41 responded to the questionnaires. This represented a response rate of 66%. The findings are presented in figure 1 below.

Figure 1 Response rate.
4.2 Demographic Information

The general information from the respondents is organized according to age range, gender, Organization Functions per Respondent, Level of Education, and years of work experience.

4.2.1 Age Range of Respondents

The findings illustrate that majority of the respondents were between the ages 35-45 years old. Respondents between ages 26-35 and 46-55 averaged the same for both age groups. The least number of respondents were in the 19-25 age groups. There is a heterogeneous mix of ages of respondents in this study.

![Age Ranges per Respondent](image)

Figure 2 Ages of Respondents

4.2.2 Gender of Respondents

The findings illustrates that 42% of the respondents were male and 58% of the respondents were female. Thus, the findings indicate that majority of the respondents were female. The findings are indicated in the figure below.
Majority of the respondents were general administrative staff with functions that cut across all the three functions of interest i.e. Finance, procurement and human resource. Respondents with an exclusive finance function and human resource function followed second and third respectively. Respondents with an exclusive procurement function were the least in number in this study.
4.2.4 Level of Education of Respondents

Majority of the respondents were degree holders with the least being higher diploma holders. There were no respondents holding doctorate level education. Diploma and master’s degree holders followed second and third respectively.

**Figure 5 Level of Education**

4.2.5 Years of Experience of Respondents

Majority of respondents had 6-10 years’ experience in the organisation at the time the study was done followed closely by respondents with less than five years’ experience. The minority of the respondents had greater than 15 years of experience.

**Figure 6 Years of Experience**
The reliability analysis was done by calculating the Cronbach’s Alpha reliability coefficients on item analysis. The number of items for every variable measured per data set is as shown in the table below. From this analysis indicated good levels of reliability except for procurement decisions that was slightly below the desired 0.7.

### Table 2 Reliability Analysis: Cronbach’s Alpha

<table>
<thead>
<tr>
<th>Summated Scale</th>
<th>Alpha</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staffing Decisions</td>
<td>.836</td>
<td>7</td>
</tr>
<tr>
<td>Procurement Decisions</td>
<td>.686</td>
<td>8</td>
</tr>
<tr>
<td>Financial Decisions</td>
<td>.853</td>
<td>9</td>
</tr>
<tr>
<td>MIS operational utilization</td>
<td>.780</td>
<td>8</td>
</tr>
</tbody>
</table>

From the literature review, MIS utilization in healthcare organisations was noted to be of operational but not strategic benefit. The respondents were asked to state to a degree, with use of a likert scale, aspects of information quantity, information quality and efficiency in resolving operational difficulties that emanated from utilisation of MIS in their organisations. In regard to this, an average of 67% of respondents strongly agreed that utilization of MIS resulted in more information of better quality and this resulted in better efficiency in solving operational challenges.

**Figure 7 HMIS Utilization Quality and Quantity of Information**
Whether the utilization of MIS resulted in duplication of certain functions was also asked with an equal number of respondents agreeing and disagreeing. 72% of respondents disagreed that utilization of MIS resulted in a slowing down of certain processes in the organisation.

![HMIS Utilization slowing down processes.]

**Figure 8 HMIS Utilization and Efficiency**

### 4.3 HMIS utilisation and Financial Decisions within healthcare organisations

Respondents in this section were asked on the availability and understanding of their organizations financial information as a result of HMIS utilisation. 68% of respondents said that organisational financial information was more available and they had a better understanding of the organizations financial position.

![Improved Availability and Better Understanding of Financial Information]

**Figure 9  Financial information Availability and understanding**
Responses on the timeliness and quality of financial reporting were also elicited with all respondents noting significant improvement in both since utilization of HMIS. A minority of the respondents reported an increase in claims submission rates at 14% and a reduction in claims denial rates was noted by 45% of the respondents as noted in table 3 below.

**Table 3 Claim Metrics**

<table>
<thead>
<tr>
<th>Claims Metric</th>
<th>Respondent Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Claim Submission Rates increase</td>
<td>14%</td>
</tr>
<tr>
<td>Claim Denial Rate Reduction</td>
<td>45%</td>
</tr>
</tbody>
</table>

The mean for the financial decisions survey scale was at 2.09 on a five-point likert scale with a standard deviation of 0.64 as noted in table 4.3 below. Statistical correlations were done between the predictors and HMIS operational utilization and representation of results is in table 4.4 below. The correlation coefficient between financial decisions and HMIS utilization was 0.286 at 95% confidence level (p=0.07) suggesting a weak but positive correlation between the two. Regression for this relationship was done and the resultant coefficient of 0.122 at p 0.36 revealed a positive but not statistically significant relationship between HMIS utilization and financial decisions. The regression equation for this relationship is as follows: **HMIS Operational Utilization= 1.312 + 0.122 Financial decisions (p=0.36).**

