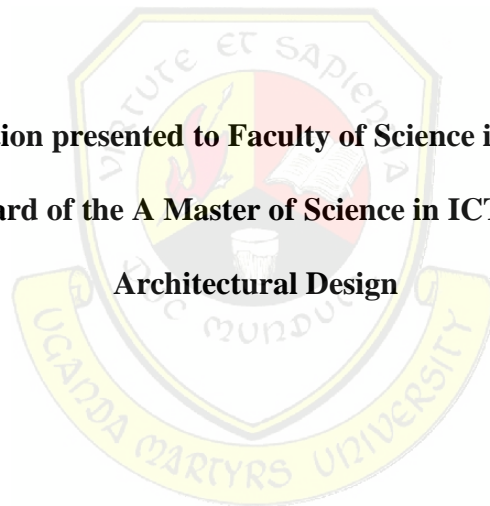


**Contribution of ICT to Private Health Facilities' Performance in Uganda;  
User perception on Enterprise Resource Planning (ERP) Contribution to Financial  
Performance**

**Multi-case research: Central Region of Uganda**

**A postgraduate dissertation presented to Faculty of Science in partial fulfillment of the  
requirements for the award of the A Master of Science in ICT Management, Policy and  
Architectural Design**



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### **Dedication**

To my parents, Canon, Dr. William Nyehangane and Mrs. Olive Nyehangane, for their continued support, prayers and counsel and to my friends Hellen and John for their continuous motivation.

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## List of Acronyms

APS	Advanced Planning Systems
ART	Antiretroviral therapy
EMR	Electronic Medical Record
ERP	Enterprise Resource Planning
GP	General Practitioner
HIV/AIDS	Human Immunodeficiency Virus
HMIS	Health Management Information System
ICT	Information and Communication Technology
IHK	International hospital Kampala
IS	Information Systems
KPIs	Key Performance Indicator
NHL	Nakasero Hospital Limited
NPfIT	United Kingdom's National Program for Information Technology
OECD	The Organisation for Economic Co-operation and Development
PHPs	Private Health Providers
PMTCT	Prevention of Mother to Child Transmission
PPPH	Public Private Partnership in Health
ROI	Return on investment
SCMS/SCM	Supply Chain Management Systems
SDLC	Systems development life cycle
SMHEs	Medium Healthcare Enterprises
SPSS	Statistical Package for Social Scientists

## **Abstract**

Information and communication technology plays a key role in the present-day business environment. Various organizations heavily rely on computers and software to deliver accurate information to successfully manage their business. Acquisition of enterprise resource planning (ERP) systems is one way that many corporations have adopted information technology on a large-scale to accomplish competitive advantage, business transaction and data processing needs. This research presents the ERP's contribution to financial performance of private health facilities in Uganda. Descriptive form of research design was employed to carry out this study and the primary data was collected using questionnaires and interviews, secondary data was collected from reviewing the existing literature on the subject. Descriptive analysis was used to analyze the primary data which was majorly of quantitative nature from the data collection forms. Themes and codes were designed for the interpretation of qualitative data. From the analyses, the study established that ERP System have a significant contribution to financial performance, that is, Improved inventory and supply chain management, improved service delivery and turn-around time, timeliness of data availability, labor efficiencies, reduced cost of doing business, improved payment processes and customer satisfaction of private health facilities in Uganda. Therefore, the study concluded that ERP Systems had a positive statistically significant influence on the financial performance of private health facilities in Uganda. The researcher recommends the adoption of the ERP System in all private health facilities in Uganda for subsequent enhancement of the same so as to enable effectiveness and assured improved financial performance

# **CHAPTER ONE**

## **INTRODUCTION**

### **1.1 Introduction**

This chapter discusses Information and Communication Technology (ICT) and financial performance, a brief of how the two variables relate directly to each other that provide a background to this research. The chapter also introduces the evaluation of the contribution of ICT to financial performance in the developing countries. The discussions in the chapter are focused on the problem statement, objectives and specific objectives, research questions, scope and justification of the study are presented. In addition, this chapter introduces and defines a number of commonly encountered words in this research.

### **1.2 Background of the study**

The financial variable of any individual or company is the backbone of an individual or a company, and if the company missed this backbone will miss its balance, so the financial performance is the main ingredient of the companies, which help its continuation and growth, A proper financial performance provides a full range of accurate and reliable information to compare the actual performance of the company's activities through specific indicators which are obtained from the actual performance and compare it with specific set targets and thus determine if there is any deviations.

Information and Communications Technology (ICT) has been referred to as a 'key instrument' in healthcare delivery and public health internationally (Drury 2005) When designed and implemented effectively, ICT can improve financial performance, access for geographically isolated communities; provide support for healthcare workers; aid in data sharing; provide visual

tools linking population and environmental information with disease outbreaks; and is an effective electronic means for data capture, storage, interpretation and management that in the end improves service delivery. In the developed world, there has been enormous investment in health ICT since the late 1960s and this is has expanded dramatically over the last 10 years. Some of the examples are the Canadian Health Infoway, the United Kingdom's National Program for Information Technology (NPfIT) which is the world's largest civil information technology investment program and the Health Connect program (Lewis Don, 2011). Each of these programs and many others have carried out substantial research within Health care, particularly in the areas of benefits and benefits realization. Despite this, there is still remarkably small evidence base of the contribution of ICT interventions available to financial performance of the health facilities. For the developing world, this evidence base is even smaller. Based on that background, this study seeks to demonstrate the contribution of information and communication technology on financial performance.

Enterprise Resource Planning systems (ERPs), Health management information systems (HMIS), procurement and inventory systems, wireless internet, e-mail, Electronic transactions, and health facility websites are some of the ICT applications that have been broadly implemented throughout the industry (Mráz, 2012; Ham et al, 2005). Some private health facilities in developing countries have adopted ICTs because the founders and administrators believe ICT adoption is a key success factor in enhancing financial performance (Richard, 2013; Siguaw et al, 2000) and a key issue for success and sustainability in the long run for most private health facilities (Jones & Wiberley, 2000) and this is aimed at profit maximization.

This Ugandan-based research focuses on evaluating the contribution of ERPs as a set of adopted ICTs, to the financial performance of the private health facilities in the developing countries.

### ***1.2.1 Historical Background***

The use of information and communications technology (ICT) in medical practices is by no means a new phenomenon (Ammenwerth et al. 2003; Waring & Wainwright 2002). A study of Australian general medical practitioners (Henderson, Britt & Miller 2006) showed that 89.9% of practices used a computer for billing and accounting, 85% of GPs indicated that they prescribed electronically, 73.8% ordered tests electronically, while only 29.5% of practices had fully automated their patient records.

ICTs have been adopted in various modules (disintegrated systems) for purposes of management and sharing healthcare expertise across the world (Khan et al, 2006 & Saroj et al, 2008). These independent systems have been rolled over to developing countries due to their immense abilities in management of healthcare costs and enhancing general management (McClure, 2007).

There have been many studies concerned with the benefits of ICT adoption (MacGregor 2004). Some of these studies have shown that benefits are often intangible; that is, they are often not realised by owner/managers at the time of adoption because of the costs involved initially. Studies by Poon & Swatman (1997) and Abell & Lim (1996) found that health facilities benefited in their ability to reach new customers and new markets through the use of ICT. This finding has been supported in more recent studies (Vescovi 2000; Ritchie & Brindley 2000; Sparkes & Thomas 2001; Raymond 2001; Quayle 2002). Earlier studies found that other benefits reported by various enterprises included: lowering of administration costs (Poon & Swatman 1997; Abell & Lim 1996), reduced lead time (Abell & Lim 1996), increased sales (Abell & Lim 1996), improved relations with business partners (Poon & Swatman 1997) and improved quality of information (Poon & Swatman 1997; Abell & Lim 1996). A study by Quayle (2002) found that benefits derived from ICT use, as reported by health centres owner/managers, included

reduced administration costs, reduced production costs, reduced lead time, reduced stock, improved marketing and improved quality of information, while Tetteh and Burn (2001) found the adoption of ICTs substantially increased internal efficiency. Despite the large number of studies in ICT adoption and its benefits during the last two decades, demonstrating the contribution of ICT on financial performance has proven difficult (Rai, and Welker, 2002). Information to date suggests that despite the rapid increase in ICT investment, realization of its financial contribution has been rather too slow and sometimes not visible for the return on investment as expected (Chircu and R.J. Kauffman, 2000)

### ***1.2.2 Theoretical Background***

Different theoretical approaches have been adopted by researchers to investigate the contribution of ICT adoption to firm financial performance over the years. Transaction cost theory (Williamson, 1975); Value chain analysis (Porter, 1985); and Resource-based view which is a more recent theory that is widely embraced by many such as Bharadwaj (2000), Wade and Hulland (2004), Kim et al. (2006), Rai et al. (2006), Wu et al. (2006), Ordanini and Rubera (2010), Lee, Koo and Nam (2010), Fahy and Hooley (2011); Rashidirad, Syed and Sol-tani (2012), the performance measurement model of Ross et al. (2003), plus the generic framework suggested by Dehning and Richardson (2002).

This study adopted the generic framework designed by Dehning and Richardson (2002) and the performance measurement model of Ross et al. (2003).

This performance measurement model was considered because it depicts the stage of the ERP post-implementation and proposes that after implementation, organizations may experience the stages of stabilization, continuous improvement, and transformation and this helped this research in the evaluating levels of contribution of ERPs to organizational performance.

The framework designed by Dehning and Richardson (2002) classifies existing research on IT-performance measurement using five paths. Based on a comprehensive review of the financial accounting and finance literature on IT-performance measurement, it demonstrates that most research in this field focuses on only one path (usually path 1), bypassing many other important factors. It also argues convincingly that this mainstream one-dimensional approach fails to explain IT-performance and leaves a gap between anecdotal evidence of IT-success and results of mainstream empirical research. The 'IT-productivity paradox' discussion and the often conflicting results of research following alternative paths, this framework is quoted as the most important example supporting their call for a more comprehensive 'multi-path' approach. This study will use three of the five paths of the framework to try and get the best results of the contribution of ICT adoption on the financial performance of health centers.

### ***1.1.3 Conceptual Background***

The concept of ICT adoption is defined as the acquisition, acceptance, use and sustainability of information and communication technology. In most of the literature, there is an agreement that adoption is a process by which stakeholders take part in all stages of system or programme utilization right from designing, through planning and implementation, monitoring and evaluation, to sharing of benefits (Brett 2002).

Financial performance is defined as measuring the results of a firm's policies and operations in monetary terms. These results are reflected in the firm's return on investment, return on assets, value added. To perform is to produce valued results and a performer can be an individual or a group of people engaging in a collaborative effort. Developing financial performance is a journey, and level of performance describes location in the journey. As advocated by Harvard's Project Zero, performance is closely related to learning-for-understanding and utilization of

available resources (Wiske, 1998). When people learn and utilize, they are empowered to create results that make a difference.

Widespread adoption of information and communication technologies (ICT) is a key strategy to meet performance challenges facing health facilities of increasing demands, rising costs, limited resources and workforce shortages (Stone *et al*, 2007). Some of the former studies carried out have stated positive contribution of ICT adoption on financial performance while other studies have stated otherwise (Wu, 2007). A common point has been concluded in most previous studies that the need for reliable measure, conceptual framework to investigate the contribution of ICT adoption on financial performance still existed in ICT literature and theory and also the lack of comprehensive review pressures academics to conduct more research in the field (Amoroso, & Cheney, 1991).

### **1.3 Statement of problem**

The global success of Enterprise Resource Planning Systems (ERPS) has not only attracted the interest of researchers from the IT/IS-discipline, but from all major disciplines in business research – including accounting. The emergence of ERPS has moved the topic 'computerised business information systems' increasingly from the IT/IS domain to the business domain; from systems design and programming to business configuration, process mapping and reengineering. Using the systems development life cycle (SDLC) as conceptual reference, we observe that the efforts and weight of the critical success factors of ERPS projects (Sumner,1999) moved from 'systems design' to 'systems implementation', and implementation teams are now usually led and dominated by classic business roles rather than IT-staff. ERPS impose their logic on organisations and often force employees to think in terms of integrated processes and to change the way they do accounting, production planning and control, etc.



All these changes brought about by ERPS made them a very ‘attractive’ research object of many business disciplines, and accounting is by nature the one from which we expect an answer to the question which ultimately counts in business: Are those systems worth the money? Thus, whether the level of investment in ERP systems actually brings real benefits to the health facilities or not is still a matter of concern in academic circles. This is because while some posit a positive contribution of ERPs to financial performance some argue to the contrary (OECD, 2010; Adekunle & Rafiu, 2014). Hence, there is a need for further studies to contribute to the ongoing debate on the nature of the relationship between ERPs and financial performance.

This new dimension to the investigation is to extend the investigation further for robustness, complementary or confirmatory purposes. Literature from the investigation of the contribution of ICT systems adoption to financial performance of private health facilities in the developing context especially Uganda is still minimal and the results from any studies carried out have not been published hence the need for this study to be carried out and results disseminated.

## **1.4 Objectives of the Study**

### ***1.4.1 General objective***

The main goal of this research was to extend the investigation in the contribution of ERP system adoption to financial performance by reviewing related literature and carrying out a detailed field study on the contribution of ERP systems to financial performance of private health facilities in a developing context.

### ***1.4.2 Specific Objectives***

1. Study and understand the expected contribution of ERP system adoption to financial performance.

2. Study what measures are used to evaluate positive contribution of ERP system adoption to financial performance in a developing context (Uganda)
3. Study ERP systems implemented in private health facilities in Uganda

### **1.5 Research Questions**

1. What is the contribution of ERP system adoption to financial performance?
2. What ERP system types are deployed in private health facilities in Uganda?
3. How is the contribution of ERPs to financial performance of the private health facilities evaluated?
4. Are the results from the evaluations of the contribution of ICT to financial performance ever disseminated to the system users and beneficiaries?

### **1.6 The Scope of the Study**

The scope of the study explains the boundaries/ limits that are observed by the study. In this study, the scope was divided into sections of time, content and geographical as described below.

#### *1.6.1 Geographical Scope*

The study was carried out in the central region of Uganda in Kampala district. Two (2) private health facilities namely; International hospital Kampala (IHK) and Nakasero Hospital Limited (NHL) were selected for this study because they met all criteria for this study. The criteria for selecting a health facility for the study was purposively focused on health facilities that have been running an ERP system for the last two years.

### *1.6.2 Content Scope*

The study was about the contribution of ICT adoption on the financial performance of private health facilities. For this study; performance was redefined to mainly focus on reduced operational costs, general profitability and better service delivery.

ERP systems are defined as a set of ICT, and this study adopted Shang and Seddon's (2002) definition, A set of packaged application software modules, with an integrated architecture, that can be used by organizations as their primary engine for integrating data, processes and information technology, in real time, across internal and external value chains. This study defined performance as the ability of the health facility to meet its objectives effectively and efficiently in a given period of time.

### *1.6.3 Time Scope*

The study took a time period of six (6) months after proposal submission. This ran from February 2016 to July 2016 to conduct the field study, analyse the data collected and finally compilation of findings and presentation of the research report.

## **1.7 Significance of the Study**

The findings from the study added on the existing body of knowledge about ERP systems` contribution to financial performance and will help enable researchers, investors, management and health facility administrators to be able to deal with and justify the resources spent on acquisition of technology, as well as plan, implement and evaluate efficiency and effectiveness of ICT strategies. These are the contributions that the study stands to make to the body of knowledge on the subject matter. To achieve these objectives, the study examined the contribution of ICT investments, to financial performance in a developing country.

## **1.8 Justification of the study**

The contribution of ICT systems to financial performance of various businesses has received massive attention from researchers over the years. The results from these studies have been markedly conflicting. Thus, whether the level of investment in ICT actually brings real benefits to the organisations or not is still a matter of concern in academic circles. This is because while some posit a positive relationship between ICT investment and performance (Becchetti, Bedoya & Paganetto, 2003; Hernando and Nunez, 2004; Indjikian and Siegel, 2005) some argue to the contrary (OECD, 2010; McKinsey, 2004). Hence, there is a need for further studies to contribute to the ongoing debate on the nature of contribution of ICT investment to financial performance.

## **1.9 Definitions of key terms**

***Information and Communication Technology (ICT)*** refers to technologies such as the Internet, Intranets, Extranets, ERP and other such technologies that cover the spectrum from basic infrastructure implementation to technologies that improve services and operations in an organization.

***ICT adoption;*** In this study, ICT adoption is defined as the acquisition, acceptance, use and sustainability of information and communication technology.

***Enterprise resource planning (ERP);*** An ERP system is a set of packaged application software modules, with an integrated architecture, that can be used by organizations as their primary engine for integrating data, processes and information technology, in real time, across internal and external value chains (Shang and Seddon 2002).

***Performance;*** Performance is defined as the ability of an entity or organization to meet its objectives effectively and efficiently in a given period of time

***Healthcare Information System:*** This is a software solution for appointment scheduling, patient data management, work schedule management and some other administrative tasks related to healthcare.

