HOSPITAL INFORMATION SYSTEMS CAPABILITY AND END-USER SATISFACTION IN HOSPITALS OF NAIROBI COUNTY, KENYA

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ABSTRACT

Hospitals in Nairobi County, Kenya continue to automate their processes to improve service delivery to their clients by implementing hospital Information Systems (HIS). As studies have revealed, end user satisfaction plays an important role in information systems acceptance, and ultimate success. The study focused on HIS capability and how it affects end user satisfaction in the hospitals by use of descriptive and observations techniques. The scope of this study was hospitals in Nairobi County, Kenya with bed capacity of at least 100 and had used HIS for a period of not less than a year. Stratified sampling method was preferred for sampling of study respondents from the selected ten hospitals of Nairobi County that met inclusion criteria and simple random sampling technique, to select respondents respectively. Semi structured questionnaires were used to collect primary data from a population of 374 respondents. The data collected was analyzed quantitatively using descriptive statistics comprising of the mean, standard deviation and P-values. Statistical Package for Social Sciences (SPSS) version 22, Microsoft Office Excel 2013 and descriptive statistics were the main tools used to analyze the data. The results have shown that systems quality, information quality and service quality of HIS positively affect end user satisfaction.

Key Words: *hospital information systems capability and end-user satisfaction in hospitals of Nairobi County, Kenya*

INTRODUCTION

J. Adler Milstein and D. W. Bates (2010) defined hospitals as complex institutions with large departments and units that coordinate care of patients. Hospitals experience an endless flow of data that begins with outpatient departments and admitting wards to all other departments throughout the hospital. Hospital data are of different categories where some are of vital nature that concern care and well-being of the patient while others help to enhance overall efficiency of the hospital generally. Yaseen A. Hayajneh et al (2014) on their part argued that the quality of patient care and their success is determinable by how hospitals respond to challenges of managing data. Yusof et al (2008) defined HIS as massive integrated systems that support the comprehensive information requirements of hospitals, including patient, clinical, ancillary and financial management. While Acharyulu (2012) claimed that, HIS have evolved as integration systems of order entry, administrative, and departmental subsystems within a hospital. It has become necessary for every healthcare staff in a hospital to use a computer terminal in almost every day's work. The Definitions and descriptions of HIS by various scholars agree on the roles they play in improving the health sector and provision of better healthcare.

Globally, over the past two decades, hospitals in the world have made significant investment in adopting and implementing Hospital Information Systems. Vasilios P. et al, (2012) contended that the gains of investments in healthcare service delivery largely depend on support provided

by technical departments that would guarantee effectual use of information provided and system end-users satisfaction, which is one of the most important determinants of the systems success.

Healthcare in developing countries majorly in Africa, according to Cline and Luiz (2013) in their study on HIS, face a myriad of challenges in serving the populace, including poor healthcare systems and inadequate facilities that limit healthcare service provision and outcomes. Information technology facilitates healthcare service provision by automating the processes to reduce ineffectiveness of manual processes and reduction of operational costs.

Dr. Rajesh Kumar Sinha and Susanna Kurian (2014), in their study: "Assessment of End User Satisfaction of Hospital Information Systems" stated that HIS support healthcare workers in managing various types of information generated in hospitals on a daily basis. They are complete and integrated information systems designed to gather, retrieve, manipulate and use information to support proceedings of hospitals. Hospitals in early days introduced HIS to automate revenue collection and accounting processes, but with advancement of computer technology, they have pervaded almost all activities and revolutionized flow of data in hospitals.