**Table 4 Descriptive Statistics**

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIS operational utilization</td>
<td>2.2783</td>
<td>.51281</td>
<td>41</td>
</tr>
<tr>
<td>Financial Decisions</td>
<td>2.0927</td>
<td>.64137</td>
<td>41</td>
</tr>
<tr>
<td>Procurement Decisions</td>
<td>2.4109</td>
<td>.50868</td>
<td>41</td>
</tr>
<tr>
<td>Staffing Decisions</td>
<td>2.2312</td>
<td>.82823</td>
<td>41</td>
</tr>
</tbody>
</table>
### Table 5 Correlation matrix

<table>
<thead>
<tr>
<th></th>
<th>Financial Decisions</th>
<th>Procurement Decisions</th>
<th>Staffing Decisions</th>
<th>HMIS operational utilization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Decisions</td>
<td>Pearson Correlation</td>
<td>.456**</td>
<td>.259</td>
<td>.286</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.003</td>
<td>.102</td>
<td>.070</td>
</tr>
<tr>
<td>N</td>
<td>41</td>
<td>41</td>
<td>41</td>
<td>41</td>
</tr>
<tr>
<td>Procurement Decisions</td>
<td>Pearson Correlation</td>
<td>.456**</td>
<td>1</td>
<td>.316*</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.003</td>
<td>.044</td>
<td>.079</td>
</tr>
<tr>
<td>N</td>
<td>41</td>
<td>41</td>
<td>41</td>
<td>41</td>
</tr>
<tr>
<td>Staffing Decisions</td>
<td>Pearson Correlation</td>
<td>.259</td>
<td>.316*</td>
<td>.405**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.102</td>
<td>.044</td>
<td>.009</td>
</tr>
<tr>
<td>N</td>
<td>41</td>
<td>41</td>
<td>41</td>
<td>41</td>
</tr>
<tr>
<td>HMIS operational utilization</td>
<td>Pearson Correlation</td>
<td>.286</td>
<td>.278</td>
<td>.405**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.070</td>
<td>.079</td>
<td>.009</td>
</tr>
<tr>
<td>N</td>
<td>41</td>
<td>41</td>
<td>41</td>
<td>41</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

There were moderately strong positive correlations between the predictors with procurement decisions and financial decisions at 0.46 at p=0.003 which is statistically significant. Correlation between staffing decisions and procurement decisions was at 0.32 at p=0.044 significant at 95% confidence level.

#### 4.4 HMIS Utilization and Staffing Decisions within Healthcare Organizations

Respondents with a human resource specific role and respondents with a general role but with some complement and staff scheduling responsibilities were queried about the utilization of HMIS in the updating and maintaining of organizational complement, performance appraisal, skill assessment/updating and tracking of the healthcare organisations contingent workforce. A majority of Respondents revealed utilization of HMIS for staffs complement related decisions at 92% as noted in the figure below.
There was poor utilization of HMIS for tracking of the contingent workforce at 8% and minimal utilization for the purposes of skill assessment and performance appraisal.

Staffing decisions survey scale mean was 2.23 on a five-point likert scale with a standard deviation of 0.83. The correlation analysis done between the staffing decisions and HMIS utilisation was the strongest of the three predictor variables at 0.405 at 99% Confidence level (p<0.01) which is statistically significant. Regression analysis of this association was conducted with a resultant coefficient of 0.206 at p=0.039. For every one unit increase in the value of staffing decisions, it is expected that HMIS operational utilisation will increase by 0.206 at a p=0.039 . This relationship between HMIS utilisation and staffing decisions is therefore statistically significant. Therefore we can
reject the null hypothesis that utilization of HMIS cannot be predicted by staffing decisions. The regression equation for this relationship is as follows: **HMIS Operational Utilization = 1.312 + 0.206 Staffing decisions.**

**4.5 HMIS Utilization and Procurement Decisions in Healthcare Organizations**

Procurement function registered the least number of respondents with this specific role. This was expected as most healthcare organisations especially those with <50 bed capacities don’t have designated procurement offices. The function runs through the pharmacy department which is represented here as the general function. Respondents were queried on speed and reduction of total cost of procurement. 46% responding to realizing a faster TAT of hospital supplies and only 29% realising a reduction in cost. 68% of respondents reported an increase in the availability of drug/supplies consumption information. This intriguingly doesn’t translate to stronger correlation between utilization of HMIS and procurement decisions. These results are represented in the table 6 below.