### **1.11 Conclusion**

Innumerable ICTs have been adopted in health care for various reasons and benefits especially in the developed world, these investments may or may not have been justifiable in terms of the value they return to those that spent on them and the reality is, they too have been adopted in the developing context. In this chapter of the study the researcher gives a clear background of what, how, why and when this research intends to achieve its objectives and answer the main question, ‘Are these investments in ICT systems worth it? We evaluate this in terms of financial performance.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter reviews related literature of the contribution of ICT adoption on the financial performance of private health facilities. The chapter presents the theoretical review of the frameworks and model that was used in guiding the study. This is followed by review of literature in line with the objectives, and we finally analyze the literature from the researcher's perspective and then conclude the chapter.

#### **2.2 ICT and health care**

The use of information and communications technology (ICT) in medical practices is by no means a new phenomenon (Ammenwerth et al. 2003; Waring & Wainwright 2002). A study of Australian general medical practitioners (Henderson, Britt & Miller 2006) showed that 89.9% of practices used a computer for billing and accounting, 85% of GPs indicated that they prescribed electronically, 73.8% ordered tests electronically, while only 29.5% of practices had fully automated their patient records.

ICTs have been adopted in various modules (disintegrated systems) for purposes of management and sharing healthcare expertise across the world (Khan et al, 2006 & Saroj et al, 2008). These independent systems have been rolled over to developing countries due to their immense abilities in management of healthcare costs, improving general performance and enhancing general management (McClure, 2007)

Despite the importance to researchers, managers, and policy makers of how information technology (IT) contributes to organizational performance, there is uncertainty and debate about what we know and don't know. A review of the literature reveals that studies examining the

association between information technology and organizational performance are divergent in how they conceptualize key constructs and their interrelationships.

A principal finding is that ICT is valuable, but the extent and dimensions are dependent upon internal and external factors, including complementary organizational resources of the firm and its partners, as well as the competitive and macro environment.

## **2.3 Review of related literature in line with the study objectives.**

### ***2.3.1 Expected contribution of ERP system adoption to financial performance***

#### *ERP systems adoption.*

An ERP system is a set of packaged application software modules, with an integrated architecture, that can be used by organizations as their primary engine for integrating data, processes and information technology, in real time, across internal and external value chains (Shang and Seddon 2002). It impounds deep knowledge of business practices that vendors have accumulated from implementations in a wide range of client organizations that can exert considerable influence on the design of processes within organizations (Shang and Seddon 2002).

ERP systems enable organizations to share common information and activities across the entire organization, automate and integrate the critical parts of business processes, and access information in a real-time environment. Since ERP systems can facilitate the productivity and efficiency of firms, the majority of organizations implement ERP systems to increase organizational competitiveness (Glover et al.1999; Davenport 1998; Pan et al. 2001). ERP systems touch on many aspects of a company's internal and external operations and provide organizations with an overall view of the business through multidimensional information (Gefen and Ragowsky 2005; Markus and Tanis

2000). Consequently, successful deployment and use of ERP systems are critical to organizational performance and survival (Markus and Tanis 2000).

Many a times, the bulk of research on the performance of ERP systems focuses on firms either prior to, during, or immediately after ERP software implementation (Krasner 2000; McNurlin, 2001). Conventional wisdom saw “going live” as the end of ERP implementation and ignored the second wave, the post adoptive stage, which refers to the actions that are taken after going live that help organizations achieve the full capabilities and benefits (Deloitte Consulting 1999).

Deloitte Consulting provided a useful starting point for analysis of ERP systems post adoption.

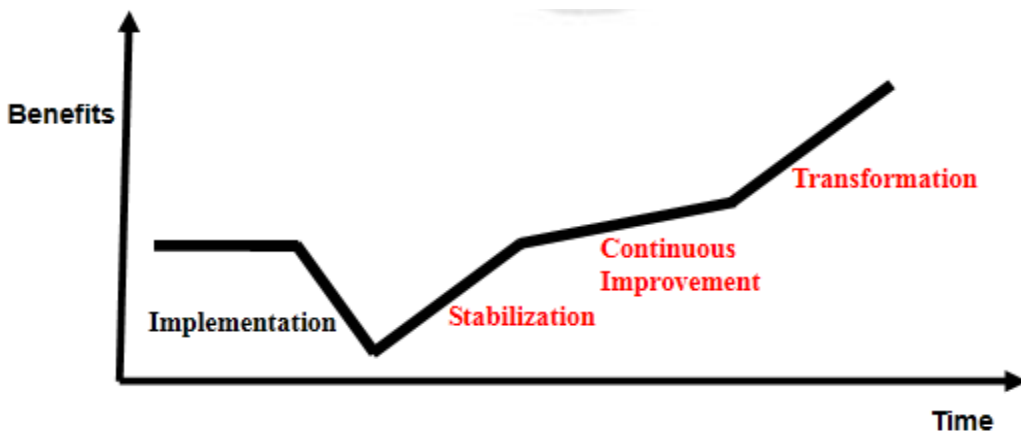
Many organizations and researchers have begun to notice and pay attention to the post implementation stage (Seddon et al. 2003) in which firms begin to realize the benefits of the ERP based organizational transformation (Clark et al. 2006) and continuous improvement, which in turn leads to the maximization of benefits from prior investment (Jasperson et al. 2005; Will and Wills-Brown 2002; Seddon et al. 2003). This study bases on the model of Ross et al. (2003) to depict the effects of the ERP at post-implementation. Ross et al. (2003) proposed that after implementation, organizations may experience the stages of stabilization, continuous improvement, and transformation.

The post-adoption stage is the longest phase of the ERP project life cycle (Rosemann 2003). It explicitly implies that organizations cannot stop advancing ERP systems even after completion of the ERP project. Many firms fail in the initial implementation, but after two or three years of effort and of defining the scope of what they want to accomplish, improvements may result (Hitt et al., 2002). Furthermore, significant improvements in ERP adopter firm performance are generally not realized until sometime after implementation (Hitt et al., 2002; Nicolaou 2004a). Therefore, after ERP implementation, organizations must continuously carry out change activities, including restructuring of IT systems and organizational structures, in order to obtain



maximum value from the ERP system (Gattiker and Goodhue 2005). To summarize briefly, though ERP systems are designed to create advantages for organizations, organizations must not only learn how to implement systems successfully, but must also pay attention to the post-implementation period, and perform activities to achieve their expectations for the ERP system instead of just waiting for the systems to automatically reach the goals of the organization.

### **The life cycle of ERP implementation adopted**



*Figure 2.1 showing the life cycle of ERP implementation adopted from Ross et al 2003*

### **Benefits of ERP implementation and use**

Since ERP systems affect so many parts of the organization, ERP systems can provide a huge range of benefits and problems, often with different benefits in different organizations (Seddon et al. 2003; Gittiker and Goodhue, 2005). Thus, organizations that have invested heavily in implementing ERP systems may want to know “Will our investment pay off?”

In the Benchmarking Partners study (1998); respondent companies anticipated not only tangible but intangible benefits. The most significant intangible benefits related to strategic effectiveness include internal integration, improved information and processes, and improved customer service, while tangible benefits related to operational efficiency include cost efficiencies in

inventory, personnel, procurement and the time needed to close books, as well as improvements in productivity, cash/order management, and overall profitability (Nicolaou 2004 ). Gittiker and Goodhue (2005), following the ideas of Barue at al. (1995), argued that organizations trying to understanding the value of the ERP investment should view it through two lenses: a fine-grained level analysis, and the intermediate benefits involved. Such intermediate benefits may include (1) higher quality data for decision making; (2) efficiency gains in business processes; and, (3) better coordination among different units of the firm. Further, the ERP systems benefits of Shang and Seddon (2002) cover the intermediate factors and extend the two dimensions (operation and strategy) to five dimensions, including the operational, managerial, strategic, IT infrastructure and organizational benefits. Operational efficiency relates to factors such as cost reduction, increased inventory turns; managerial benefits refers to factors such as improved decision making and planning and better resource management; Strategic effectiveness refers to factors such as improved managerial decision making; IT infra-structure benefits related to IT flexibility and capability, and Organizational benefits refers to factors such as employee learning, and empowering workers. The table below shows the dimensions and sub dimensions of ERP systems benefits.

### **Dimensions of ERP systems benefits**

<b>Dimensions</b>	<b>Sub dimensions.</b>
1.Operational	1.1 Cost reduction, 1.2 Cycle time reduction, 1.3 Productivity improvement, 1.4 Quality improvement, 1.5 Customer services improvement

2.Managerial	2.1 Better resource management, 2.2 Improved decision making and planning 2.3 Performance improvement
3.Strategic	3.1 Support for business growth 3.2 Support for business alliance 3.3 Building business innovations 3.4 Building cost leadership 3.5 Generating product differentiation 3.6 Building external linkages
4.IT Infrastructure	4.1 Building business flexibility for current and future changes 4.2 IT costs reduction 4.3 Increased IT infrastructure capability
5.Organizational	5.1 Changing work patterns 5.2 Facilitating business learning 5.3 Empowerment 5.4 Building common visions

*Table 1: Dimensions of ERP systems benefits: Adopted from Shang and Seddon (2002)*

### ***2.3.2 Measures used to evaluate positive contribution of ERP system adoption to financial performance in a developing context***

#### **The relationship between ICT adoption and financial performance**

Previous research has shown that information technology may indeed contribute to the improvement of organizational financial performance (Brynjolfsson and Hitt 1996; Kohli and

Devaraj 2003; Mukhopadhyay et al. 1995). In the network era, electronic linkages within and among organizations are proliferating, altering the ways in which firms acquire factor inputs, convert them into products and services, and distribute the result to their customers (Hammer 2001; Straub and Watson 2001).

Researchers have taken different approaches in modeling ICT value by focusing on the attributes of ICT and other organizational resources that together may confer a competitive advantage. Bharadwaj (2000) models three key ICT resources and their relationship to a firm's capability to deploy ICT for improved performance: ICT infrastructure, human ICT resources, and ICT-enabled intangibles. Clemons and Row (1998) argue that ICT is widely available to all firms and can only confer a sustainable competitive advantage if applied to leverage differences in strategic resources. Mata et al. (1995) derive a resource-based conceptual framework mapping the attributes of ICT to competitive advantage. According to the framework, the extent to which ICT is valuable, heterogeneous, and imperfectly mobile determines the level of competitive advantage. If ICT is valuable in lowering costs or enhancing revenue for all firms, then competitive parity results, if it is also heterogeneous, i.e., if one firm possesses it and others do not, then the firm receives a temporary competitive advantage. Though the authors conclude that only ICT adoption and management skills may lead to sustained competitive advantage and improved performance, they acknowledge that "there may be other attributes of ICT whose competitive implications have not been fully evaluated" (Mata et al. 1995, pp. 500).

### **Performance measurement model by Dehning and Richardson**

Like Matolcsy et al. (2005), this study adopted the generic framework suggested by Dehning and Richardson (2002) as guidance for the evaluation of ERPS performance. This framework classifies existing research on IT-performance measurement using 5 paths as shown in *Figure 2* below. Based on a comprehensive review of the financial accounting and finance literature on

IT-performance measurement, they demonstrate that most research in this field focuses on only one path (usually path 1), bypassing many other important factors. They also argue convincingly that this mainstream one-dimensional approach fails to explain IT-performance and leaves a gap between anecdotal evidence of IT-success and results of mainstream empirical research. The 'IT-productivity paradox' discussion and the often conflicting results of research following alternative paths in their framework can be quoted as the most important examples supporting their call for a more comprehensive 'multi-path' approach.

This research focused on the path 1 and 2 because of the time limitation, scope of the study and financial constraints

### The Framework for Evaluating Research on the Effects of IT Investments

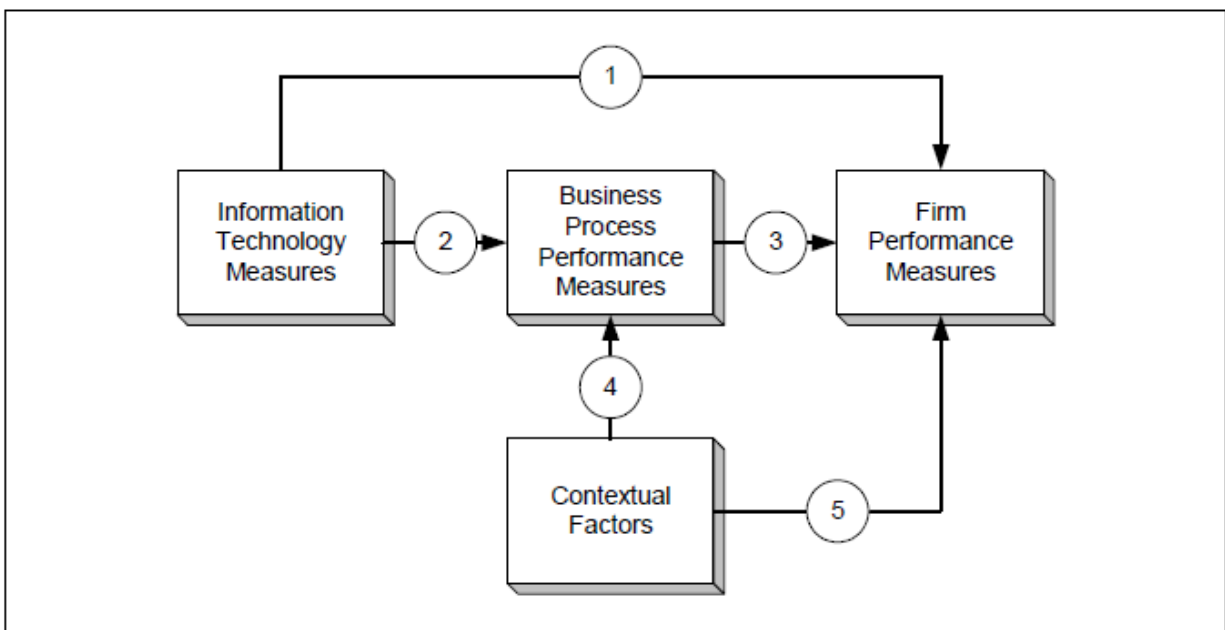


Figure 2.2 showing the Framework for Evaluating Research on the Effects of IT Investments (Dehning and Richardson, 2002; simplified)

### IT (ERPS) Measures

The first comprehensive empirical analysis of the performance of ERPS used 'ERPS adoption' as the only independent variable, and then compared the performance of organizations pre and post-adoption (Poston and Grabski, 2001). Later research considered and investigated the time-factor in more detail, or more precisely: the time-difference between the adoption of an ERPS and when performance was measured (e.g. Hunton et al., 2003, Matolcsy et al., 2002, Nicolaou et al., 2003, Matolcsy et al., 2005). The results of more recent research suggest the existence of a time-lag between the adoption of an ERPS and the realisation of benefits.

The second aspect of ERPS that was considered was the co-existence of other components of enterprise systems (ES), in particular specialized supply chain management systems (SCMS). Already back in 2001, a survey (N = 89) in the US found that 59% of the respondents either had already or were planning to extend their ERPS with a SCM solution. 84% of the respondents indicated that for any such expansion they would prefer to use the SCMS provided by their ERP-vendor (CIO magazine, 2001). SCM software packages are more specialized forms of ES which integrate all logistics functions within organizations and usually also support inter-organizational business and systems integration (Tarn et al., 2002). In contrast to ERPS, SCMS usually comprise advanced Planning Systems (APS) which support mathematical optimization procedures and heuristics. Used in combination with ERPS, they partly substitute and partly complement ERPS functionality, with the level of substitution/complementation being primarily determined by the functionality of either package and partly by the preferences of the organization using them.

## **Business Process Performance Measures**

All major ERP-products on the market support organisational processes and methods in operations management as part of their core-functionality. Therefore, it is expected that the adoption of ERPS leads to better performance in terms of both primary and secondary (support) business processes.

Financial KPIs are doubtlessly the most important and most widely used KPIs for firm performance, and they can also provide some valuable insights into business process performance (Dehning and Richardson, 2002, Matolcsy et al., 2005). These insights are, however, limited, especially if only publicly available data are used. These highly aggregated data can only be used for a very general analysis of core processes. Obtaining these more detailed data on business process performance, however, requires research beyond secondary data analysis, i.e. a field study.

## **Firm Performance Measures**

The empirical studies investigating the financial performance implications of ERPS use primarily financial ratios (and some limited market data). However, there is little overlap in terms of the precise measures used.

Interestingly, there is no agreement in the accounting literature with regards to which KPIs measure overall firm performance or business process performance best in the context of ERPS evaluation. There are even substantially different views as to whether certain KPIs measure firm performance or business process performance.

The approach taken by Matolcsy (Matolcsy et al, 2005), uses net profit margins and the current ratio as indicators of firm performance and fixed asset turnover, sales days outstanding, accounts payable days, inventory turnover and sales change as examples of process measures.

In contrast to the study mentioned above, we use a field study (survey), which gives more flexibility with regards to the selection of financial performance measures, because it does not have to rely on publicly available financial data. In addition, it is able to include respondents' perceptions about their company's performance. This study uses provision of better quality health care, reduced operational costs, general profitability and better service delivery as indicator of the profitability of the capital employed and operating profits as an absolute KPI of improved financial performance.

### **Impact of ERPS on Performance**

Research on the impacts of ERPS on financial performance has found some evidence supporting the claim of all major ERPS vendors that their products enable companies to achieve "faster return on investment" (SAP, 2003a, and similar: SAP, 2003b, ORACLE, 2003a/b, and PEOPLESOFT, 2003). Poston and Grabski (2001), for example, analyze four financial characteristics before and after ERP adoption using univariate tests. Their results indicate that ERP adoption leads to efficiency increase in terms of a reduction in employee numbers and in the ratio of employees to revenues for each year following the ERP implementation.