A good HIS can improve quality, safety and efficiency of healthcare service provision besides routine administrative and financial tasks. Hospitals are now more dependent on hospital Information Systems (HIS) than ever before in carrying out patient care functions, education and research for better and improved service delivery and practices (Information System, 2014). Hospitals of Nairobi County, like KNH embraced IT to enhance revenue collection and to forestall cases of embezzlements by cashiers, similar to observation of Sinha et al (2014), which conjectured that the focus of hospital information systems was to computerize revenue collection to eliminate cases of revenue loses and misappropriations in accounts sections. Hospitals must evaluate HIS carefully to ensure they meet the operational objectives of both the facilities and end-users who must be involved in the process of implementation with a view to addressing their requirements. Failure to involve users in system development or acquisition process alienates them from it and this could force them to reject it entirely. Mohd-Fadhil et al (2012) in the study on "Hospital Information System (HIS) Implementation in A Public Hospital: A Case Study in Malaysia", reasoned that training for system users is an important component of implementation as a measure of ensuring acceptability. Sima Ajami et al (2012) in the study on "The Role of Information System in Multiple Sclerosis Management", postulated that end-user satisfaction is significant to successful implementation of HIS and their failure is normally due to psychological and organizational issues. It was thus essential to assess end users' satisfaction towards usage of HIS capability for the hospitals to gauge their acceptability and sustainability.

Hospital information systems have been implemented and used in Kenya for nearly two decades, and the cost of introducing and spreading their use has increased constantly but very little research findings exist that have examined the results of such investment and level of satisfaction among their users. This conforms to the findings of Ariel Salleh (2010). Implementation of HIS

is inevitable in healthcare institutions due to several mediating factors that include organization, the people and technology among others. These efforts made in the hope that HIS could help improve quality of healthcare delivery as well as reduce costs. But as much as it is generally accepted that technology has capability of improving services and saving costs, still it was conceived necessary that adoption of HIS must be evaluated on a regular basis among users to ensure they continually comply with quality standards, are reliable, maintainable and sustainable throughout their life cycle.

Jean-Marc Palm et al, (2010) in "Clinical Information System Post-Adoption Evaluation at the Georges Pompidou University Hospital, advanced the position that evaluation of a clinical information system (CIS) at different stages of deployment and routine use is a key factor to improving acceptability and use by health professionals. This agreed with other literature existing that also linked acceptability to system currency and user involvement. They further posited that incorporation of information technology (IT) into healthcare processes must undergo evaluation process at pre-adoption, installation, and post-adoption phases to improve their quality and effectiveness. This study based on post-adoption setting to assess end-user satisfaction with HIS capabilities in the hospitals of Nairobi County, Kenya. For the continuous use of HIS, it is important that managers identify and manage the critical barriers to HIS implementation and foster the capabilities of physicians and nurses to perform their routine tasks. To healthcare providers that have implemented HIS to back their processes, it is critical in post-adoption settings, to question the affiliations between user operational requirements and service delivery to establish that systems implemented still fulfill the needs, are inefficient and or need improvement or replacement.

Healthcare organizations in Nairobi County, Kenya have incessantly embraced IT despite economic downturns experienced in the Country, similar to findings of Kanaracus, (2008). Fears about economic conditions and increasing competition create pressure on organizations to cut costs through use of technology. This study therefore undertook to investigate whether technological interventions put by hospitals yield any meaningful positive results to conclude that such investments are worthwhile. Given that the impacts of IT are indirect and influenced by other factors such as human, organizational and environment, assessment of IS success becomes very complex and elusive.

According to researchers who studied end-user satisfaction like Indah et al, (2011), Sinha et al (2014) and Vassilios et al (2008), the success of HIS depends on the user satisfaction. They observed that compared to other methods, evaluating end-user satisfaction with the information systems capability is one of the most effective evaluation methods. Bahari & Ling (2010) defined user satisfaction as fulfillment of a desire or need through the users' feelings and attitudes towards the service or product. Nenonen et al (2008) and Poldma, (2009) on their part argued that the phenomenon of the users' experiences involving their emotions reflects satisfaction and that the service outcome is of quality.

Lee I, (2009) gave two types of definitions for the end-user satisfaction concept, based on different approaches. The process-oriented approach considers consumer satisfaction as the difference between expected satisfaction and achieved satisfaction, whereas the outcome-oriented approach regards satisfaction as an attribute extracted from a product or service after its consumption and the degree to which objectives of systems or the organizational units utilizing the systems are realized. This study adopted outcome-oriented approach and considered satisfaction as an aspect of service after consumption that signifies end users' gratification with the Hospital Information Systems they use.