**Table 6 Procurement Survey Scale**

<table>
<thead>
<tr>
<th>Procurement Metric</th>
<th>Respondent percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faster Turnaround time of hospital supplies</td>
<td>46%</td>
</tr>
<tr>
<td>Reduction in total cost of procurement</td>
<td>29%</td>
</tr>
<tr>
<td>Increased availability of supplies consumption information</td>
<td>68%</td>
</tr>
</tbody>
</table>

The mean for procurement decisions survey scale was the highest of the measured variables at 2.41 on a five-point likert scale with a standard deviation of 0.51. Correlation between HMIS utilization and procurement decisions was not statistically significant with a coefficient of 0.27 at p= 0.8. Regression analysis for this association was conducted with a resultant coefficient of 0.104 at p=0.55. The regression equation is as follows: **HMIS Operational Utilization = 1.312 + 0.104 Procurement decisions.** This relationship although positive is not statistically significant at p=0.55.
4.6 Regression Analysis

From the study, the results of regression of the predictor variables of the utilization of HMIS in healthcare organizations produced the model summary shown below.

### Table 7 Model summary

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.455a</td>
<td>.207</td>
<td>.143</td>
<td>.47479</td>
</tr>
</tbody>
</table>

- a. Predictors: (Constant), Staffing decisions, Financial decisions, and Procurement decisions.

The R square denotes how well the ‘fit’ of the dependent and independent variable model is. In this study it is 0.20. Phrased alternatively, it’s the percentage of changes in the dependent variable that can be explained by the independent variable i.e. 20%. Although low, the resultant analysis of variation and coefficients are still able to elucidate the relationships among these variables and in particular the predictor variable staffing decisions.

The analysis of variance for this study revealed an F test with a p value of 0.034 which is less than the level of significance for this study which is 0.05 (95 % confidence level), table 4.7 below. This means that the HMIS utilization can be predicted by the selected predictor variables. Therefore we can reject the null hypothesis i.e. the model suggested has no predictive value and accept the alternate hypothesis i.e. the model fits reasonably.

### Table 8 ANOVA

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Regression</td>
<td>2.178</td>
<td>3</td>
<td>.726</td>
<td>3.221</td>
<td>.034b</td>
</tr>
<tr>
<td>Residual</td>
<td>8.341</td>
<td>37</td>
<td>225</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10.519</td>
<td>40</td>
<td>250</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- a. Dependent Variable: MIS operational utilization
- b. Predictors: (Constant), Staffing decisions, Financial decisions, Procurement decisions.
Finally the coefficients for the predictor variables are shown in table 4.6 below. This formula represents the regression equation for this study:

**HMIS Operational Utilization= 1.312 + 0.122 Financial decisions + 0.104 Procurement decisions + 0.206 Staffing decisions.**

Every one unit increase in the value of staffing decisions, it is expected that HMIS operational utilisation will increase by 0.206 at a p=0.039 .This relationship between HMIS utilisation and staffing decisions is therefore statistically significant. Therefore we can reject the null hypothesis that utilization of HMIS cannot be predicted by staffing decisions. From the study’s’ regression coefficients, there is no statistically significant relationship between HMIS utilisation and financial decisions with a B of 0.122 at p=0.36. There also was no statistically significant relationship between HMIS utilization and procurement decisions at B= 0.104 at p=0.55.

**Table 9 Coefficients**

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>1.312</td>
<td>.384</td>
<td>3.416</td>
</tr>
<tr>
<td></td>
<td>Financial decisions</td>
<td>.122</td>
<td>.133</td>
<td>.153</td>
</tr>
<tr>
<td></td>
<td>Procurement decisions</td>
<td>.104</td>
<td>.170</td>
<td>.103</td>
</tr>
<tr>
<td></td>
<td>Staffing decisions</td>
<td>.206</td>
<td>.096</td>
<td>.333</td>
</tr>
<tr>
<td>a. Dependent Variable: HMIS operational utilization</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER FIVE

5.0 DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS.

5.1 Introduction
The purpose of this chapter is to delineate the usefulness and applicability of the study. The chapter will be organised through a summary, discussion and finally conclusions. The study investigated the relationships that may exist between HMIS utilization in private hospitals in Nairobi, Kenya and the operational decisions in these healthcare organizations.

5.2 Summary
The purpose of this study was to establish the relationship between utilization of Hospital Management Information System and operational decisions within private hospitals in Nairobi, Kenya. This study had three specific research questions. That is to establish the relationship between HMIS utilization and operational financial decisions. Secondly, to establish the relationship between HMIS utilization and operational procurement decisions and finally to establish the relationship between HMIS utilization and human resources operational decisions in private healthcare organisations in Nairobi, Kenya.