Hunton et al. (2003) provide evidence on the impact of ERPS adoption and overall firm performance by comparing return on assets, return on investments and asset turnover for ERP adopters and non-adopters. Their key results do not indicate a performance improvement for ERP adopters. However, they find that the financial performance of adopters has not declined during their test period, whilst the performance of non-adopters has declined during the same period.

Nicolaou et al. (2003) compare financial data of companies adopting enterprise wide systems and of a matched control group of firms. The results from a univariate analysis of performance



differences across time periods show that firms adopting enterprise systems have significantly higher differential performance in their second year after the completion of the system than the control group.

All these examples of accounting research on the impact of ERPS on the performance of organizations provide valuable insights into a previously under-researched topic and they are similar in their approach in several ways: (a) They use only aggregated, publicly available financial accounting data to measure performance, (b) they do not clearly distinguish between overall firm performance and business process performance, and (c) the dependent variables used are essentially only ERPS adoption and the time of adoption.

Matolcsy et al. (2005) performed a study using the same approach with regards to (a) and (c), however they extended the analysis of performance by also explicitly investigating financial performance indicators of core business processes in the value-chain. They found that the adoption of ERP systems leads to sustained operational efficiencies and improved overall liquidity. In addition, some support was found for increased profitability sometime after the adoption of ERP, and for improvements in accounts receivable management.

### **The effects of ICT adoption on organizational performance**

Many of the empirical ICT value studies find a positive association between ICT adoption and performance. However, research also indicates that the former may not always lead to the latter: operational improvements gained from adopting ICT within the organization may not translate to financial measures of performance (Barua et al. 1995; Hitt and Brynjolfsson 1996). One implication is that a firm is not able to capture all the value it generates from ICT. Even if a firm is able to obtain performance improvements from its operational improvements, the question of competitive advantage via ICT remains. One approach to assessing the implications for

competitive advantage is to identify ICT adopted and applied for strategic reasons and examine its impact on sustained performance and competitive advantage. A study of the valve manufacturing industry indicates a weakly negative association between ICT adoption and performance (Weill 1992). In contrast, an event study finds that the stock market reacts favorably to announcements that firms are using ICT systems (Brown et al. 1995). Moreover, in subsequent years those firms tend to be more productive and more profitable than their industry rivals. There is also evidence that firms making investments in ICT systems achieve sustainability via their established technology base (Kettinger et al. 1994). Another approach is to assess the attributes of ICT adoption and their ability to confer performance. Mata et al. (1995) concludes that only fully ICT adoption confer a competitive advantage and contributes to improved performance.

### **Over view of Private Health facilities in Uganda**

The size of the private sector in Uganda has been at the center of recent discussions of human resources for health and public–private partnerships that increase access to health services. The number of facilities in, and the volume of services produced and delivered by this sector have been subject to broad estimates, but no reliable estimates have been available. This information is important, however, because it underlies the vision of the Public Private Partnership in Health (PPPH) as outlined in the draft national policy and the Health Sector Strategic Plan II. Effective partnership between government and private [for-profit] health providers (PHPs) needs information on how many facilities exist, where they are located, what staff they employ, what services are offered, what equipment and infrastructure are available, and how they currently relate with the public sector (e.g. registration with professional councils, submission of health

management information). Ideally, this information should be available to both public and private sector stakeholders.

To address this information gap, Partners for Health Reformplus (PHRplus) in collaboration with the PPPH Desk of the Ministry of Health has created a comprehensive database for PHPs. From the database, PHRplus selected a nationally representative sample of health facilities run by PHPs and surveyed them to provide a more in-depth picture of their number and distribution, the human resources they employ, and the services they offer (*Mandelli et al, 2005*).

The information is intended to inform policy and programmatic decision, especially to enable informed debate on the potential scope and merit of public private partnerships for health. The number of health facilities in Uganda is estimated at 4,639, of which 2,154 (46 percent) are PHPs. The majority (68 percent) of the PHPs are located in the Central Region; Kampala District alone accounts for 45 percent of the PHPs.

The estimated number of staff employed in the PHP sector nationwide is 12,775. Fifty-four percent of the doctors working in the private sector also work in the government sector, whereas more than 90 percent of private sector nurses, midwives, and nursing aides work only (full-time) in the private sector. A total of 9,500 health professionals are estimated to be working exclusively within the private sector, including more than 1,500 doctors and 3,500 nurses. More than 80 percent of the doctors are employed within the Central Region (*Mandelli et al, 2005*).

PHPs provide an array of important health services. Twenty-six percent of the PHPs surveyed provide inpatient services. Curative services are widely offered, whereas preventive services are more limited. The exception is family planning, which is offered by three-quarters of PHP facilities. While more than 90 percent of PHP facilities offer treatment for malaria and sexually transmitted diseases, only 22 percent offer immunization services. About 40 percent of the PHPs provide maternity, post abortion care, and adolescent reproductive health services. Across the

population of PHP facilities, this translates into almost 900 private sector service delivery points for these priority services that can help address Uganda's high maternal mortality.

For HIV/AIDS services, about 60 percent of the PHPs surveyed offer voluntary counseling and distribute condoms, but only 29 percent have facilities for HIV testing. Prevention of mother-to-child transmission (PMTCT) and antiretroviral therapy (ART) are still limited within the PHP sector with just 12 percent and 2 percent offering these services respectively. Only 4 percent of the PHPs surveyed have been accredited by the Ministry of Health to offer ART. Eighty-one percent of facilities that offer PMCTC services have a doctor on staff, while 50 percent have a midwife. All facilities offering ART have a doctor.

From the results, 95 percent of the units surveyed were registered with different regulatory councils, but only 56 percent of these had renewed their licenses for the year 2005. An estimated 45 percent of the PHPs surveyed subscribe to a voluntary health professional association. PHP facilities are more numerous than government or private not-for-profit facilities, although they are concentrated in the Central Region and urban areas. These facilities employ an average of nine staff people per facility, and 70 percent have a doctor. In total PHP facilities employ a large number of staff, many of whom work exclusively in the private sector. These facilities offer any critical health services. They also have the staff, equipment, and infrastructure to provide even more public health services. Public-private partnerships can encourage and enable PHPs to offer services through advocacy and dialogue, training, provision of drugs and supplies, and improved access to financing. PHP facilities are a key component of the health sector in Uganda and should be recognized for their contribution.

## **Health Management Information System**

The analysis of information about use and availability of HMIS instruments in PHP facilities nationwide is also presented below (*Mandelli et al, 2005*).

Of the units that offer outpatient services, 94 percent report using outpatient registers, 29 percent collect routine HMIS data, and 24 percent submit HMIS reports. Of the units offering inpatient services, 93 percent use inpatient registers, 40 percent collect routine HMIS data, and 34 percent submit HMIS reports to District Directors of Health Services. Although the MOH expects PHP facilities to submit HMIS data, less than a third of PHPs have access to HMIS forms. About one-quarter of PHPs collect HMIS data. These variables are evenly distributed across regions, with the exception of PHP facilities in the Northern Region, which have less access to HMIS tools and use them less often. Overall, less than 25 percent of the PHP facilities submit HMIS data to the districts. This underlines the information gap that exists in the national health information system and national health statistics.

## **Financial Management of Private Health facilities in Uganda**

The survey by Mandelli et al, 2005, examined the use of financial management procedures, including the availability of books of accounts and dedicated bank accounts for PHP facilities. The findings are summarized in Figure 3. Basic financial management procedures are widely established across PHP facilities (always above 60 percent), while the existence of dedicated bank accounts is not yet common practice (on average in 45 percent of all facilities, ranging from 42 to 54 percent).

## Availability and Use of Financial Management Procedures, by Region

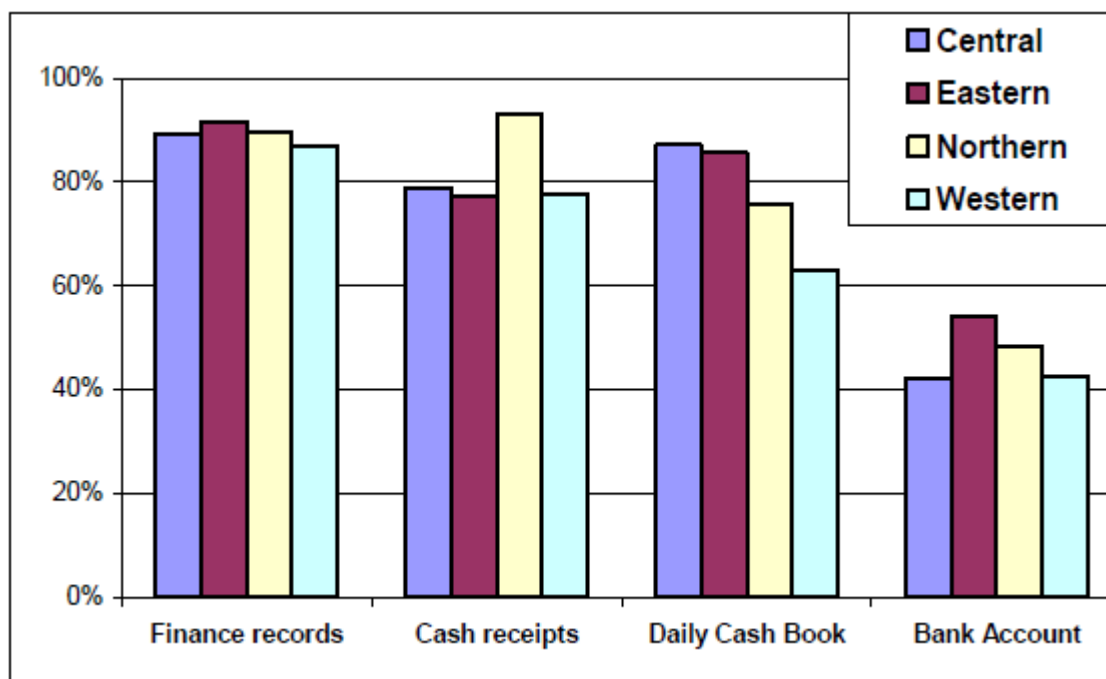


Figure 2.3 showing Availability and Use of Financial Management Procedures, by Region (Mandelli et al, 2005)

### 2.4 ERP system and Financial Performance in private health facilities

The integration of ERP in healthcare is needed to support issues such as: Clinical and administrative tasks, Better healthcare, Patients' data security, Interoperability, Healthcare process integration, and Utilisation of valuable legacy systems and new technologies. In addition, ERP can provide numerous benefits to health care organization. Human resource can benefit from ERP implementation due to centralized scheduling. In addition, billing, laboratory, pharmacy and patient records can help in the anticipation of internal workflow (Jenkins and Christenson, 2001).

Technology is propelling the world-wide advancement of health care offering the greatest opportunity to implement best practices, utilize evidence-based medicine, reduce human error,

improve efficiency, compile comprehensive health data sources, and provide minimally invasive care tools. It removes access to expertise barriers through tele-health and telemedicine. ERP systems can rapidly convert from analogue to digital distribution of information. In the future, all information and communication will convert to digital format in which the Internet will link millions of providers, services, and settings link seamless web of care.

Special applications, such as patient management, patient logistics, hospital finance and general management, have been developed so that the ERP system fits with the hospital setting. There are a number of reasons why hospitals differ from other industries, and these may have implications for the implementation and use of an ERP like any other needs of hospitals are diverse, they aim at curing and caring for patients, as well as training and educating new doctors and nurses. It's true that the hospital processes are different in that they are highly varied and more complicated than processes in many other industries (Arrow, 1963).

The workforce of hospitals is diverse and includes a large spectrum of professionals that can be characterised by possessing expertise, power and autonomy (Johnson, 1972; Scott, 1982; Mintzberg, 1983; Raelin, 1991; Yi et al., 2006). We assume that these specific characteristics impact the implementation and use of ERP systems. Differences in the nature of the processes may have implications for the implementation and use of IS within a hospital context. Heeks (2006: 127) argues that 'hard design' often conflicts with 'soft design'. Hard design can be characterised by a top-down approach, with formalised communication flows and a 'big bang' implementation. Soft design, on the other hand, is more informal and involves a rather loose 'muddling through' approach.

ERP is designed to operate the entire healthcare functionalities and all related activities including finance, materials management, human resources, and decision support. ERP (i.e. Enterprise Resource Planning) is a derivative of "Manufacturing Resource Planning", which has become an

old term because industry professionals were not being successful with it due to the limitations of the software tools which existed at that time. Healthcare in counties will have the ability to transform how care is offered, such in the future will become a global industry, competitive, where patients will utilize the best service medically, practitioners and facilities in the world. With the transformation into an ERP system, a healthcare organization has the opportunity; perform in terms of service delivery.

### ***ERP benefits to health care***

The ERP provides an effective solution to hospitals that plan to reduce the costs of administrative and clinical transactions, and at the same time, provide better service to their consumers. It aids hospital administrators by significantly improving operational control and streamlining operations. It enables improved response to demands of patient care because it automates the process of collecting; collating and retrieving patient information. Clinical pathways mapped to the system improve diagnoses and treatments offered. It provides doctors and hospital staff with the decision support system that they require for delivering patient care, which is comparable to global standards .By enabling an automated and intelligent flow of patient information, the ERP enables hospitals and doctors to better serve their patients. Additionally, the ERP provides a host of direct benefits such as easier patient record Management, reduced paperwork, faster information flow between various departments, greater organizational flexibility, reliable and timely information, minimal inventory levels, reduced wastage, reduced waiting time at the counters for patients and reduced registration time for patients. The indirect benefits would be an improved image of the hospital and increased competitive advantage. The System not only provides an opportunity to the hospital to enhance their patient care but can also increase the profitability of the organization



## **2.5 Information Systems (HIS) in private health facilities in Uganda**

A huge number of healthcare service providers in Uganda are Small and Medium Healthcare Enterprises (SMHEs) with employees ranging from 5 to 100. Information Systems (HIS) used in healthcare units in Uganda include patient records management systems, decision support systems, drug monitoring and control systems, mobile technologies, electronic mail, enterprise resource planning systems and several other office automation systems. Healthcare HIS offer several benefits towards service delivery in Uganda including easy record keeping, enhancing communication, performing simple calculations, supporting decision making, gaining competitive advantage, better management of chronic diseases, faster retrieval of records, improving process flow and increasing productivity. Irrespective of the benefits mentioned, HIS failure continues to be high in Uganda. Amanyire *et al.* (2010) studied HIS failures in three Small and Medium Enterprises (SMEs) clinics in Uganda and established that the major causes of failure include skills deficiency in usage of computers, resistance to change, inadequacy of necessary information system infrastructure, high cost of information system infrastructure, poorly designed HIS, concerns raised by patients and general community about privacy of their information.

### **2.5 Brief background of the cases.**

The private health facilities selected for this study are Nakasero Hospital Limited (NHL) and International Hospital Kampala (IHK). The two were selected as a representative of the entire population of the private health facilities in Uganda that have adopted and implemented ERP system. NHL has implemented Medi 360 ERP system where as IHK has implemented Navision which was originally an accounting software that has been buffered up to become a comprehensive ERP.

Below is a brief background of the private health facilities selected for this study.

**a) Nakasero Hospital Limited (NHL)**, commonly referred to as Nakasero Hospital is a major private hospital based in Kampala, Uganda. Operating out of centrally located and modern facilities, NHL provides general and specialist medical services. NHL commenced business in March 2009, offering out-patient services, with in-patient services commencing in July 2009. NHL is owned by corporate investors together with a number of consultant doctors practicing at the hospital. The objective of the founders was to provide high quality and affordable medical care by leveraging skills of highly trained Ugandan consultants with access to state of the art equipment and technology, which before the establishment of NHL, were not available in Uganda, thus bringing quality healthcare closer to users who would otherwise have had to travel abroad for medical care. The hospital caters for communities in Uganda and the Great Lakes region and is run by experienced, committed teams of consultants, physicians, nurses and administrators as well as a dedicated team of support staff.

**b) International Hospital Kampala (IHK)** is located in Namuwongo in Makindye Division, in southeast Kampala, about 6 kilometers from the central business district of the city. IHK became operational in 2000. Its founder, Dr. Ian Clarke, a general practitioner and tropical medicine specialist, born in Northern Ireland, first hosted the hospital in leased premises in Old Kampala, until the first phase of the current Namuwongo premises were completed in 2006. The facility along with its sister institutions, together known as the International Medical Group (IMG) offer outpatient services, accident and emergency, inpatient services, theatre, diagnostics and intensive care. IMG is on the journey to provide a world class medical services that are sustainable using the latest models of technology to ensure best service delivery in the region.

## **2.7 Summary of literature review**

The few empirical studies that examine the contribution of ICT adoption to financial performance indicate the potential for positive results. However, such studies say little about which factors are important in which settings and the detailed mechanisms by which they combine. Synthesizing the findings of quantitative and qualitative empirical research, it is clear that complementary organizational resources such as workplace practices, change initiatives, and culture all interact with ICT adoption in the process of value generation and performance improvement. It is unclear however, which organizational practices are most synergistic with which types of ICT adoption in specific organizational contexts.