STATEMENT OF THE PROBLEM

For about two decades now, major healthcare institutions in Kenya have continued to increase their expenditure in Hospital Information Systems (HIS) and annual budgets persistently rise too, even when the country experiences serious economic downturn. This observation is similar to findings of Kanaracus, (2008) in the study "Measuring Information Systems Success: Models, Dimensions, Measures, And Interrelationships". This is probably because of the general belief that HIS can improve service delivery to clients, both internal and external. Internal users include members of staff like physicians, nurses, administrators, managers and researchers among others while external user groups comprise of suppliers, creditors, service providers and patients alongside their relatives. Neglect of any client groups is dangerous and implies missing related experience, expertise, skills, knowledge, requirements and expectations. Expectations and requirements arise from what users see and hear about the system and interpret the ways the system work for them. Successes of these systems are largely dependent on the end-user satisfaction. Many scholars have conducted qualitative researches on HIS success based on DeLone and Mclean model (2003) that identifies six ways of measuring information system success comprising of system quality, information quality, service quality, use, user satisfaction, and net benefits. This research focused on user satisfaction as its subject matter and highlighted factors that influence satisfaction through quantitative research method. End-user satisfaction is key factor for successful implementation of hospital information system because it has direct relationship with use and is a sign of system acceptance. DeLone and McLean, (2003) theorized that many systems fail due to resistance from users that comprise both the management and operators. Mohd-Fadhil NF et al, (2012) supposed that it is critical for hospitals to assess user satisfaction with HIS and constantly monitor them over a period to ascertain that they still satisfactorily met the needs of users. Satisfaction with the system measured acceptability and sustainability of HIS in the healthcare organizations.

Indah and Hussein, (2011) decried existence of little research on assessment of end-user satisfaction levels as majority of studies focused on system failures and comparison of systems used in different Kenyan hospitals. G. Gatero (2011) in his study, "Utilization of ICTs for Accessing Health Information by Medical Professionals in Kenya: A Case Study of Kenyatta National Hospital" and Ouma et al, (2009) in "The Journal of Global Health Care Systems,

(2011)". In one of the studies by Ouma and Herselman (2008) conducted multiple case studies of technological assessments in which they established there was high-capital requirement for implementation of hospital information technologies as a major barrier to adoption (Jha et al., 2009) among other scholars. Studies investigated utilization of HIS in KNH and comparison of levels of computerization in KNH and Matter hospitals respectively. It is worth noting that majority of studies were conducted in Kenyatta National Hospital. Fewer researches have focused on measuring end-user satisfaction with HIS in Kenya. End-user satisfaction assessment was vital in ensuring HIS reliability, quality, maintainability and sustainability for its life and duration of system lifecycles. User requirements are vital and need consideration before system implementation. Failure to consider the specific user requirements during implementation may result into resistance from the intended users, and consequently system failure. It was fundamental to conduct more of the empirical investigations to identify benefits and weaknesses of HIS for better understanding of the requirements for different user groups. However, Fatima JALIL et al, (2016) in the study of "The Impact of the Implementation of the ERP on End-User Satisfaction Case of Moroccan Companies" observed that current trends relating to the implementations of HIS indicate that user satisfaction progressively depends on other dimensions just like in organizational management. The dimensions include infrastructural changes in data communication, hardware, user involvement and training.