The study conducted was a descriptive cross-sectional quantitative study utilising the survey technique. The intended population of this study were healthcare personnel in finance, human resource and procurement departments working within private facilities in Nairobi County. The facilities of interest will be level 3 and above health facilities with hospital beds as categorised by the Kenya ministry of health. These facilities total one hundred and fifty five in Nairobi County. Sampling for the study followed the random stratified sampling technique with stratification from the sampling frame based on bed capacity i.e. more than 50 beds and less than 50 beds. The sampled facilities totalled 31. The sample size targeted form these facilities was 62. A five level likert scaled questionnaire was used as the data collection tool. The data was collected over a two week period using both email and pick and drop research procedure with the help of two assistants.
Study findings on the relationship between HMIS utilization and financial decisions revealed 68% of respondents had noted an increase in organisational financial information and experienced a better understanding of the organizations financial position. Responses on the timeliness and quality of financial reporting were also elicited with all respondents noting significant improvement in both since utilization of HMIS. A minority of the respondents reported an increase in claims submission rates at 14% and a reduction in claims denial rates was noted by 45% of the respondents. The mean for the financial decisions survey scale was at 2.09 on a five-point likert scale with a standard deviation of 0.64. The correlation coefficient between financial decisions and HMIS utilization was 0.286 at 95% confidence level (p=0.07) suggesting a weak but positive correlation between the two. Regression for this relationship was done and the resultant coefficient of 0.122 at p 0.36 revealed a positive but not statistically significant relationship between HMIS utilization and financial decisions.

The study findings in regards to the relationship between HMIS utilization and staffing decisions were as follows. The staffing survey scale queried about the utilization of HMIS in the updating and maintaining of organizational complement, performance appraisal, skill assessment/updating and tracking of the healthcare organisations contingent workforce. 92% of respondents utilized HMIS for staff complement decisions. There was poor utilization of HMIS for tracking of the contingent workforce at 8% and minimal utilization for the purposes of skill assessment and performance appraisal. Staffing decisions survey scale mean was 2.23 on a five-point likert scale with a standard deviation of 0.83. The correlation analysis done between the staffing decisions and HMIS utilisation was the strongest of the three predictor variables at 0.405 at 99% Confidence level (p<0.01) which is statistically significant. Regression analysis of this association was conducted with a resultant coefficient of 0.206 at p=0.039. This positive relationship between HMIS utilization and staffing decisions is therefore statistically significant.

The relationship between HMIS utilization and procurement decisions was investigated on three aspects; these were procurement turnaround time, reduction of total cost of procurement and availability of supplies consumption information. Forty six per cent of respondents realized a faster turnaround time of hospital supplies and only 29% realising a reduction in cost. Sixty eight per cent of respondents reported an increase in the
availability of drug/supplies consumption information. The mean for procurement decisions survey scale was the highest of the measured variables at 2.41 on a five-point likert scale with a standard deviation of 0.51. Correlation between HMIS utilization and procurement decisions was not statistically significant with a coefficient of 0.27 at p=0.8. Regression analysis for this association was conducted with a resultant coefficient of 0.104 at p=0.55 which is positive but statistically significant.

5.3 Discussion
5.3.1 HMIS Utilization and Staffing Decisions within Private hospitals in Nairobi.

This study found a statistically significant positive correlation between HMIS utilization and staffing decisions. This is in line with previous research (Khashman, 2015) that found that staff decisions that involve job analysis, performance appraisal and new recruitment of staff were strongly correlated positively with human resource MIS utilisation in Jordanian private hospitals. No similar local studies have demonstrated this claim at the time this study was done. The decisions made from such utilization were further linked to improved effectiveness and efficiency in human resource function in the private hospitals although our study did not investigate this association.

(Argyris, 1971) And (Hanson, 1982) generally state that tactical decision making will be enhanced and will be increasingly dependent on MIS utilization that generates information that is easily recalled and that plugs in to the decision making process of an organisation. Our study affirms this assertion from the resultant correlation. The need to make operational decisions in regards to staffing levels, contingent workforce and skills mix increases the MIS utilization in search for information that will enable estimations of staffing need to be made. (WISN, 2010), (Troshani, 2011) and (Wat, 2006) postulate a positive association between HMIS utilization for the purposes of complement and recruitment with better human resource decision in regards to staff scheduling and staffing levels which is in line with study findings.

(RNAO, 2005) and (WISN, 2010) findings and recommendations are in line with our study that MIS systems with capability of measuring workload indicators e.g. organisational complement and activity hours support staffing decisions by making them easier( information in MIS is already in relational form) and faster therefore a positive
correlation exists between the two. Our study contradicts previous research by (Alexandra, Neeru, & Nadine, 2011) that revealed no positive association between human resource function and MIS utilization questioning the need for investment in systems with this capability as the cost benefit analysis is not favourable. It further states that human resource personnel by and large are not aware or do not have available quality information that is of benefit to them when making staffing related decisions. This study was a global review of available literature in relation to healthcare organisations. Due to the there being little to no attention locally and regionally in both theoretical and empirical literature in this thematic area, this disparity can be explained. (Karim, 2003) and (Whitten & Bentley, 2007) Noted in their studies that MIS utilization was of strategic but not tactical significance but our study contradicts them, at least in regards to human resource operational decisions.