## **2.8 Conclusion**

This chapter discussed the related literature of the role of ICT adoption on the performance of private health facilities. The review was guided by sub-themes according to the study objectives namely: expected benefits of ICT adoption in health care, measurement of the impact of ICT adoption on financial performance of private health facilities, research data collection and analysis and reporting research finding. This detailed review of related literature gives a strong basis to the next chapter on the research approaches and methods to be adopted for this study

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter discusses the methodology and procedure that was employed in the study. It covers the research design, study population, sample size and selection, sampling techniques and procedure, data collection methods, data collection instruments, data quality control (validity and reliability), procedure of data collection, data analysis, ethical considerations and limitations of the study.

#### **3.2 Research Design**

A multi-case study research design was adopted for this study because this design is considered ideal as it allows studying a particular phenomenon in detail (Amin, 2005). Descriptive design approach of the case study was used for this study because it gives a description of the state of affairs, information about people's attitudes, behavior, practices, opinions and system's performance and processes. A triangulated approach of both qualitative and quantitative approaches was used to allow the study arrive at empirical evidence and help to understand the study in depth and in its natural setting, appreciating its complexity and context.

#### **3.3 Area of study**

The study was carried out in the central region of Uganda, in the district of Kampala. Two (2) private health facilities namely International hospital Kampala (IHK) and Nakasero Hospital Limited (NHL) were studied in detail for this study.

### **3.4 Research Framework**

This study adopted the generic framework suggested by Dehning and Richardson (2002) as guidance for the evaluation of ERPS performance. This framework classifies existing research on IT-performance measurement using 5 paths well demonstrated in the previous chapter 2: Literature review. This research focused on the path 1 and 2 because of the time limitation, scope of the study and financial constraints

Path 1 evaluates the effects of Information and communication technology on the firm's performance and path 2 evaluates the effects of Information and communication technology on the performance of a firm's business processes.

### **3.5 Study Population**

This study was conducted in the various departments of the selected private health facilities and the categories studied include unit managers, administrators, Facility operational staff/System users and monitoring and evaluation officers. The above categories were chosen because they are the key implementers of improvement initiatives, and are directly interact with the functionality of the ERP systems.

### **3.6 Sampling procedures**

#### ***3.6.1 Sample Size and Selection***

Amin describes a sample as a collection of some elements of the population (Amin, 2005). Sliven's formula of  $n = N / (1 + Ne^2)$  was used to determine the sample size (Miaoulis and Michener, 1976). Where  $n$  = sample size,  $N$  = population size,  $e$  = sampling error and the confidence level was 95%. The sample size for the study was 235 respondents out of the total 455 target population as indicated in table below.

### **Resultant Sample Size as determined by Slovene**

Category	Total population	Targeted Sample size	Sampling technique
Facility managers	10	6	Purposive sampling
Facility administrators	15	10	Purposive sampling
Facility operational staff/System users	535	213	Simple random sampling
Facility Monitoring and evaluation officers (M&E)	10	6	Purposive sampling
<b>Total</b>	<b>570</b>	<b>235</b>	

*Table 3.1 showing the resultant Sample Size as determined by Slovene*

#### **3.6.2 Sampling techniques**

Sampling techniques included both probability and non-probability sampling. Purposive, stratified and simple random sampling were used to obtain a representative sample. Purposive sampling applied to unit managers, M&E officers and administrators. Stratified sampling was used to sample Facility operational staff/System users by dividing them into two strata from each of the health facilities under study. This technique was preferred because it is used when the population is not homogenous and it ensures fair representation of the population (Sekaran, 2003). In each stratum, simple random sampling was used to select the required number of respondents to participate in the study.

#### **3.7 Data Collection Methods**

Data collection methods comprised of questionnaire survey, interview and document review. A questionnaire was used to get information from the administrators and some facility staff. Interview method was administered to Facility operational staff/System users. Document review involved critical examination of public or private recorded information related to the study.

### **3.8 Data collection instruments**

#### ***3.8.1 Questionnaire***

The questionnaire presented four parts that had both open ended and close ended questions to ease respondents' effort in answering and minimize the subjectivity. Responses from facility administration and some beneficiaries were obtained using questionnaires. The instrument was standardized allowing flexibility in answering of the questions.

#### ***3.8.2 Interview guide***

An interview guide is a set of questions that the interviewer uses when interviewing (Mugenda and Mugenda, 2005). The interview guide with open ended questions was used to give detailed information to supplement data that was obtained from the questionnaire. The instrument was administered to some facility staff and administrators of facilities.

#### ***3.8.3 Documentary Review Guide***

A checklist was developed to guide the document review. The review included; newsletters, journals, performance reviews, systems assessment reports, monitoring reports, conference papers, user manuals, related research papers, published books and recognized Websites.

### **3.9 Quality control methods**

Quality control and assurance of the data collected involved the following:

After each day of data collection, the questionnaires were edited and cleaned readying them for data entry. Missing information or inconsistencies were identified where appropriate, follow up interviews were conducted to clarify or correct the inconsistency or missing ness. This follow-up process took the form of a telephone conversation.

Consistency in terms of interpretation and contextual presentation of information was also emphasized.

### **3.10 Data management and processing**

#### ***3.10.1 Data management***

The data collected from the study was checked for completeness first. After checking, the data was coded i.e. was given unique identifiers to identify each during analysis. Data was then entered into an electronic database and cleaned to get it ready for analysis.

#### ***3.10.2 Data Analysis***

##### *Quantitative Analysis*

Quantitative analysis of data collected from the questionnaire was done using Statistical Package for Social Scientists (SPSS). Descriptive analysis of frequencies and percentages were conducted to describe the characteristics of responses.

##### *Qualitative Analysis*

Mugenda asserts that qualitative analysis of data refers to non-empirical analysis. (Mugenda et al 2003). Data collected using face to face interviews was analyzed qualitatively using descriptive method based on themes to be able to distinguish the responses by the use of codes and then establish the relationship among these themes and come up with in-depth explanation and interpretation.

### **3.11 Ethical considerations**

*Informed consent:* All the persons who took part in this study did so at their own will. Participants taking part in the study were given a briefing about the study, the benefits and risks



of the study, their contribution and they were asked for their consent before taking part in this study.

*Privacy and confidentiality:* The researcher ensured that all the information gathered during and after the study was protected privately with integrity and confidence. After data collection the information was entered into an electronic database and access controls implemented and enforced to allow access only to the researcher and the database operator.

*Anonymity:* The study only used codes and unique identifiers to identify information collected during the study. This helped keep participants' names off any study documents and kept all the information providers anonymous.

*Researchers' responsibility:* The researcher had the over role responsibility of keeping the study as ethical as possible by ensuring that all the ethical issues are abided with.

### **3.12 Limitations of the study**

The study has a number of limitations from the time available to carry on the research to the sample size and scope of the study. The time available is less than twelve (12) months and this time is too short to follow the trend of performance change in a given situation. The sample size of the study is small because mainly of financial constraints and this might not give the best representation of the total population of the study.

### **3.13 Conclusion**

The chapter discussed the methodology and procedure that was employed in the study. It discussed in detail the research design, study population, sample size and selection, sampling techniques and procedure, data collection methods, data collection instruments, data quality control (validity and reliability), procedure of data collection, data analysis, ethical considerations and limitations of the study.

## **CHAPTER FOUR**

### **RESEARCH FINDINGS**

#### **4.1 INTRODUCTION**

This chapter presents the finding of this research. The findings are categorized according to specific objectives to answer the research questions and the two paths of the framework used in the study. Presentation of the data in this chapter does not follow a sequence of how this research was carried out in terms of research tools used and the respective findings and the framework that guided this study but rather it follows the stated themes in form of research questions answered by this research. This research's main goal was to investigate the contribution of ERP system adoption to financial performance of private health facilities in Uganda. To achieve this goal, the researcher set out three specific objectives and research questions that were answered by the data gathered for this research.

#### **4.2 RESEARCH APPROACH**

##### *4.2.1 Case Study Design*

A multi-case study research design was adopted for this study because this design is considered ideal as it allows studying a particular phenomenon in detail (Amin, 2005). Descriptive design approach of the case study was deployed for this study because it gives a clear description of the cases being studied in terms of processes, information about people's opinions and systems and system's performance in relation to the financial performance and processes. A triangulated approach of both qualitative and quantitative approaches was used to allow the study arrive at empirical evidence and help to understand the case studies in depth.

##### *4.2.2 Case Studies*

This study was carried out in two health facilities, both located in Kampala district, central region in Uganda. The facilities are; International Hospital Kampala (IHK) and Nakasero

Hospital Limited (NHL). The two facilities have both adopted and implemented ERP systems for their organisational management of resources and processes. IHK has employed Navision from Microsoft whereas NHL has employed MED360 a web based ERP system.

This study mainly focused on how both ERP systems contribute to financial performance zeroing on facility's operational functions and resources and service delivery to the clients. It concentrated on the systems' functionality, capabilities, users' opinions and the facilities' financial performance.

### **4.3 ANALYSIS OF THE CURRENT SYSTEMS**

#### *4.3.1 IHK with Navision from Microsoft*

Microsoft Dynamics NAV is a complete enterprise resource planning (ERP) software solution for mid-sized organizations that is fast to implement, easy to configure, and simple to use. Right from the start, simplicity has guided and continues to guide innovations in product design, development, implementation, and usability. Facility Management in NAV 2009 gives organizations an efficient way to control their management processes by providing visibility and insight into performance and actual costs of operations of all departments, services and projects. Microsoft NAV 2009 delivers compelling application functionality that helps businesses gain greater control of their business through increased visibility and insight into how the business is performing.

## **Key Software Features**

Microsoft NAV 2009 delivers integrated functionality to provide support for financial management, Supply chain management, Manufacturing, Distribution, Customer relationship management, Sales and marketing, Service management, Human resource management, Project & Resource management and Warehouse Management Architecture

## **Software Environment**

The Microsoft Dynamics NAV software is composed of three major components:

The Database Server that runs that databases and responds to requests and processes on the data base. A database that stores the Microsoft Dynamics NAV data (NAV 2009 only uses the Microsoft SQL Server) the Application Server (starting from NAV 2009 RTC), a service that controls all aspects of Microsoft Dynamics NAV's operation

The Client(s); the actual user interface into Microsoft NAV. NAV 2009 includes three clients: Windows client; this is a stand-alone client mostly used on desktops that run the system SharePoint client; this client is used within a local area network of the organisation where NAV 2009 is being used. Web client; this is used over a wide area network or the internet.

## **Software Functionality**

Microsoft NAV 2009 delivers simple-to-use business management functionality for small and midsize businesses. The Microsoft NAV 2009 at IHK has been customized with the following functionalities. Budgets/estimates, clinic and patient records management, interaction/document management, automated stock data capture, standard cost worksheet, internal picks and put

aways, service tracking and contact classification, calendars, customer relations add-on solutions, cash flow projections and many others.

## **Financial Management**

### *Cash flows*

Understanding cash inflows and outflows is the key to running a successful business. Measurement of cash flow is not always easy. However, Microsoft Dynamics NAV provides tools to make this easier. One creates a periodic calculation of the forecasted operational revenues and expenses to calculate the cash surplus or the cash deficit. According to these results, the company can take adjustment measures, such as credit reduction for a surplus, or borrowing if there is a deficit.

In forecasting, one can incorporate values from the General Ledger, Sales and Marketing, Purchasing, and Service, set up your own chart of cash flow accounts.

From the General Ledger, one can get information about the liquid funds and the budgeted values of your company and from Purchasing, one get information about the current payables and any forecasted debts from open purchase orders.

### *Cost Accounts*

In cost accounting, one allocates budgeted and actual costs of operations, departments, products, and projects to analyze the profitability of your company. Cost accounting has the following main components:

Definition of cost types, cost centers, and cost objects to analyze what the costs are, where the costs come from, and who should bear the costs. One defines chart of cost types with a structure and functionality that resemble the general ledger chart of accounts. Cost centers are departments and profit centers that are responsible for costs and income. Cost objects are products, product

groups, or services that carry the costs in the end. You often link cost centers to departments and cost objects to projects in the hospital.

Cost budgets work similarly as general ledger budgets. one can transfer the general ledger budgets, import and export budgets to and from Excel, or create own cost budgets.

Allocations move costs and revenues between cost types, cost centers, and cost objects. Each allocation consists of an allocation source and one or more allocation targets.

Most reports and statistics are based on the posted cost entries. One can set the sorting of the results and define with filters which data must be displayed. creating reports for cost distribution analysis.

### *Taxation and Tax Reports*

The tax authorities require that one submit periodic reports of transactions that include VAT. In Microsoft Dynamics NAV, in the tax Report window, one can define these reports just like creating documents such as orders, invoices, and credit memos. One fills in the lines based on tax entries, and then export the tax report to the appropriate authorities. Depending on the type of tax report that one set up, the report can be exported in different formats.

## **Supplies and Inventory Management**

### *Supplies management*

Supplies movement is an activity that is used to move items to and from internal departments, such as stores and operations departments, where posting of the items like drugs, medical equipment occurs as consumption, utilisation and dispensing.

Supplies movements resemble existing supplies picks and put-aways with the following features;

Each supply movement includes both a pick and a put-away, which are represented by a take line and a place line and supply movements cannot be posted. They can only be registered as store entries. However, the related source document is updated when a supply movement is registered.

### *Dedicated Bins*

To manage the flow of items in and out of an internal operation area, there set up locations or machine and work centers with a default bin structure that communicates to store workers where to place components for a particular operation. Although the items are placed in bins in internal operation areas, they are still part of availability until consumed. To secure bin content for the particular department where they have been placed, such as avoiding that they are consumed by another department, set up of the bin to Dedicated sectors is done, which makes it unavailable to other department.

### *Inventory*

Microsoft Dynamics NAV has several enhanced features to manage inventory. These are; Item Availability by Event, Item Availability by Timeline and Item Availability by BOM Level.

The *Item Availability by Event* window shows projected inventory figures by demand or supply event. The window only has information about the dates when figures change because of an event. One can filter the Item Availability by Event window to also include forecasted figures and planning suggestions.

The *Item Availability by Timeline* window provides a graphical view of an item's projected inventory based on future supply and demand events, including planning suggestions. The result is a graphical representation of the inventory profile. One can change the quantity and due date of suggested supply orders by using drag-and-drop editing in the graphical view and then save the changes to the planning worksheet.

The *Item Availability by BOM Level* window provides availability figures for bills of material that tell how many units of a parent you can make based on the availability of child items at lower levels. Any item that has a BOM structure, assembly BOM, or production BOM, is shown in the window as a collapsible line, which you can expand to see the underlying components and any lower-level subassemblies with their own collapsed BOM structure.

### *Supply Planning*

To obtain a rational supply plan, a planner must adjust planning parameters to limit rescheduling suggestions, to accumulate demand and to avoid insignificant planning actions.

Microsoft Dynamics NAV has five reorder period fields added to the item card planning parameters to help optimize when and how much to reorder. These fields are Time Bucket, Rescheduling Period, Lot Accumulation Period, Dampener Period and Overflow Level.

To avoid stock-out and to reduce both ordering costs and inventory costs, one must define the correct setup values in the planning system from the start. The figure below shows a sample chart report from the order management module



## Snapshot from the order management module.

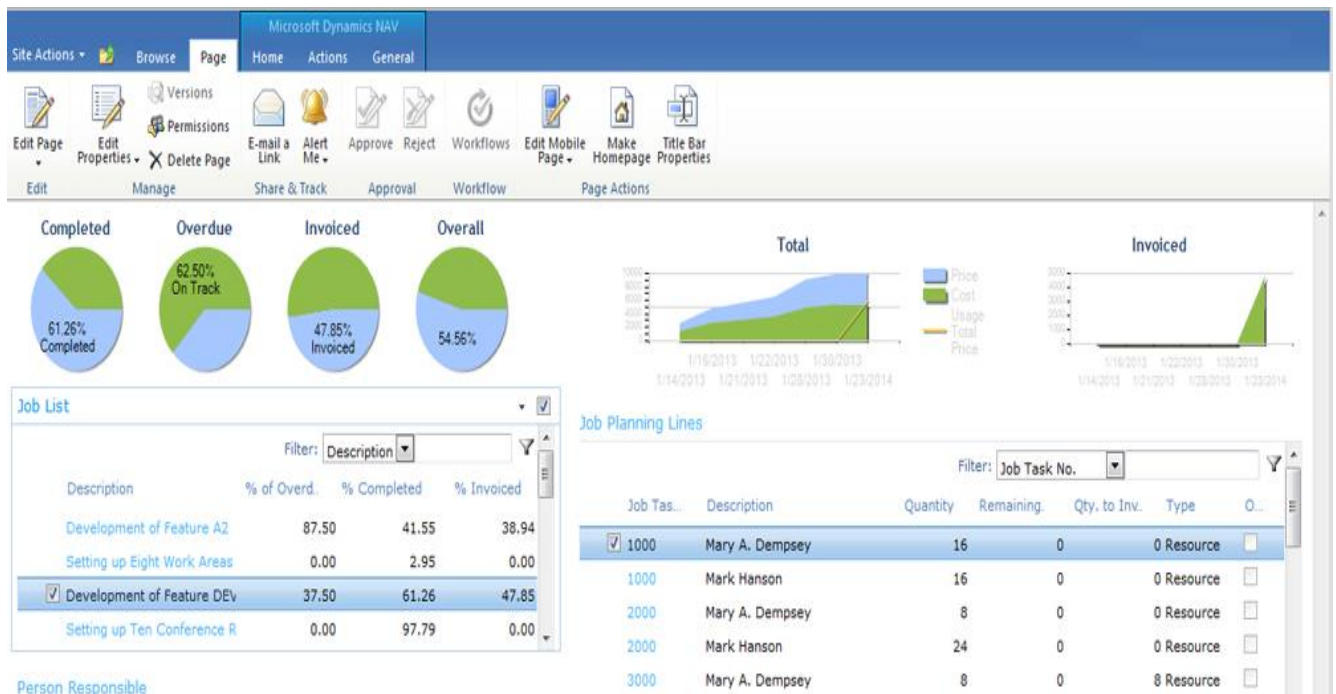


Figure 4.1 showing a sample page from the order management module

## Operations management

In Microsoft Dynamics NAV has several features of jobs and project management.