GENERAL OBJECTIVE

Objective of the empirical study was to measure end-user satisfaction with Hospital Information Systems capability in hospitals of Nairobi County, Kenya

SPECIFIC OBJECTIVES

1. To investigate how the service quality of hospital information systems capability influences the end user satisfaction in Nairobi County, Kenya
2. To establish the effect of system quality on the end user satisfaction capability in Nairobi County, Kenya
3. To determine how information quality and mediatic of the hospital information systems capability influences the end user satisfaction in Nairobi County, Kenya

THEORETICAL REVIEW

The Theory of Reasoned Action

Ajzen & Fishbein, (1980) and Fishbein & Ajzen, (1975) developed the theory of Reasoned Action (TRA) over Information Integration theory as an improvement It defines relationships between beliefs, attitudes, norms, intentions, and behavior. According to Theory of Reasoned Action, an individual's behavior regarding use or rejection of technology is of intention to perform behavior. According to Dillon & Morris, (1996), the intention is a product of the

individual's attitude and subjective norm, referred to as "the person's perception, that most people who are important to him expect he should or should not perform the behavior in question".

Attitude towards a behavior is a product of beliefs about the consequences of the behavior and effective evaluation of those consequences according to TRA. Beliefs are the individual's subjective probability that performing a given behavior will result into a given consequence. Fishbein and Ajzen (1980) argued that affective evaluation is "an implicit evaluative response" to the consequence thus, the attitude construct in TRA is general in nature and not anchored to any given belief set. Dillon & Morris (1996) and Fishbein Ajzen (1980), postulated that the theory presents an information processing view of attitude formation and change, which proposes that external factors influence attitudes only through changes in the person's belief structure. Dillon & Morris (1996) further observed that attitude alone does not solely determine behavioral intentions. Intentions are determined by subjective norms as well, which, in turn, are determined by an individual's normative beliefs and motivation to comply with perceived norms. The result is a generalized model for understanding the determinants of human behavior in situations where people may exert their choices.

In view of the TRA, users can decide to reject or even accept HIS because of the attitudes formed but not necessarily that the system meets their operational requirements or not. Postulations of Dillon & Morris (1996), Fishbein, and Ajzen (1980) both of whom argued that attitude formation and change can be influenced by external factors through changes in the person's belief structure strengthen this argument. End-users similarly sometimes reject HIS because of normative considerations but not because they have not met the operational requirements. System success therefore is subject to a number of factors that range from personal beliefs to technical performance. Choice of the Theory of Reasoned Action is relevant to this study because it points out circumstances, other than technical features under which HIS can be rejected or acceptable to end-users.

Socio-Technical Systems Theory of Acceptance

Socio-Technical Systems Theory of Acceptance has gained traction in analysis of the organizational impact of technology. According to Dillon & Morris (1996), this theory views any organization as an open system of interdependent sub-units, transforming inputs to desired outputs. They further noted that the term "socio-technical" has become synonymous with almost any analysis of a configuration of technology and users since this theory has moved on from its original psychodynamic model of human behavior. This theory is based on the premise that technology on its own (in the form of its technical capability) has little meaning for purposes of organizational analysis, being truly comprehensible only in terms of the context in which it is embedded and, by extension, the organizational goals or transformations that it serves or enables.

Moving beyond a concern with one user and an interface, socio-technical systems theory argues that a network of social relationships surround all working practices such as cooperation among

workers over the course of a task, supervisory relationships, and general social interaction. For a technology to be gainful to any organization there must be the ability and willingness of users to employ it for worthwhile tasks. As such, it was postulated that any technology could not be analyzed or understood in isolation of the goal-oriented organization it is intended to support. To optimize both social and technical attributes of any organization, there must be an allowance at the engineering level of the social dynamics of any organization or sub-unit within it. Various researchers and practitioners in Europe, Asia, and North America have criticized this theory, as being more management-oriented than truly user-centered. Additionally, concerns that participant users may become victims of groupthink over time, that power in making design decisions resides with the same management groups, and that the theory takes an overly simplistic view of job satisfaction have been raised as serious concerns.

Socio-Technical Systems Theory of Acceptance was relevant to the study because it introduces the need of technology in service delivery and links the individual employees with task performance. The theory recognized that technology could only meet its purposes if the organization is structured and goal oriented in consonance with technologists' belief that a computer system works best for an organization that has proper manual working systems. Technical solutions are goal oriented and analyzed against specific performance variables and goals. The results, in such cases determine acceptance or rejection. Similarly, HIS would be accepted or rejected in relation to how it helps the organization in goal achievement. Socio-Technical Systems Theory of Acceptance was relevant to this study because it undertook to give circumstances under which HIS can be acceptable to the end-users or reject.