Although the healthcare operating dynamics of different regional areas are different from the local context, the similarities in the human resource function and even in its transition to a health management information system would come in the common sense understanding of what a hospital information system does. Regardless of the fact that HMIS systems have evolved globally to be integrated complex systems, they are fundamentally a record of activities that have been performed by specific set of an organisations employees over a specified time. The decisions on staff scheduling for example at its most basic form, utilizes this simple form of information available at a glance from human resource capable MIS. In this regard issues of integration and inter-data comparison, although fundamental in their own right, may not plague staffing decisions like they would for example financial ones.

This similarity in even the most complex of HMIS would account for the similarity in the correlations as has been described even in different economic and demographic operating environments. In the global review of available literature that presented a different view, we are of the opinion that it’s the paucity of studies in this thematic area in the local and regional area that most likely did not lend a hand to the acknowledgement of a different reality to the authors of the global review of available literature on operational staffing decisions and MIS utilization.
5.3.2 HMIS Utilization and procurement Decisions within Private Hospitals in Nairobi.

This study found that there was no statistically significant correlation between procurement decisions and HMIS utilization for hospital operations. This is in-line with (Tanner, Wölfle, & Quade, 2006) that revealed in their study that although the benefits of e-procurement have been demonstrated in many other industries, the benefits in healthcare industry are yet to be established in regard to tactical procurement decisions in healthcare organisations. Sixty eight per cent of the respondents in our study reported an increase in the availability of drug and other supplies consumption information. This intriguingly doesn’t translate to stronger correlation between utilization of HMIS and procurement decisions. The OIT (organisational information theory) and (Theo lippeveld, 2000) puts forth the concept of equivocality that would explain this disconnect. It states that information although present doesn’t always lead to better or influence decisions in organisations. The assumption from this theory that information if available will be utilised and if utilised it will be of benefit to the goals of the organisation comes to the fore.

The study findings are in contrast with (Kambaza, 2009) and (Ineza, 2015) study in Rwanda that states that the most significant challenge in e-procurement is availability of supplies consumption information. Our study shows that even in the presence of this information, HMIS utilization and procurement decisions are still not associated. (Mungu, 2011) Study suggests MIS for procurement as a solution for increased information and reduction in cost. Our study affirms this recommendation in regard to more information but not in regard to reduction in cost as this wasn’t realised in our study.

(Ketikidis, 2010) In his study concludes that hospitals lack the mechanism that allows for a seamless linkage and interaction with suppliers. This finding suggests that the link that would lead to a better correlation between MIS utilization and procurement decisions is system integration (EDI). Although this data interchanges are common place in other industries, their utilization in healthcare is low. Our study is also in line with (Andries,
2002) that revealed that integrated procurement MIS in healthcare organisations are not always associated with procurement/supply chain decisions in both quality and efficiency in the decisions made, especially for small to mid-sized capacity hospitals. Our study revealed that for this calibre of private hospital, no dedicated procurement function existed. This supports this claim. (Matunga, 2013) Study finding reveals that the cost benefit analysis is not in favour of e-procurement utilization in healthcare organisations, this assertion is in line with our findings as the association between MIS utilization and procurement decisions was non-existent.

Some studies from literature demonstrated a relationship between these two variables but the hospitals in these studies were operating in the public healthcare space where computerised HMIS utilization was a new entry into the hospitals operations. The initial efficiency gains compared to a manual system would be evident in the initial phase but with continued use and generation of more information the question of whether further improvements in the procurement decisions can be made still arise. Private healthcare institutions in our study where operating HMIS systems for a period of at least five years at the time of the study hence this disparity. Any e-procurement system that is efficient and that delivers value has to integrate the needs of the consumer and supplier to allow for seamless constant communication. The variability of supplies ordering due to variability is service needs that are common place in hospitals makes integration with suppliers and seamless connection a daunting task. Although these connections have delivered value in other industries e.g. retail, a significant amount of effort has to be expended to customize this feature of supplier integration into hospital management information systems. The cost element of system integration, goodwill and the intent from all players in the decision loop will present challenges that need to be overcome to achieve this reality.