### Work in Process

Tracking work in process (WIP) is a critical aspect of jobs and project management. To make monitoring easier and to improve the interaction with financial reporting, Microsoft Dynamics NAV has the following features:

Jobs setup is expanded to include options to control the treatment of WIP in all jobs. For example, one can specify that a WIP method that has been defined be the default for the hospital. Nurses and clinicians track and perform WIP calculations one location. From here, one can calculate and post WIP to the general ledger and show any warnings if there are problems with a WIP calculation.

## Time Sheets

Time sheets in Microsoft Dynamics NAV manage time collection in weekly increments of seven days. They are used to track the time that is used on a job, service order, or assembly order. In addition, they are used to record simple resource time registration. Resource managers and project managers review and approve time allocation using time sheets and then follow up with posting with duty rosters. Below is a sample snapshot of the staff timesheet management page

### Sample sample snapshot of the staff timesheet management page

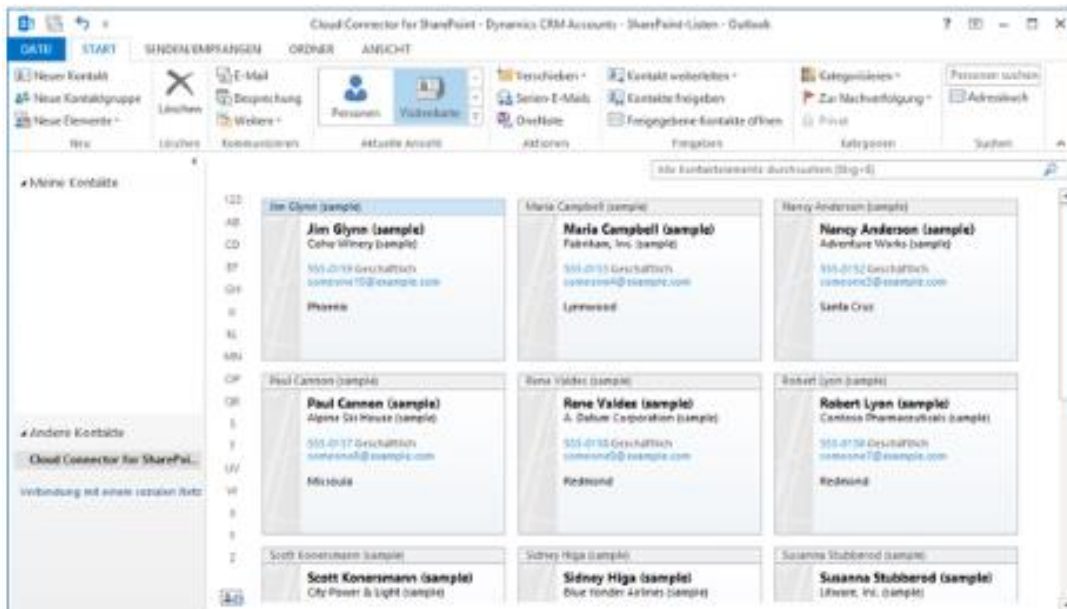


Figure 4.2 showing sample snapshot of the staff timesheet management page

## PAYMENT SERVICES

Microsoft NAV enables customers to pay for their hospital bills with credit cards onsite and online. Receiving and processing online credit card payments for online payments provides flexibility and faster payments. The online credit card payment feature automates authorizing credit card amounts at the time of billing and processing the actual charge when the bill is invoiced.

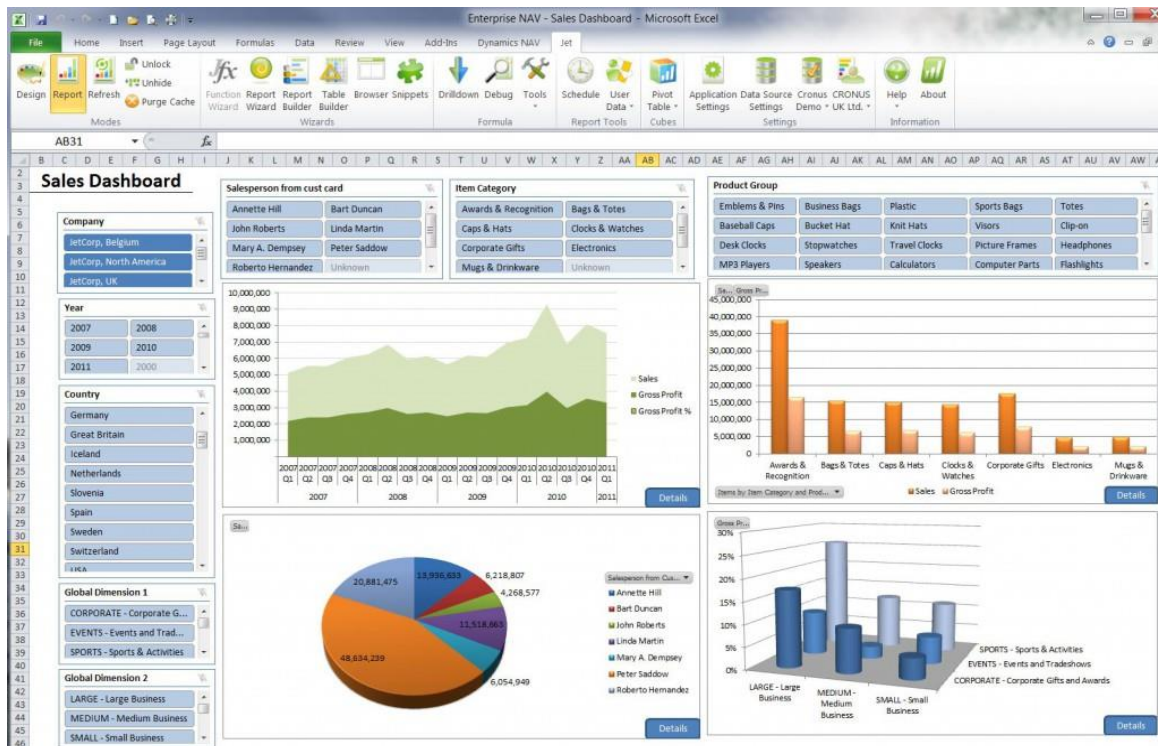
## BUSINESS INTELLIGENCE

### *Excel Integration*

Microsoft NAV integrates with Microsoft Excel to produce Excel-based reports that use NAV pages as data sources. The data in Excel is provided in a data region format so that it creates PivotTables and reports. Data can be refreshed in Excel to reflect updates that are made in NAV.

The figure below shows a snapshot of data from NAV database being displayed in an excel sheet.

**Snapshot of data from NAV database being displayed in an excel sheet.**



*Figure 4.3 showing data from NAV database being displayed in an excel sheet.*

### *OneNote Integration*

Microsoft NAV includes integration with Microsoft OneNote. It enable OneNote integration on a per-role basis in profiles.

## **SECURITY FILTER MODES**

Record-level security limit the access that a user has to the data in the database tables. This is implemented by record-level security by setting security filters on table data. In some cases, setting security filters cause unexpected behavior when a user performs an action in the application. This conflicts can be resolved with security filters and specifying the behavior by setting a new SecurityFiltering property on record objects, which include both explicit record variables and implicit records on pages, reports, or XMLports. The SecurityFiltering property specifies how security filters are applied. Below is a snapshot of an account creation page. Accounts creation is a security measure on access of data and data processes.

### **Snapshot of an account creation page**

Dynamics CRM Accounts	
<b>Data Entity Title</b> Please enter a title for current data entity.	<input type="text" value="Dynamics CRM Accounts"/>
<b>Entity Type</b> This is the role of your entity. You can change the synchronization direction in the connection settings.	<input type="text" value="Source"/>
<b>Data Provider</b> Select your data provider from the list of installed drivers.	<input type="text" value="Layer2 Data Provider for OData"/>
<b>Connection String</b> More Information about the Layer2 Data Provider for OData you will find <a href="#">here</a> . See <a href="#">FAQs</a> for step-by-step guides and release notes.	<input type="text" value="Uri=https://yourCompany.crm4.dynamics.com/XRMService/2011/OrganizationData.svc/Collection=AccountSet;Authentication=DynamicsCrmOnline;User=username@company.com"/> <input type="checkbox"/> Encrypt <a href="#">Verify Connection String</a>
<b>Password</b> Password to use for authentication.	<input type="password" value="*****"/>
<b>Select Statement</b> Please enter here your SQL query if required. Visit <a href="#">here</a> about general SQL information.	<input type="text" value="\$select=*"/> <input type="checkbox"/> Encrypt <a href="#">Verify Select Statement</a>
<b>Primary Key(s)</b> Please enter primary key column(s) if not automatically set e.g. Col1, Col2 and verify.	<input type="text" value="AccountID"/> <input type="checkbox"/> Encrypt <a href="#">Verify Primary Key</a>

Figure 4.4 showing a snapshot of an account creation page.

## MICROSOFT NAV ADMINISTRATION

Microsoft NAV includes a Server Administration tool for administering Microsoft NAV Server.

The Server Administration tool is a snap-in for the Microsoft Management Console. When installed, the Server Administration tool is a default feature for server administration. The figure below shows a snapshot of the database administration page

### Snapshot of the NAV SQL Database Administrative Page

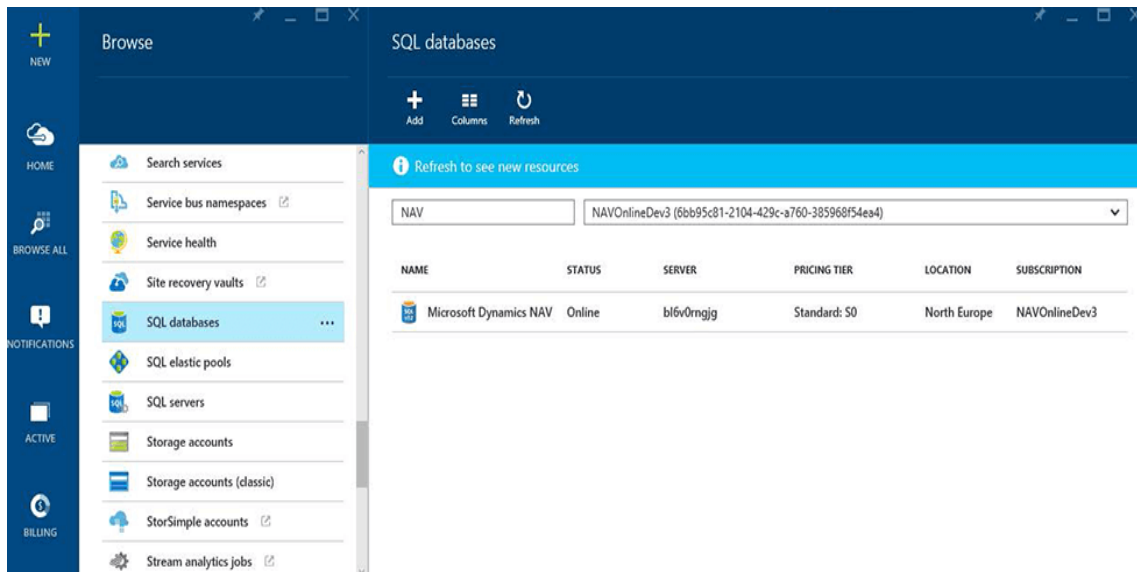


Figure 4.5 showing the NAV SQL Database Administrative Page

### 4.3.2 NHL with MED360

MED360 is multi-purpose software used to manage health facilities, Polyclinics and Multi-Specialty Clinics. It is complete with tools to manage all facility departments. The MED360 functionalities run from doctor's consultation to laboratory tests, to prescriptions and finally itemized billing with checks and measures at each and every stage. MED360 was developed by Kingdee Software Company in China and is distributed by WY Technology Company; a business partner of Kingdee in US and Europe Market.

### Key Software Features

Appointments, Registration, Clinical investigations, Online prescriptions, Reporting, Patient records, online EMR, Referrals, Pharmacy management, Laboratory management, Management reports, Graphical reports, Patient statistics, MOH reporting, Accounts and Inventory

## **Software Environment**

MED360 is customized for any medical specialty dealing with Patients and comes with specially designed Templates. It runs on any PC running Microsoft Windows, Ubuntu, Linux or MacOS with medium-end desktop system. MED360 runs on multiple machines across the health facility and all data is shared across the setup.

## **Software Functionality**

The administrative modules help manage the doctor fees, Pharmacy, Laboratory, inventory, accounts, referrals and patient profiles. The OPD visits are handled by the visit manager using a structured reporting system. The simple user interface eases cumbersome tasks saving time and improving productivity.

The OPD manager manages the patients by taking them through a simple and easy registration process with simple workflow to doctor consultation with online prescriptions and tests. The quick access to itemized billing makes billing error free for the clinical staff.

## **Sample modules from the MED360**

### *Patient management module*

This module is mostly used by the billing, care management and the hospital administration departments. It is used for patient registration, monitoring and reporting and everything concerning patients' details. The screenshot in below shows a patient registration interface which is used to capture all the necessary details about the patient.

## Patient registration interface

The screenshot displays the 'New Patient Registration' form within a software application. At the top, there is a navigation menu with tabs for Home, Masters, IP Masters, Patients (selected), Inpatient, Cashier, Lab, Radiology, and Services. Below this, there are sub-tabs for Amendment, Accounts, Stock, Purchases, Pharmacy, eRecords, Reports, File Uploads, and IP Reports. The main form is titled 'New Patient Registration' and is organized into several sections:

- Registration Fields:** Includes dropdowns for Type, Sub Type, and Account; text boxes for Copy, Bill Type, and Limit; a dropdown for Gender; and text boxes for DOB, Age, First Name, Middle Name, Last Name, and National ID.
- Personal Details:** Includes dropdowns for Marital Status and Blood Group; text boxes for Address 1 and Address 2; and dropdowns for City and Country (set to KENYA).
- Contact Details:** Includes text boxes for Home No., Mobile No., Email Id 1, and Hot Lin; a dropdown for Promotion; and text boxes for Address no. and Email Id 2.
- Misc Details:** Includes text boxes for Reg Code (VH-1292), Reg Date (2014-11-03), and Reg Time (14:09:19); a file upload button for Photo; and a 'No file chosen' message.

At the bottom of the form, there are four buttons: 'Save Registration (Alt+S)', 'Save & Go OP Visit (Alt+O)', 'Save & Go IP Visit (Alt+I)', and 'Reset (Alt+R)'.

Figure 4.6 showing the patient registration interface.

### Cashier Module.

This is a module designed with the primary capability of making payments. Cashier's interface enables users to make payments using modes of cash, direct transfers, insurance or credit cards and generate reports on payments.

The cashier interface contains a tab for searching the users and making payments depending on the prior agreements on the mode with the clients. To make a payment, a client must be selected in the search results. The number of clients to display in search results can also be limited by the administrator's settings.

The users' rights determine the level of access to the set clients. This is limited and is not to be accessed by all the users under the cashier module. Cashier's interface supports the report on



payments made. The reports on payments can only be viewed by the few permitted persons according to the administrator’s custom settings.