Total Quality Management (TQM)

The main theoretical framework underlying this study is the system theory of management, regarded as one of the Total Quality Management (TMQ) approaches espoused by quality management writers such Dobbins and Crawford-Mason, (1998). The system theory views organizations as unified and purposeful systems of interrelated parts. This approach expects management to look at the organizations as whole and as part of larger, external environment. As Bertalanffy et al (1956) pointed out, the system theory tells us that the activity of any part or segment of the organization affects, in varying degrees, the activity of every other segment. This presupposes that every part of the system including the workforce must work to support each other. When the sub-systems of an organization do not support each other, then the organization cannot focus on quality management. According to Weihrich et al (2008), the theory emphasized that every organization interacts with the internal and external systems by drawing resources from the environment and providing output.

According to the system theory, every organization has two major inputs. The first input is the human resources that come from people who work in the organization by contributing their time, energy and value systems to the organization in exchange for wages and other tangible and

intangible benefits. According to the work of Wilkinson (1994), there are the non-human resources, consisting of raw materials and information, technology and physical infrastructure among others. The human and material resources are inputs into the system and are transforming into final products and services to satisfy consumers. For instance, the hospital inputs are its staff, supplies, and patients.

The patients go through the application of medical knowledge and treatment, and the inherent organizational culture and value systems. The output is patients restored to a level of psychological and physical health consistent with the severity of the diseases. The system receives feedbacks from the external environment for assessment in terms of quality of service. Organizations assess feedback of services provided through customer surveys and their systems improve through the results of such surveys upon implementation of recommendations. Von Bertalanffy (1962) stated that management must coordinate activities of the entire organization and recognize that the organization is an element of the larger system, consisting of individuals, organizations and institutions that make demand on the organization because of their dependency on it for some valued services.

The initial implementation was non-formalized. In the decision-making and management process, the pattern among nurses and doctors respectively differed. While nurses' decisions tended to be problem-oriented and managed on a person-driven basis, doctors' decisions were consensus-oriented and managed by autonomy. All, however, experienced a knowledge-based execution of the research results, as the implementation process ended. The results illuminate the challenges involved in closing the evidence-practice gap and may add to the growing body of knowledge on which basis actions may take place to ensure the best care and treatment available actually reaches the patient.

Application of systems theory in assessing end user satisfaction in healthcare services takes cognizance of inseparability of the product or service from the providers. This qualifies the need for continuous quality assessment on the system to guaranty delivery of quality services to clients. End user satisfaction is an overriding factor for clients that make regular visits to health facilities for treatment and pay for the services rendered. As such, it is imperative that clients receive quality services from medical professionals in exchange of payments that they make. The ability of health care management to establish systems to improve service delivery will determine a repeat visit to the same facility next time. In harmony, J Ofosu-Kwarteng (2012) argued that this situation occurs with increasing availability of equally competitive services at their disposal.

EMPIRICAL REVIEW

Aveyard (2010) defined literature review as a "comprehensive study and interpretation of literature that addresses a specific topic". He postulated that it is a preliminary review before a larger study to critically assess the current literature and rationalize why further study and

research is required. In this study, Literature review refers to work or studies of other researchers' empirical knowledge on research problems similar to other people's areas of study to establish what their conclusions, strengths and weaknesses were, to present solutions and establish new knowledge on the same topics. End user satisfaction is described as the