5.3.3 HMIS Utilization and Financial Decisions within private Hospitals in Nairobi.

There was no statistically significant correlation between financial decisions and HMIS utilization in our study. This is in contrast with a study by (Park, 2012) that a positive strong relationship between the two exists and further links these financial decisions to hospitals bottom line improvements. The study was done in South Korea. The operational model of the MIS in the hospitals in this study involved significant levels of integration with insurance payers and third party claim management firms. This level of
integration between payers and hospitals would explain their positive correlation. (Sandler, 2015) Study on synergistic MIS systems also is in contrast with our study findings as it finds a strong positive correlation. Enhanced integration of hospitals organisational financial systems with payer systems were present in similarity with the South Korea study. In contrast, our financial decisions study scale showed negligible levels of payer and provider integration for the purposes of claims adjudication. This would explain the difference as financial decisions are heavily reliant on data that is relational i.e. that incorporates data from different sources both within and without the organization to generate information of value to decision making.

The system scale that is necessary to support this kind of relational data is significantly cost prohibitive to most middle and low bed capacity healthcare institutions and to a great extent large bed capacity hospitals. The local healthcare ecosystem isn’t developed enough in terms of payer and provider integration and third party claim adjudicators to allow the financial benefits of HMIS utilization to be realised as has been in Asia and in the west. The lack of locally available synergistic systems e.g. Patient pre accreditation/pre authorization systems that can plug into and support healthcare organisations ERP for the purposes of financial decision making only compounds this issue and explains why similarities in correlations from studies done in areas where these auxiliary services and integrations are present are lacking.

Our study findings were in line with (Adebayo, 2007) findings that financial information availability doesn’t always influence decisions and other factors such as timing of the information, presentation and format of the information, quality of the information and external market factors will often lead to decisions that are not necessarily associated with MIS utilization within the organisation. (Sahay & Latifov, 2012) Study findings are also similar in that there was no association between utilization of MIS for finance and the decisions that resulted from it or vice versa. The reasons behind this in this study were lack of non-relational information e.g. staff numbers vs. revenue, that financial decisions heavily on. (Leventhal, 2017) Study reveals no association between financial decisions and MIS utilization. Healthcare facilities in this study were having difficulties associating the benefits in decisions that reduced operating costs, improved financial reporting and improved financial workflow with their utilization of HMIS in their facilities, bringing into question the cost benefit ratio of hospital wide financial system
implementation and utilization. (GEHealthcare, 2015) Case study also couldn’t find an association as financial systems in healthcare organisations are rarely large enough to encompass all aspects of RCM i.e. claims tracking, claim adjudication, patient collections, payer integration etc.

5.4 Conclusions

5.4.1 HMIS Utilization and Staffing Decisions within Private hospitals in Nairobi.

From this study, the staffing decisions of performance appraisal, new recruitment and staff scheduling have been strongly associated with HMIS utilisation in healthcare organizations in private hospitals in Nairobi Kenya. This relationship has been demonstrated by similar studies done in the Middle East and Europe with few demonstrating a contrary relationship. The relationship between staffing decisions and HMIS utilisation is a significant one as it fortifies and defends the critical resource that is healthcare personnel in any hospital by ensuring that decisions made in its regard are based on factual and relevant information. It also bolsters knowledge on the utilisation of MIS by establishing that operational decisions on staffing can influence utilisation in addition to other established factors such as behavioural intention to use and perceived advantage as a result of use.

5.4.2 HMIS Utilization and procurement Decisions within Private Hospitals in Nairobi.

This study concludes that there has been no demonstrated association between the operational procurement decisions and HMIS utilisation in private healthcare organisations in Nairobi Kenya. The study findings also demonstrate an increase in supplies consumption information from HMIS utilization. This increased availability of information in this case doesn’t translate to an association between decisions and utilization. Availability of information doesn’t necessarily lead to its utilization. Aspects of information quality ease of integration into an organizations decision model and dependence of third parties to close the decision loop would account for this disparity. The lack of integration between procurement capable MIS and suppliers of hospitals is a major drawback leading to this disassociation. While hospitals may be willing to integrate, third parties i.e. suppliers, may not hence the benefits to be achieved from e-procurement may not be realised.
5.4.3 HMIS Utilization and Financial Decisions within private Hospitals in Nairobi.
This study did not find any correlation between the financial functions of financial reporting, improving patient cash collections and claim adjudication with HMIS utilization. Functional decisions relating to finance may not be associated with HMIS use as they are ripe for both internal and external influence by factors such as timing of available information, the quality and presentation of available information and external market factors. HMIS systems in private health organisations at this point in time are still operating as ‘electronic medical records’ and have not advanced to incorporate data in different organisational information silos therefore generating indicators that are more user friendly for financial decision makers. Finance is heavily reliant on indicator type information and current HMIS systems in the local setting are not yet at a level of generating them. This is both a system design issue and an appreciation issue, on the length and breadth of information that can be available to them for the purposes of decision making by the financial functional heads.