### Cashier’s interface

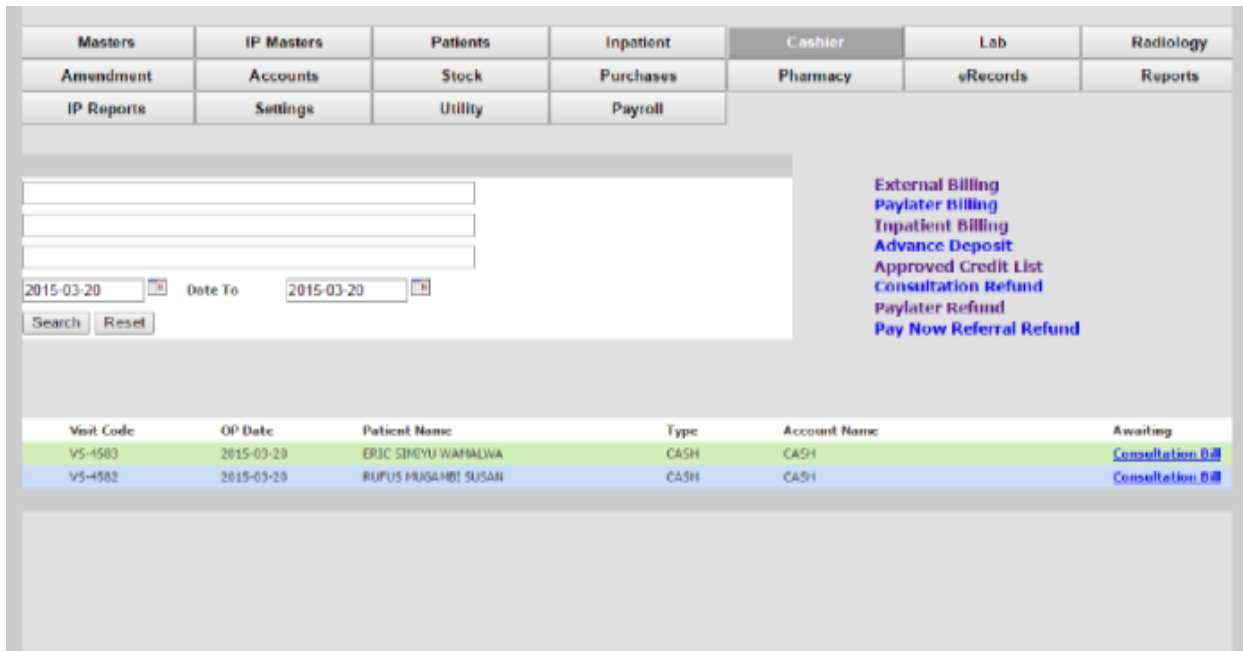


Figure 4.7 showing Cashier’s interface

### Stock Module

This module was mainly designed for monitoring of supplies, proper allocation of various supplies, real-time administration of inventories in the stores and tracking shelf life of stock.

The stock control module automatically updates for any medicines dispensed. Each action within the other related modules will automatically update related stock levels, keeping stock figures accurate and up to date without the need for manual data entry. The figures below show samples of an interface from the stock module.

## Index interface of the stock module

MED360 TONNY.OLANYA Thursday, August 11, 2016 19:16:58

Home Masters IP Masters Patients Inpatient Cashier Lab Radiology  
 Services Amendment Accounts Stock Rate Templates Purchases Pharmacy eRecords  
 Reports IP Reports Settings Payroll Budget Help Cafeteria

Stock Taking Location Nakasero Hospital Limited

Location: Nakasero Hospital Limited  
 Store: ACCIDENT AND EMERGENCY STORE  
 Doc No: SA-402  
 Search Reset

No.	Item Name	Exp Date	Batch	Phy Qty	Select All
1	AMBU.BAG.CHILD	2020-12-01	170616		<input type="checkbox"/>
2	CONDOM CATHETERS LARGE	2019-04-01	6092		<input type="checkbox"/>
3	HUMIDIFIER BOTTLE	2022-12-01	222		<input type="checkbox"/>
4	AIRWACY GUEDEL 3	2018-12-01	120		<input type="checkbox"/>
5	ALCOHOL SWABS	2020-08-01	2023501		<input type="checkbox"/>
6	APRON PLASTIC RE USABLE	2021-12-01	170617		<input type="checkbox"/>
7	BACTIGRAS (PARRAFING)10 X 10CM	2016-09-01	133905		<input type="checkbox"/>

Figure 4.8 showing the Stock management module index

## Stock management interface

MED360 TONNY.OLANYA Thursday, August 11, 2016 19:16:24

Home Masters IP Masters Patients Inpatient Cashier Lab Radiology Services  
 Amendment Accounts Stock Rate Templates Purchases Pharmacy eRecords Reports IP Reports  
 Settings Payroll Budget Help Cafeteria

Opening Stock Entry Stock Taking Closing Stock Report Stock Movement Report Expiry Stock Report Stock - By Item Stock - By Date  
 Stock - By Category Item to Supplier Mapping Stock Adjustment Stock Adjustment Report Stock Variance Add Opening Stock Entry View Opening Stock Entries  
 Store Stock Transfer Stock Cost Of Purchases Stock Cost Of Sales Stock Transfer Report Current Stock Revenue

Figure 4.9 showing the Stock management module

## Reports Module

The reports module provides a user interface that outlines reports from all the system's modules. This module is accessed and viewed by only the authorized users who are mostly involved in management and decision making. The reports generated from this module can be further analyzed because there are two format options to generate report i.e Pdf file or Microsoft excel file format.

### The reports module index interface



Figure 4.10 showing the reports module

The sample modules discussed above are the commonly used one on the day-to-day operations of a health facility. The MED360 has many more modules that cover all the businesses processes of a health facility.

#### 4.4 DATA COLLECTION

The data collected and used in this study was majorly qualitative and this was supported by a minor quantitative data to help give a clear explanation and evidence of the qualitative statements.

The study focused on two private health facilities ie Nakasero Hospital Limited (NHL) and International Hospital Kampala (IHK). Both qualitative and quantitative data was collected from the two facilities. Methods of reviewing literature and conducting interviews were used to collect data. The interviews conducted were both physical and telephone interviews. The populations from the two facilities were big and this research used purposive sampling to get a small representation of the big population.

The targeted sample size was 235 that included managers, administrators and other beneficiaries. 193 of the respondents responded out of the 235 that constituted the target population, giving a response rate of 82%. According to Mugenda and Mugenda (2003) a 50% response rate is adequate, 60% good and above 70% rated very good. This also concurs with Kothari (2004) assertion that a response rate of 50% is adequate, while a response rate greater than 70% is very good. This implies that based on this assertions; the response rate of 82% for this study is very good.

##### Summary of the response rate

<b>Category</b>	<b>Targeted Sample size</b>	<b>Respondents reached</b>
Facility managers	6	4
Facility administrators	10	7
Facility operational staff/System users	213	177
Facility Monitoring and evaluation officers	6	5
<b>Total</b>	<b>235</b>	193 (82%)

*Table 4.1 showing a summary of the response rate*

## **4.5 DATA ANALYSIS**

Since the study had both qualitative and quantitative data collected, analysis was done for both data categories.

### *4.5.1 Quantitative analysis*

Quantitative analysis of data collected from the questionnaire was done using Statistical Package for Social Scientists (SPSS). The answered questionnaires which were returned were coded first with unique codes to ease the data entry and tracking. The data was then cleaned up and follow up made for the necessary clarifications to correct any errors identified. Each question was then given a variable name to aid in the analysis. The data was then entered into SPSS and descriptive analysis of percentages was conducted to describe the characteristics of responses.

### *4.5.2 Qualitative Analysis*

The data collected using face to face and telephone interviews were analyzed qualitatively using descriptive method based on themes created. Different codes were also employed to be able to distinguish the responses and then establish the relationship among these themes. These were then used to come up with in-depth explanation and interpretation.

## **4.6 PRESENTATION OF RESEARCH FINDINGS**

The main objective of this research was to further extend the investigation in the contribution of ERP system adoption to financial performance by reviewing related literature and carrying out a detailed field study on the contribution of ERP systems to financial performance of private health facilities in a developing context. This objective was split into three specific objectives and the presentation of research findings will be based on these specific objectives.

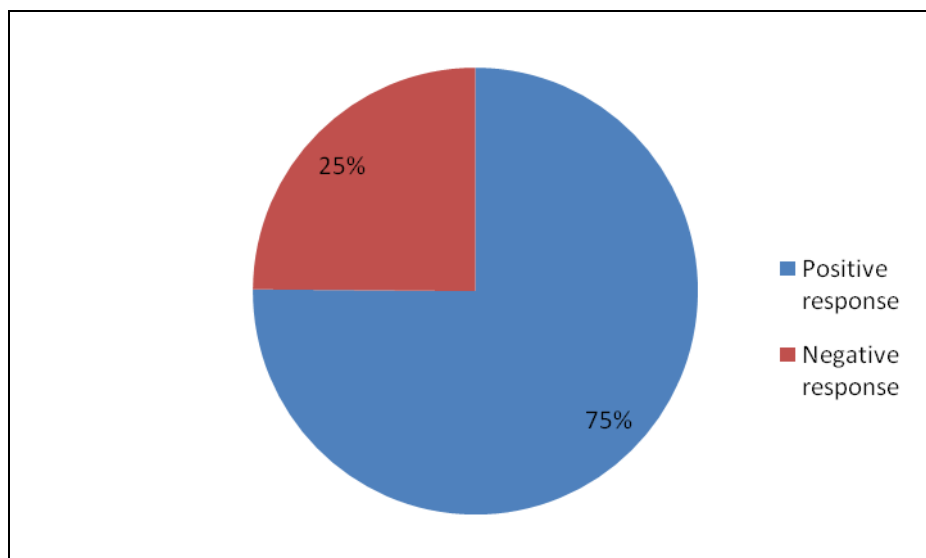
**4.6.1 Study and understand the expected contribution of ERP system adoption to financial performance.**

This objective was studied in detail mainly by reviewing literature on ERP procurement proposals, system performance reports and financial performance reports. More data was gathered from conducting questionnaire interviews with persons responsible for procuring ERP systems and evaluating the systems.

The questionnaire interviews conducted had their “PART TWO” focusing on this objective. A total number of six questions were set to capture information about this objective. This was studied in detail with the qualitative data from procurement proposals and performance reports.

145 responses of the total 193 respondents indicated that these two ERP systems ie MS Navision and Med360 were selected because they could meet the user requirements that were well spelt out before the aquisition of the systems. This gives a 75.13% positive response to this section as shown in the figure below.

**PERCENTAGE OF RESPONSES ON WHETHER THE SYSTEM MET THE USERS REQUIREMENT**



*Figure 4.11 showing the percentages of responses on whether the systems meet user requirements.*

Qualitative analysis of literature from the system procurement proposals shows that more than 80% of the ERP systems were selected because of their presented design and functionality that meets the user requirements. 54.5% (6 of 11) of the reviewed system performance reports indicated that the ERP systems were meeting their expected targets of financial contribution.

#### ***4.6.2 Expected contribution of ERP system adoption to financial performance***

This study set out to find the expected contribution of ERP system adoption to financial performance. This information was gathered through document review and the documents reviewed included; ERP system requirement documents, ERP system procurement proposals, ERP system performance reports and ERP system reviews. Additional information was gathered through conducting interviews with facility administration, managers, M&E officers and system users.

Some of the expected contributions of the ERP systems adoption as confirmed by the research include;

##### ***Improved supply chain and inventory management***

Facilities reported unsynchronized stock records and this greatly affected inventory management. This led to losses to the facilities due to wastages in expires and over/under stocking of the stores which ended up affecting the financial performance of the facilities. A big percentage of 81.8% (9 of 11) of the facility administration i.e. a combination of facility managers and administrators, reported poor stock and inventory management as a big problem which needed a fast and sustainable solution. The adoption of ERP system was expected to facilitate the synchronization of all the supply chain activities and improve on the stock and inventory management.

##### ***Reliable progressive analysis for close projection of facility performance***

In order for the facilities to fully utilize their resources and improve on their financial performance, close projections on required resources need to be made. The facilities needed a system that could help them make the closest projections to improve their financial performances. The facility manager of IHK is quoted saying, “*when we are unable to visualize our potential at fully performance as a facility, we can never utilize it maximally*”. Close projections in addition would contribute to maximum resource utilization and increased competitive advantage. The facilities adopted ERP systems to facilitate performance projections.

*Improved coordination and monitoring of business processes*

One of the case study facilities (IHK) expected improvement to standardizations of operation. This was mainly in the business processes especially in the supply chain and logistics management. The facility administrator who was already working with the facility before the adoption of the ERP system reported uncoordinated business processes as was a big challenge in monitoring of facility performance. He said, “*Monitoring of our business processes was a nightmare at IHK. One would have to monitor individual processes, measure the degree of their effect on other processes and how their effect can be maximized for positive performance*” this consumed a lot of time and it was extremely hard to come up with correct monitoring results. For this and many related reasons, they expressed the need for a system that would ease monitoring and reporting of the procurement, usage and management of facility supplies.

*Elimination of errors in billings and payments made to the facility.*

Both facilities under this study expected the adoption of the ERP system to improve on their billing and payment systems. This was expected in form of reduced errors in the financial records and easy reconciliation with the facilities’ debtors and creditors. An error rate of 35% was reported by NHL before the adoption of the ERP. The facilities needed to reduce this error



rate to close to 0%. This would greatly contribute to their financial performance by reducing losses and shortages made in mismanaged billing processes and payment errors.

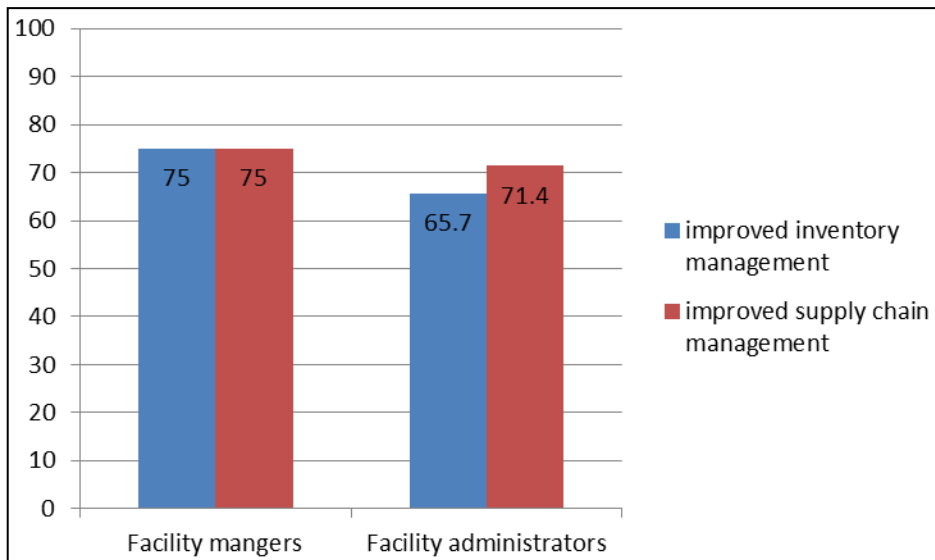
## REPORTED CONTRIBUTIONS OF ERP ADOPTION TO FINANCIAL PERFORMANCE

### *Improved supply chain and inventory management*

The majority responses (3 of 4 facility managers; 75%) from the facility administration indicated an improved inventory level tracking and this greatly results into better managed utilization of stock that reduces on the total wastages to expiry and stock outs thus providing a clear picture to management in terms of running both IHK and NHL in line with financial control management.

75% (3 of 4) of the facility managers interviewed confirmed the great improvement in supply management and 71.4% (5 of 7) of the facility administrators concurred with the agreement.

### **Results of ERP adoptions to supply chain and inventory management**



*Figure 4.12 showing results of ERP adoptions to supply chain and inventory management*

The facilities' adoption of the ERP systems has to a large extent had a positive impact on the supply chain and inventory management. There is great improvement in the management of supplies and inventory.

### ***Close financial projections***

69.3% of the respondents indicated that ERPs have made it easy to make the necessary financial projections to enable the facilities have enough of the required supplies for the smooth running of the facility. This enables the facilities to accurately plan for their resources, supplies and time. This is made possible by the modules of planning and projections in both ERP systems adopted by the two facilities.

### ***Reduction in operational costs***

Respondents from NHL indicated a great reduction on human resource in terms of staff by implementing the ERP system. There has been a reduction from three nurses to just one nurse that can handle the transactions at one time sitting as opposed to three that were stationed to do the same activity at one sitting. This has reduced on the operational costs of paying the three nurses and instead one nurse is paid. The facility manager of IHK reported a reduction in the number of staff handling billing and payment from five to two. He said *“we were formerly employing three nurses and two accounts assistance to manage the billing and payment process. But with the adoption of MS Navision software, we only employ one nurse and one accounts assistant to handle all the billing and payment desk”*. This is possible with using the ERP system that automates all processes from consultations to treatments and billings. The finance staff have to confirm the billings and payments made. This reduces on the operational costs in form of reduced salaries and allowances.

### ***Logistics management***

70.5% of the responses from IHK administration reported an improvement in standardizations of business processes brought about by the ERP used. This was especially in the logistics management. The ERP system has enabled IHK to standardize and monitor the medical supplies cycle from purchase to prescription and the reporting. All the logistics are captured into the system from the time of placing an order for them to when they are utilized, dispensed, consumed or disposed of. This tracking of all the logistics has eased logistics management and has established a standard for continuous management of logistics in the facilities.

### ***Improved billing and payment processes***

There has been great improvement in payment processes achieved by both facilities in form of reduced errors in the financial records and easy reconciliation with the facilities' debtors and creditors. This has saved IHK and NHL from great losses that would otherwise be incurred. All respondents interviewed and literature reviewed points out a large positive impact on the billing and payment processes. Billing errors have been completely minimized, payment process is faster and swift and has created a more relaxed and calm billing environment for both the facility staff and their clients. Below is a figure showing the improvement portions from the different research population groups.