5.5 Recommendations
5.5.1 Recommendations for improvements for Healthcare Practitioners
5.5.1.1 HMIS Utilization and Financial Decisions
The authors recommend the continued development of HMIS systems that incorporate financial modules as this will drive HMIS utilization in healthcare organizations. The benefits from such utilization will be improved availability of and understanding of the organizations financial position. Healthcare financial sectional heads need to appreciate the wealth of information available in HMIS systems that have been in operational in organizations even for brief periods of time. They need to start to data mine this information and generate past indicators that will start to generate trends they can utilize for financial forecasting and other operational decisions. A strategic push by industry players’ i.e. healthcare providers, healthcare suppliers and healthcare insurance payers, towards developing a framework that will guide the process of payer, supplier and provider systems integration will provide parties with opportunities to grow in revenue and overall impact of quality of care in hospitals. The challenges of data privacy will need policy direction from not only industry operators but government.
5.5.1.2 HMIS Utilization and Staffing Decisions
Following the discussions and conclusions, the study authors recommend that hospital information system design should incorporate more staffing related functionalities as this will drive HMIS utilization further and impact on human resource organisational decisions. This impact on decisions relates to the quality and promptness of decisions making taking into consideration the human resource elements of organizational complement, contingent workforce available and skills available for specific responsibilities to be carried out effectively.

5.5.1.3 HMIS Utilization and Procurement Decisions
Integration of supplier and healthcare providers systems has been demonstrated by the study to be a significant hindrance to enjoying the full benefits of e-procurement. HMIS utilization for procurement will avail more and readily available supplies consumption information for healthcare organizations. This is in itself a benefit especially in organizations that are yet to utilize computerized HMIS and procurement integration. As with financial decisions, a strategic push by healthcare providers and healthcare suppliers towards developing a framework that will guide the process of systems integration will provide both parties with opportunities to grow in revenue and overall impact of quality of care in hospitals.

5.5.2 Recommendations for further Research
The study authors recommend further research on the healthcare industry bottlenecks that are limiting systems integration between healthcare insurers and healthcare providers, healthcare suppliers and healthcare providers. This knowledge will benefit these players on how to make a more integrated healthcare space in Kenya can be a reality.
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Wunderlich, & Sloan, D. C. (1996). *Nursing Staff in Hospitals and Nursing Homes: Is It Adequate?* Institute of Medicine (US) Committee on the Adequacy of Nursing Staff in Hospitals and Nursing Homes.


Appendix 1: Cover Letter

TO HOSPITAL ADMINISTRATOR,

RE: PERMISSION TO ENGAGE WITH THE ORGANISATION STAFF

My name is DR. MICHAEL NG’ANGA NJOROGE currently pursuing a master’s program at the UNITED STATES INTERNATIONAL UNIVERSITY, CHANDARIA SCHOOL OF BUSINESS. This letter is to apprise you of the purpose of the intended research study and to seek your assistance and/or participation in data collection.

The study seeks to collect views from at least three individuals in a management position at the hospital in any of the three areas of finance, human resource and procurement. The tool used for the study is a short questionnaire that is self-administered. These individuals need not be the heads of the said departments but their input would be highly appreciated if possible. The study intends to shed light on the benefits or lack thereof of utilization of HMIS in your facility in the three aforementioned areas. No financial or hospital strategic information will be collected and all responses will remain anonymous.

My research assistant ANTHONY WANYONYI will be collecting the data on my behalf in most cases. I believe the study findings will be of benefit to your institution for both current and future decision making. Study results will be shared with you if so desired. I look forward to your consideration in this matter and cooperation towards this end.

CONTACT DETAILS:

DR. NG’ANG’A NJOROGE
0723661246

Professor FRED.O NEWA
Chandaria School of Business
0726302232
fnewa@usisu.ac.ke

Ng’ang’a Njoroge
Appendix 2: Questionnaire

SECTION 1: BACKGROUND INFORMATION

1. Gender: Male (   ) Female (   )

2. Age (years): 19-25 (   ) 26-35 (   ) 36-45 (   ) 46-55 (   ) above 55 (   )

3. Which of these organisational function(s) are you responsible for in your organisation?
   - Financial/Accounting (   )
   - Human Resource (   )
   - Procurement (General and/or pharmaceutical) (   )

4. Level of education.
   - Diploma (   )
   - Higher diploma (   )
   - Degree (   )
   - Masters (   )
   - PhD (   )

5. Years of experience.
   - Less than 5 years (   )
   - 6-10 years (   )
   - 10-15 years (   )
   - 15-20 years (   )
   - More than 20 years (   )

SECTION TWO: UTILISATION OF HMIS DATA IN FINANCIAL, HUMAN RESOURCE AND PROCUREMENT DECISIONS.