## Percentage improvement of the billing and payment processes

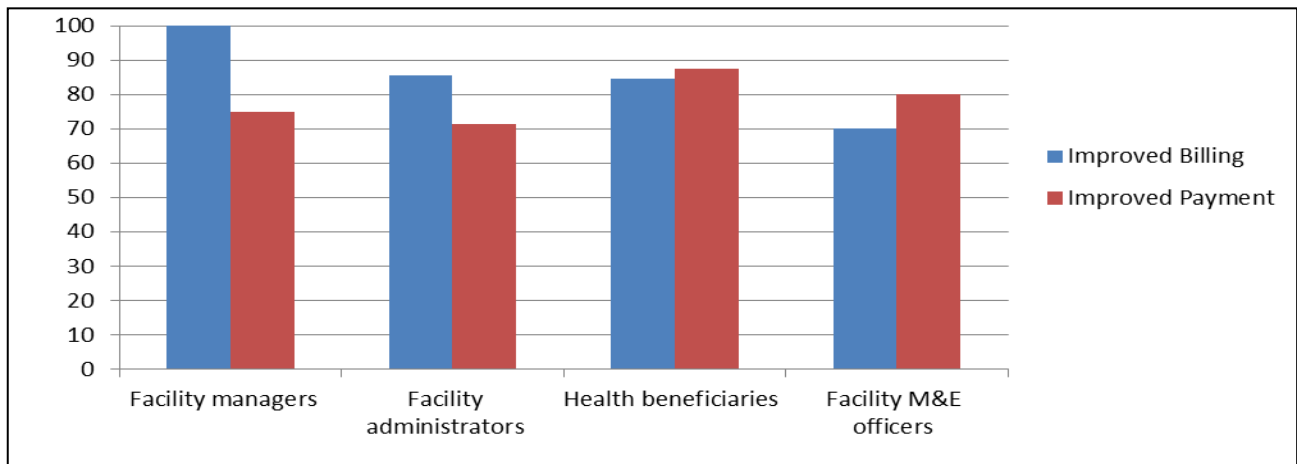
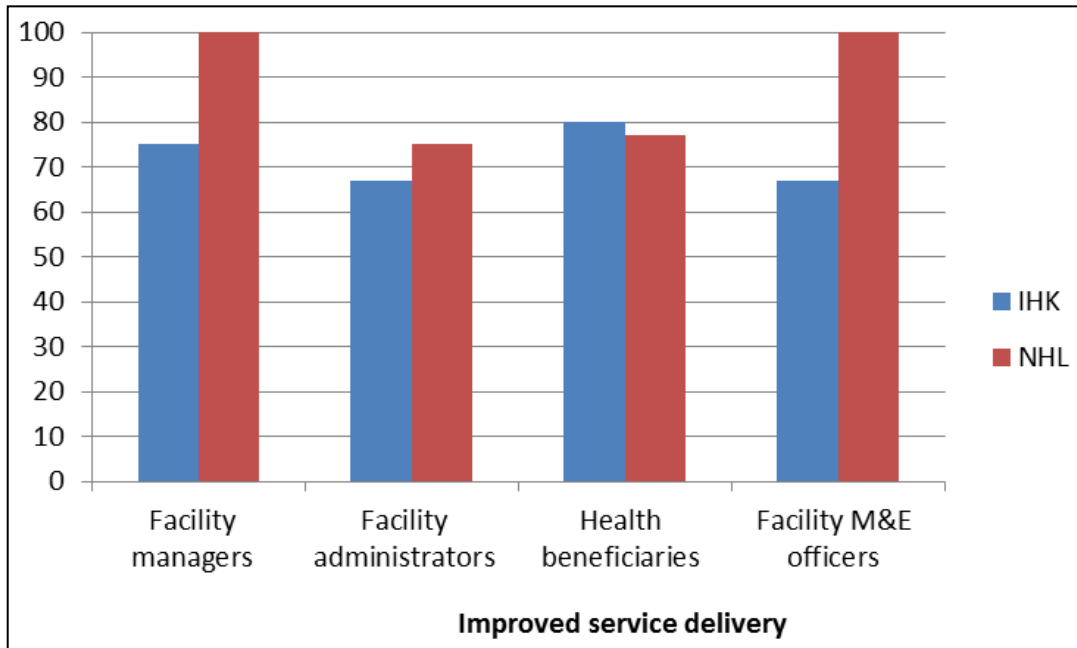


Figure 4.13 showing percentage improvement of the billing and payment processes

### ***Improved service delivery***

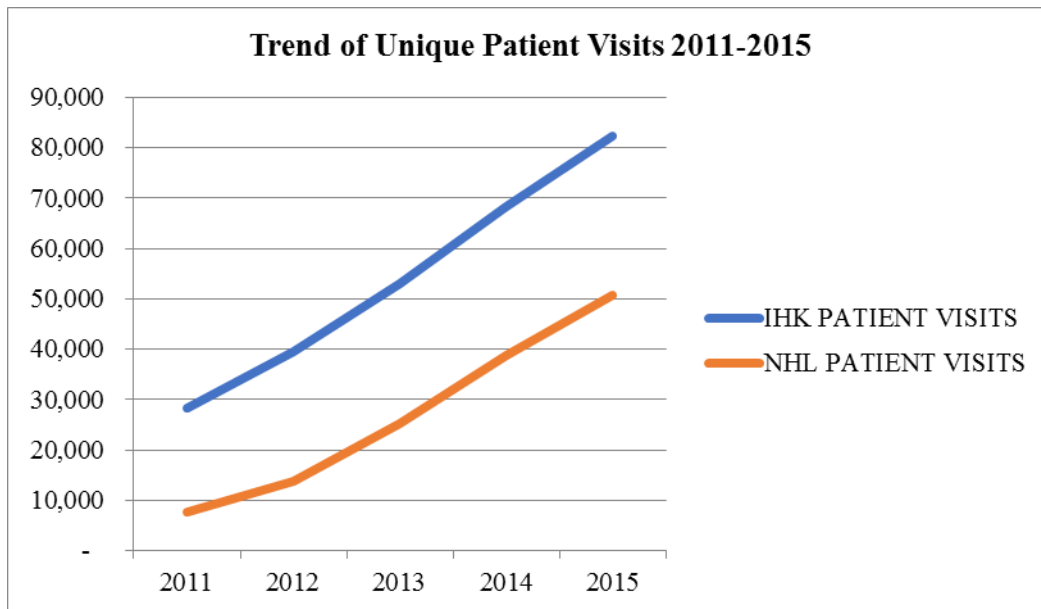
Service delivery has greatly improved with the implementation of the ERP systems. Study responses indicated that the systems have had a positive effect on the service delivery model of the facilities. According to the respondents, this is largely attributed to the fact that the staffs have one system to deal with; which is user friendly and faster to use, this gives them enough time to attend to the clients. One of the old staff interviewed during this study is quoted saying *“the new system has saved us the inconvenience of carrying information cards whenever we go to the hospital and having to repeat our health history every time we see a doctor. This was disturbing and time consuming”*. We the adoption of the ERP, clients are satisfied and make recommendations for more clients thus extra cash flow into the facilities. The figure 4.14 shows percentage improvement in service delivery and figure 4.15 shows the trends of patient visits.

**Percentage improvement in service delivery**



*Figure 4.14 showing percentage improvements in service delivery*

**Annual patient visits from 2011 to 2015**



*Figure 4.15 showing trends of patient visits.*

### ***Improvement in human resource management***

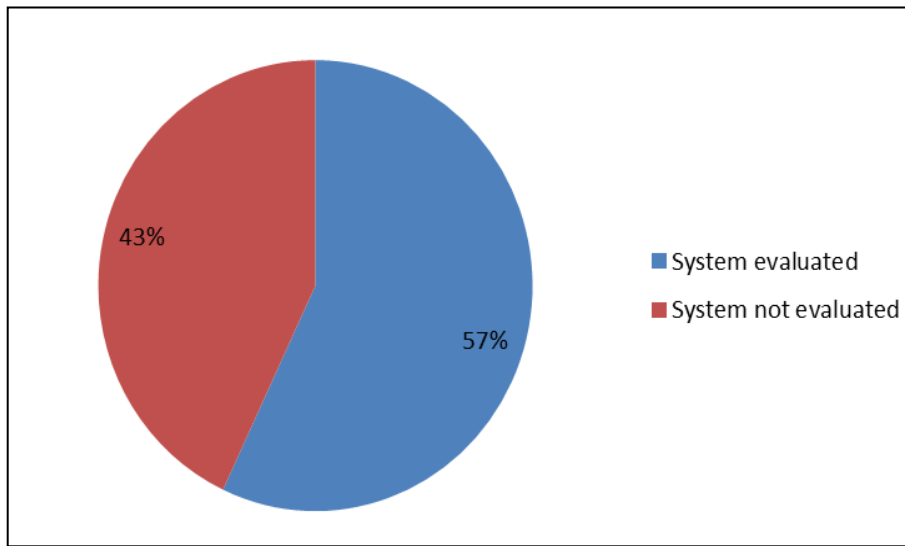
The adoption of ERP system in both facilities has improved the management of human resource in the facilities. This has been made possible by the automated duty roster designs, leave applications and confirmations, automated payment managements for both allowances and salaries and automated hiring of staff. NHL reported a 75% improvement in human resource management with the adoption of MED360 system. There has been minimized corruption, favoritism and bias in the management of human resource. This is attributed to the automation of human resource management by the ERP systems.

#### ***4.6.3 Study what measures are used to evaluate positive contribution of ERP system adoption to financial performance in a developing context (Uganda)***

This objective was studied mainly using the questionnaire interviews. Section 3 of the questionnaire had questions targeted for this objective. Some literature was also reviewed to help understand this objective in detail. Literature reviewed included financial performance reports, monitoring and evaluation reports, department performance reports and general facility performance reports.

Fifty-seven percent (57%) of the responses indicated that ERP Systems are periodically assessed and evaluated on their usefulness and contribution to the financial performance as shown in figure below. 43% indicated that the systems are not evaluated giving reasons of not knowing how to evaluate the system, not included on the facility budget, having no time and not part of the work plan as some of the reasons for not evaluating the systems.

### Percentage of systems evaluated to ascertain their contribution

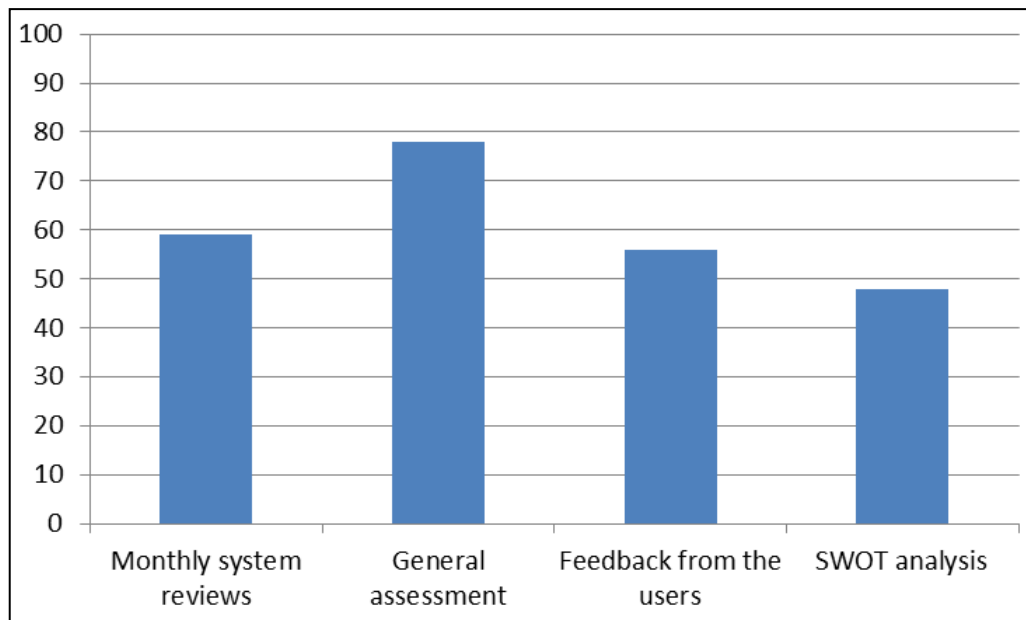


*Figure 4.16 showing the percentage of systems evaluated to ascertain their contribution*

### Models used for ERP system evaluation

The data collected indicated that only four (4) models have been employed to evaluate the ERP systems in both IHK and NHL. NHL has maintained the SWOT analysis and using feedback from users as a model of evaluation, while IHK focused and employed general assessment, monthly system reviews and using feedback from the users. The reasons for selecting these models were not disclosed by the respondents because some of the models had been selected without consideration. Below is a figure showing the usage of different system evaluation models

## Usage of different system evaluation models



*Figure 4.17 showing percentage of usage of different system evaluation models*

### **SWOT analysis**

Nakasero Hospital Limited (NHL) selected SWOT analysis as a model for evaluating its ERP system. SWOT is an acronym for strength, weaknesses, opportunities and threats. Considerations in-line with the SWOT were set to be used as guidelines while using this model for system analysis. These guidelines are presented below

1. Ease of adaptability to the new users, in terms of training versus the rate at which usage is adapted to.
2. The level of flexibility. How efficient is the ERP when it comes to incorporating a new need by the management and overall users of the system? They look at a system that can candidly keep up with the current trends of change in the health industry.
3. Efficiency and consistency in the quality of data collected from all users of the system.



4. Impact of the system on the financial outlook of the Hospital (the ease of usage of the system, results into less time spent attending to patients or customers and staff thus availing more time to the administrators to innovate better ways to further the business.
5. The level of automation employed by the system as a key determinant in evaluation
6. The level of breakdowns of the system. In a given period of time, how often has the system failed to function effectively. Failure to function as expected often leads to unnecessary costs.
7. Reliability of the supplier of the system. They keenly considered how much support would be availed and the ease with which it would be availed to our users by the supplier, at either a low or manageable cost.
8. Ease of information access. *“How do we efficiently ensure our partners can remotely access relevant information when needed?”* The current system effectively meets this need.

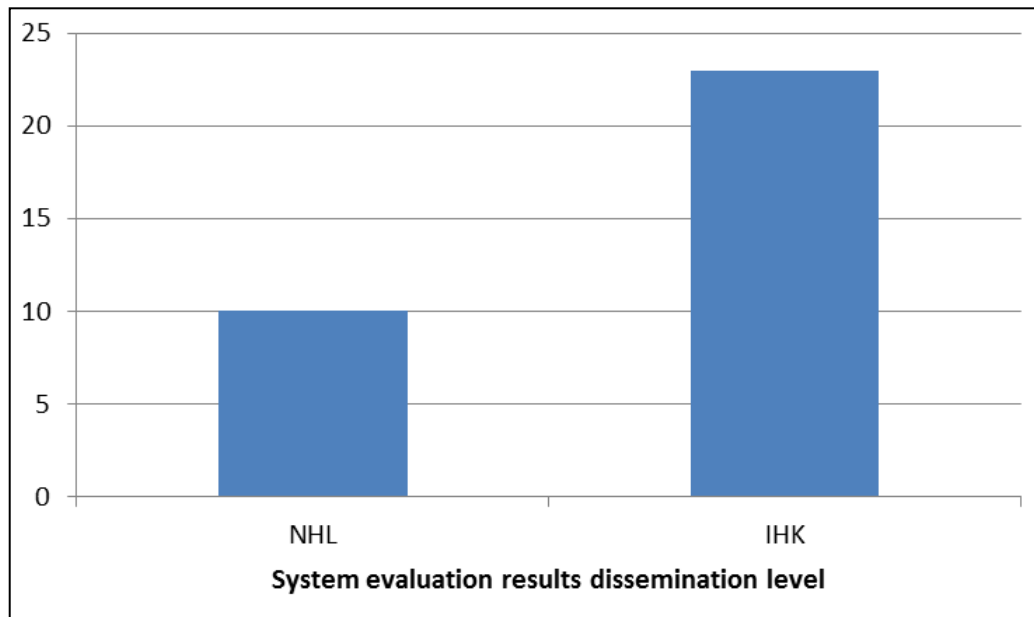
#### ***4.6.4 Dissemination and sharing of system evaluation results***

Dissemination of system evaluation results is another section of system evaluation that this research set out to study in detail. Part 4 of the questionnaires used to gather information for this study had three specific questions focusing on the system evaluation results dissemination, sharing and usage.

These specific questions were asked to the facility administration and system users in the two facilities under this study.

Results from IHK show that only 23% of the system evaluation results were disseminated periodically. Although some results were disseminated, system users reported not to have been given a chance to comment on those results. From NHL, only 10% of the facility staff reported to have ever received results from the system evaluations. These reported dissemination findings are shown in the figure 4.18.

## Percentage of the system evaluation results disseminated



*Figure 4.18 showing percentage of the system evaluation results disseminated*

### **4.6.5 Study ERP systems implemented in private health facilities in Uganda**

This objective was studied mainly by conducting interviews with the facility staff especially the administration. Literature from the IT department and evaluation department was also reviewed to support the data collected from the interviews. Part 4 of the questionnaire was designed to capture information on this objective.

100% of the study findings indicate that both case study facilities acquired and used an ERP system for more than two years. Nakasero Hospital reported to be using MED360 while IHK is using Microsoft Navision 2009.

Nakasero Hospital reported change of the system in the past 2 years from Microsoft Navision to MED360 and the reasons for the change include;

1. High cost of maintenance. NHL reported very high costs of system maintenance. The facility was paying a sum of US\$ 10,000 annually for maintaining Microsoft Navision ERP. This was regarded generally expensive for the facility

2. The version was outdated. The version of Microsoft Navision formerly used by NHL (Microsoft Navision 2009) was out of date and was not handling the most recent improvement in technology.
3. Frequent system failure. The system had a high failure rate and this was affecting the business operations that were depending on it. The system failures were in the long run affecting the performance of the facility.
4. High level of system redundancy. The ERP system formerly used by the facility had many redundant processes and modules. This was affecting the effectiveness of the system.
5. Some of the modules were not interconnected. Some modules of the ERP were “stand alone” without any connections to the entire system. This was “killing” the whole idea of Enterprise resource planning system

IHK did not report any change of an ERP in the last two years. The facility started using Microsoft NAV in 2006 and it still uses the same but with an updated version of Microsoft dynamic NAV 2013.

### **Reasons for acquiring and adopting ERP systems**

The facilities disclosed the reason as to why they acquired and use the specific ERP systems. These reasons were categorized into improved performance, quality service delivery, reduced costs and time saving. Below is the figure showing the distribution of the categories of choice.

## Reasons for acquiring and using the ERP system

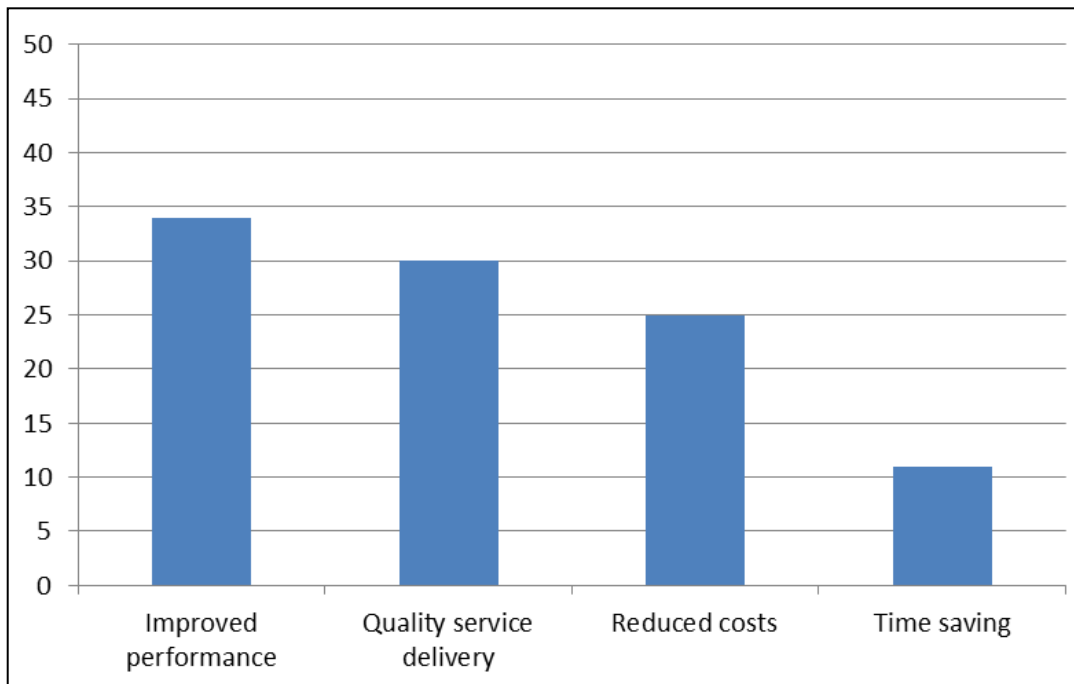


Figure 4.19 showing the reasons for acquiring and using the ERP system

### 4.7 Summary of findings

#### *Expected contribution of ERP system adoption to financial performance*

Interactions with the health facilities' stake holders and ERP systems' users revealed the various expectations they had from the systems. The expectations of both system users and stakeholders of the facilities were high before they acquired and adopted the ERP systems. The accuracy and timeliness of data, improvement in payment processes, system scalability, effectiveness, automated reporting, better inventory and supply chain management, improve staff efficiency and performance, enable more reliable financial projections, streamline the facilities' overall operational processes and reduce the cost of doing business, improve patient turnaround times and improved service delivery and customer satisfaction were what the stake holders expected of the ERP systems. These expectations were then translated into some of the system user requirements while purchasing these ERPs.

### ***The ERP system contribution to financial performance***

The two case study facilities both indicated a positive contribution of the ERP system to their financial performance. Both IHK and NHL indicated that the cost of doing business has been drastically reduced. The reduction of work stoppages, the timeliness of data availability and better controls have improved financial performance and promoted labor efficiencies. Also, better inventory and supply chain management has resulted in decreased costs. Simultaneously, the ability to make accurate commitments to various trading partners and improve turn-around time has increased customer satisfaction, thereby resulting in increased revenues. The adoption of ERP system has further improved the process of decision making where facilities rely on accurate data to make informed decisions. This has saved a great deal of resources and funds for the facilities thus increasing their revenue margins. Some of the decisions mainly relying on the ERP system are stock orders, supply consumptions, financial projections, human resource planning and management and general facility management.

### ***Linking ERP systems contributions to business objectives***

Our discussions with company personnel indicated that the initial decision to replace all of the legacy systems with an ERP system was primarily based on a cost-benefit analysis for automation of all business processes. The main implementation objective of the ERP system in both facilities was to automate and coordinate all the business processes, which was expected to lead to a lowered overall operational budget, increased efficiency of workers, reduced input error rate and more timely availability of accurate and reliable information. However, once managers and other users learned more about the new ERP system's capabilities, they recognized that improved information accessibility and visibility across the enterprise allowed them to make more effective operational, tactical and strategic decisions. This resulted in better financial

projections and timely purchasing of the necessary supplies. Eventually, the consequential increase in customer satisfaction has led to a bigger market share enjoyed by IHK and NHL in health care delivery in central region.

#### **4.7 CONCLUSION**

Chapter four was a full discussion of the whole research process and findings. The chapter discussed the process of data collection, analysis and presentation of research findings. It discussed in detail the case studies, the analysis of the current ERP systems used by the case studies and all related reasons for acquiring and adopting different ERP systems.

## CHAPTER FIVE

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### 5.1 Introduction

This study sought to establish the contribution of ERP systems to the financial performance of private healthcare facilities in Uganda. This chapter presents the summary of findings, limitations of the study, conclusions and recommendations of the study.

#### 5.2 Summary of the study

This study was about the contribution of ERP systems to financial performance of private health facilities in Uganda. It was a multi case study that had two case study facilities. The case study facilities were Nakasero Hospital limited (NHL) and International Hospital Kampala (IHK). The study was carried out in a period of seven months. This study report is structured into five chapters each connecting to each other to give a full report of the study.

##### *Chapter 1*

Chapter one gives an overall introduction to the study highlighting the study's background, statement of the study problem, the objectives, the research questions, the justification and scope of the study.

##### *Chapter 2*

This chapter presents the review of related literature from previous studies. It reviews literature by research objectives and how this study is related to previous study. It's from this chapter that the justification of the study is concertized.

### *Chapter 3*

Chapter three lays out the methodology that was followed to carry out this research. It gives the details of the research design, methodology, data collection techniques and method, data management and analysis, quality controls and ethical considerations.

### *Chapter 4*

This chapter presents the research findings. It gives an analysis of the current situation of the ERP systems in the case study facilities, data collection, analysis and interpretation of research findings.

### *Chapter 5*

Chapter five gives the general conclusions of the study. It discusses in detail the summary of the study, the limitations, conclusions and recommendations with suggestions for further research in the subject matter.

All these chapters are put together to give a detailed report of the research.

## **5.3 Limitations of the study**

Limitations of the study are the factors that negatively affect the planning, implementation and reporting of study findings. This study had a few limitations as it was planned in time and its implementations went as planned. Some of the few limitations of this study were;

### *The study sample size*

The sample size of the study is small and this was because of mainly of limited time for carrying out the study and the financial constraints. The small sample size might not fully give the best representation of the total population intended to be reached by the study.



### *Time frame*

Secondly the time available to carry out this study was less than twelve (12) months. This time is too short to follow the trend of performance change given the fact that this was a multi-case study where we are studying more than one case study of health facilities in different geographical locations with different strategies. The factor of change in performance is normally measured by analysing trends and a change in a trend for only 12 months might be a very slight change.

### *Access to information*

Obtaining financial information of these private health facilities was a challenge as most of them were reluctant to provide the information basing on availability and the confidentiality of the this information.

### *Study of other factors that contribute to financial performance*

This study has not examined all the other factors that directly contribute to financial performance of these health facilities. Factors like capital investments, customer base, organizational culture, staff motivation, marketing and sales and political, economic and social environment. These factors have an impact on the financial performance of every health facility.

Although the limitations were a number, the study was successful implemented and all the objectives were studied in detail and findings shared in this report.

## **5.4 Conclusions of the study**

This study focused on establishing the contribution of ERP systems to financial performance of private health facilities in Uganda. From the implementation and findings from the study, the researcher concludes that;

ERP systems have a statistically significant positive contribution on the financial performance of health facilities. These contributions are in the forms of improved inventory and supply chain management, improved service delivery and turn-around time, timeliness of data availability, reduced cost of doing business, improved payment processes, customer satisfaction and consequentially financial performance of private health facilities understudy. This finding confirms those of Mata et al. (1995) who conclude that full ICT adoption confer a competitive advantage and contributes to improved performance and Singla (2008) who established that, ERP adopters' performance was higher compared to non-adopters of ERP system.

The adoption and implementation of ERP systems greatly improve the quality of data and automation of reports that subsequently lead to more appropriate and strategic decisions made. In a similar study, Poston et al. (2001) found that, ERP affects positively a firm's performance in two ways: it reduces the cost by improving efficiency of business processes in a computerized way and it enhanced decision making ability by providing accurate information in time.

The adoption of ERP systems for a considerable period of time; two years or more, has a great impact on the performance of a private health facility.

## **5.5 Recommendations**

The study set out to find the contribution of enterprise resource planning systems to financial performance of private health facilities in Uganda. After the study, the following recommends are made;

All private health facilities intending to adopt ERP systems should ensure the buy in of top management for the consistent and dedicated commitment, support and sustainability of the project.

All able health facilities in Uganda need to adopt ERP systems so as to improve their efficiency and improve their financial performance. Based on the findings of this study, the policy makers need to carefully determine their user requirements from the ERP System as this will guide the successful adoption and implementation of the system.

Health facilities that have adopted ERP systems need to frequently evaluate the system performance. This helps in the sustainability planning of the system and is a foundation to successful system maintenance and continued use. This will in the long run have a positive return to investments made in acquiring the system.

The results from system evaluation of ERP systems need to be shared with all system users. Results sharing will encourage use of results and this will enhance the feedback cycle of system usage. The enhanced cycle of user feedback for a system is a good foundation of system maintenance and sustainability.

All health facilities intending to adopt ERP system need to first study in detail their business processes and then acquire a system that best fits their business needs. This saves the health facility or any business the trouble or procuring a system that does not fit their business needs and they have to change it a short period of time.

All students who intend to carry out a similar study need to advocate for more time assigned to the study period. This would sort out the limitations of limited time and small sample sizes. The study would be done in more detail and more accurate and representative results would be derived from the study.

## **5.6 Suggestions for further studies**

*“Contribution of Enterprise Resource Planning to financial Performance of Private Health Facilities in Uganda”*, this was a guide to this research and there is much more to it than what was done in this study.

A similar study can be carried out focusing on different case studies in a different business field where ICTs have been adopted using different frameworks.

A framework and model can be derived and tested to evaluate the contribution of ERP systems to the financial performance in any given case especially in a developing context.

This study focused on the contribution of ERP systems to the financial performance. A similar study can be done on another aspect of the business/firm/corporation or even the overall performance of various organization.

The same study can be done to further find out in detail individual contributions of different factors that have effected on the financial performance of any businesses.

ERP system evaluation frameworks need to be further studied to have standard frameworks and models used for ERP system evaluations.

## **5.7 Conclusion**

Chapter five is the cocluding chapter of this study. It in, findings of the study were summarized, limitations discussed and recommendations and suggestions were made for further studies and changes in the startegies of doing research.

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**APPENDICES.**

**APPENDIX I; Research Questionnaire.**

Dear Respondent: My name is Lilian Maureen Kemigisha. I am a student at Uganda Martyrs University pursuing a Master of Science in ICT management, policy and architectural design and I am in my final year of study. In partial fulfillment of the requirement of this course, I am conducting my academic research entitled ‘The contribution of ICT Adoption to financial Performance of Private Health Facilities in developing countries/Uganda’. The University has permitted me to carry out this research and I will treat all your information with integrity and confidentially.

Kindly answer the questions below appropriately.

**PART ONE: BASIC INFORMATION**

- 1) Name of the Health Facility.....
- 2) What is your role in this health facility.....

**PART TWO: ENTERPRISE RESOURCE PLANNING (ERP) SYSTEM IMPLEMENTATION**

- 1) Does your health facility employ any ERP system? Yes [ ] or No [ ]
  
- 2) In what year was the first ERP system in your organization implemented?.....
  
- 3) For how long has the current enterprise resource planning been in use?
  - a) Less than a year [ ]
  
  - b) 1-2 years [ ]
  
  - c) 3-4 years [ ]
  
  - d) 5–6 years [ ]
  
  - e) More than 7 years [ ]

- 4) Which type of enterprise resource planning system is in use in your health facility?
- 5) Have you changed the ERP systems in the last two years? If yes, what system did you have before and why did you change?

.....  
 .....

- 6) Was the current system in use chosen because it could meet your system requirements? Yes [ ] or No [ ] If no, please give the reason.

.....  
 .....

**PART THREE: EVALUATION OF ENTERPRISE RESOURCE PLANNING SYSTEM TO FINANCIAL PERFORMANCE**

- 1) Is the ERP system in use periodically assessed and evaluated on its performance? Yes [ ] or No [ ]

- 2) What measures are used to evaluate the performance of this ERP system?

.....  
 .....

- 3) Is the system evaluated as a whole or the modules are evaluated independently?

.....  
 .....

- 4) Is there a specific model or framework employed in evaluating this ERP system?

.....  
 .....

- 5) Has the contribution of this system to financial performance ever been evaluated? Yes [ ] or No [ ] If no, why?

.....  
 .....

- 6) Were the results from these evaluations ever disseminated?

.....  
 .....

**PART FOUR: EXPECTED CONTRIBUTION OF ENTERPRISE RESOURCE PLANNING SYSTEM TO FINANCIAL PERFORMANCE.**

1) What were the considerations for the acquisition of the ERP system currently in use?

.....  
.....  
.....

2) Was the system tailored to the requirements that were submitted to the system vendor/developer? Yes [ ] or No [ ]

3) Does this ERP system meet your expectations? Yes [ ] or No [ ]

If no, why?

.....  
.....  
.....

4) Has the current ERP system changed the way you operate in this facility? Yes [ ] or No [ ]

If Yes, How?

.....  
.....  
.....  
.....

5) Would you wish to change from the current ERP system? Yes [ ] or No [ ]

6) Has this system improved on the facility's financial management? Yes [ ] or No [ ]

7) Does this system have an effect on the overall service delivery of this health facility? Yes [ ] or No [ ]

8) Were the cost implications of adoption of this system too high or low? High [ ] Low [ ]

Please explain your answer.

.....  
.....  
.....  
.....

**THANK YOU VERY MUCH FOR YOUR TIME AND CO-OPERATION**

## **APPENDIX II: Interview Guide.**

### *Part One; Greetings and Introduction*

### *Part Two; Basic Information*

1. What is your role in this health facility?

### *Part Three: Enterprise Resource Planning (ERP) System Implementation*

2. Does your health facility employ any ERP system?
3. For how long has the current enterprise resource planning been in use?
4. In what year was the first ERP system in your organization implemented?
5. Which type of enterprise resource planning system is in use in your health facility?
6. Why was the current system chosen?
7. Have you changed the ERP systems in the last two years? If yes, what system did you have before and why did you change?

### *Part Four: Evaluation of Enterprise Resource Planning System to Financial Performance*

1. Is the ERP system in use periodically assessed and evaluated on its performance?
2. What measures are used to evaluate the performance of this ERP system?
3. Is the system evaluated as a whole or the modules are evaluated independently?
4. Is there a specific model or framework employed in evaluating this ERP system?
5. Has the contribution of this system to financial performance ever been evaluated?
6. Were the results from these evaluations ever disseminated?

### *Part Five: Expected Contribution of Enterprise Resource Planning System to Financial Performance.*

7. What were the considerations for the acquisition of the ERP system currently in use?
8. Was the system tailored to the requirements that were submitted to the system vendor/developer?
9. Does this ERP system meet your expectations? If no, why?
10. Has the current ERP system changed the way you operate in this facility?
11. Would you wish to change from the current ERP system?
12. Has this system improved on the facility's financial management?
13. Does this system have an effect on the overall service delivery of this health facility?
14. Were the cost implications of adoption of this system too high or low? Kindly elaborate your answer.

### **APPENDIX III: Document review checklist.**

All the reports and documents reviewed from the hospitals were permitted to the research for use.

1. User requirement documents.
2. User training manuals and reports.
3. System procurement reports
4. System evaluation reports
5. User feedback workshop reports
6. Organizational strategic plans
7. ICT staff recommendations reports
8. Procurement policies and procedures
9. Logistics management reports
10. Patient flow management presentations
11. System review meeting minutes
12. Human resource management reports
13. International Journals and magazines
14. Books with related literature