This section seeks measure your individual utilisation of Hmis data for making decisions while executing your work responsibilities.

**KEY:**
- 1 = Strongly Agree
- 2 = Agree
- 3 = neither agree nor disagree
- 4 = Disagree
- 5 = strongly disagree

HMIS (Health management information systems) Note: Hospital/clinic ERP (enterprise resource planning systems included)
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<tr>
<th></th>
<th>Question</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither</th>
<th>Disagree</th>
<th>Strongly disagree</th>
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<tr>
<td>6</td>
<td>Would you say you have more information about your organisation's operations following HMIS introduction?</td>
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<td>7</td>
<td>Would you say you have better quality information about your organisation's operations following HMIS introduction?</td>
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<td>8</td>
<td>The organisation is resolving its operational difficulties more efficiently now than before HMIS introduction?</td>
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<td>9</td>
<td>Would you say you are making better quality decisions on the day to day operations of the hospital because of HMIS introduction?</td>
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<td>10</td>
<td>Since HMIS introduction in the organisation, I have experienced duplication of tasks i.e. both manual and HMIS tasks.</td>
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<td>11</td>
<td>Since HMIS introduction in the organisation, I have experienced a slowing down/delay of certain processes in the organisation compared to before its introduction.</td>
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<td>12</td>
<td>Staff attitudes towards the hospital's administration have improved for the better since utilisation of HMIS in the organisation.</td>
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<td>13</td>
<td>The utilisation of HMIS in my department has led to a reduction in monthly workload.</td>
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<td>14</td>
<td>I have developed a better understanding of the organisation's financial position because of HMIS utilisation.</td>
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<td>15</td>
<td>The organisation has realised an increase in cash collections due to HMIS utilisation in billing.</td>
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<td>16</td>
<td>There has been an improvement in efficiency of financial/accounting workflows due to HMIS utilisation.</td>
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<td>17</td>
<td>The hospital has noted a reduction in number of staff in my department since the introduction of HMIS.</td>
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<td>18</td>
<td>The organisation's financial reporting has improved in quality since HMIS utilisation.</td>
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<td>19</td>
<td>The organisations financial reporting has improved in timeliness since HMIS utilisation.</td>
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<td>20</td>
<td>The hospitals claims submission rates have improved since HMIS introduction.</td>
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<td>21</td>
<td>The hospitals claim denial rates have reduced since HMIS introduction.</td>
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<td>22</td>
<td>The utilisation of HMIS in procurement has led to a faster procurement process within the organisation.</td>
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<td>23</td>
<td>The utilisation of HMIS for procurement has led to a more transparent procurement process.</td>
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<td>24</td>
<td>The hospital has realised a reduction in the total cost of procurement with utilisation of HMIS than without.</td>
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<td>25</td>
<td>The utilisation of HMIS has led to better drug consumption information.</td>
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<td>26</td>
<td>The utilisation of HMIS has reduced the drug purchase to drug use duration in the hospital.</td>
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<td>27</td>
<td>There are aspects of the procurement process that are better accomplished manually rather than by utilising the HMIS.</td>
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<td>The utilisation of HMIS for procurement has led to lengthening and/or delays in the procurement process within the organisation.</td>
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<td>29</td>
<td>Medical staff (doctors and nurses) is able to utilise this procurement system and contribute to the procurement process.</td>
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### SECTION THREE

**KEY:** 1 = to a great extent  2 = Somewhat  3 = very little  4 = Not at all  5 = Unknown

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<th>To a great extent</th>
<th>Somewhat</th>
<th>Very little</th>
<th>Not at all</th>
<th>Unknown</th>
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<td>30</td>
<td>I am able to access the organisational complement (number of staff) at any one time from the HMIS in place in my organisation.</td>
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<td>31</td>
<td>The HMIS utilised in my facility contains skill levels of all staff in the organisation.</td>
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<td>32</td>
<td>The HMIS utilised in my facility is capable of updating new skills of existing staff on an on-going basis.</td>
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<td>33</td>
<td>The HMIS keeps track of contingent workers (locum workers) for the organisation.</td>
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<td>Performance appraisals of staff are updated into the HMIS for human resource decisions.</td>
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<td>35</td>
<td>This organisation has realised a reduction in the number administrative tasks since HMIS utilisation.</td>
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<td>36</td>
<td>To what extent is the linkage between your HMIS and your health insurance providers systems for the purposes of claims management? (Pre authorisation, claim submission)</td>
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<td>37</td>
<td>Your organisation has realised faster pre authorisation and/or claim submission due to this linkage.</td>
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