M. M. Yusof, et al (2008) described modern hospital information systems (HIS) as comprehensive, integrated and specialized information systems designed to manage the administrative, financial and clinical aspects of hospitals and healthcare facilities. They are considered one of the most important focal points on which the delivery of healthcare within hospitals and different types of medical institutions depend. Dulce Magalhaes (Copyright: © 2008) in Encyclopedia of Networked and Virtual Organizations, defined end-user satisfaction two different concepts namely process oriented and outcome-oriented. Process-oriented concept is the difference between expected satisfaction and achieved satisfaction whereas the outcome-oriented approach regards satisfaction as an attribute extracted from a product or service after its consumption. This study adopted Vassilios P. Aggeelidis et al (2012) version of out-come oriented approach and treats end-user satisfaction as affective and cognitive evaluation of the pleasurable level of consumption-related fulfillment experienced with the HIS. User satisfaction is an indicator of perception on success of the HIS and therefore is an important parameter to use when evaluating systems.

End-user satisfaction with HIS capability survey measures how well the users' expectations concerning the system are achievable. Earlier scholars, used end-user satisfaction as a key measure of computer system success. However, the development of techniques for defining and measuring user satisfaction was ad hoc and open to question. User satisfaction is a factor of system quality, service quality and information quality. The major focus areas in this research included quality of the system, time scales such as access and response time, and technical personnel on responsiveness, politeness, attentiveness and helpfulness among other concerns.

Vassillios et al (2008), conducted a survey of Hospital Information System, by measuring end user computing satisfaction, in which they empirically tested the D&M model (2003) using data from HIS users, correlation, explanatory and confirmation factor analysis to test reliability and validity of the measurement models. This study employed qualitative method, which lacked physical experience with the users to explain exactly what their expectations with the systems would have been. Further, relying on other researchers' findings alone cannot provide conclusive results since different scholars had varied objectives and employed different methodologies. The most reliable outcomes from such studies are achievable when similar methods, timings and situations are not varied. According to DeLone and McLean, (2003) model, qualitative studies provide details of logical nature such as emotions, human behavior and personality characteristics. Hence when applied in the study of end user satisfaction, the method does not really give quantifiable results that are of significance. Similarly, C.L. Hughes (2014) suggested

that data obtained from qualitative research simply describes qualities that cannot convert to numbers.

Indah et al (2011) used Kruskal-Wallis test to analyze the data on some 248 respondents drawn from different departments, in two hospitals using similar HIS. The results showed that there are significant differences between different types of users for HIS, in regards to quality of HIS interface, quality of function and quality of performance among others. Different results observed may probably occur due to levels of customization, training or experience and computer literacy of HIS users in the hospitals. The aforementioned factors are capable of determining the level of use and quality of HIS and by extension impact on end-user satisfaction.

RESEARCH METHODOLOGY

Research design

A research design is a plan or strategy that moves from the underlying theoretical assumptions to specifying the selection of respondents, the data-gathering techniques to be used and the data analysis to be done (Nieuwenhuis, 2010). This study adopted descriptive research design and descriptive methods. In particular, the study espoused a quantitative, cross-sectional study design to assess end-user satisfaction level. The key purpose of descriptive research is that, it describes the state of affairs, as it exists at present. Descriptive Research design describes data as characteristics about the population or phenomenon under study. It answers the questions who, what, where, when and how. This study sought to assess end user satisfaction with hospital information systems capabilities in healthcare service delivery in selected hospitals of Nairobi County, Kenya. Descriptive research seeks to portray accurately the characteristics of a particular situation or group in which the researcher has no control over the variables and can only report on what is happening. Descriptive research depicts the participants in an accurate way. It involves observation in which case participant are viewed and recorded, case studies which is more in-depth and survey which involves interview or discussion with an individual about a specific topic. Observation research (or field research) is a non-experimental research whereby a researcher observes ongoing behavior. Observational research is mostly common in the social sciences and in marketing. It involves the direct observation of phenomena in their natural setting. It is typically divided into naturalistic (or "nonparticipant") observation, and participant observation (Atlast.ti: Quantitative Data Research, 2018). This observation method is preferred because it does not allow researcher to manipulate variables. It allows measurement of what behavior is like. Nevertheless, this method also has limitations that include its incapability to explore the real causes of behaviors, and inability to determine whether observation is true representation of an episode. The questionnaire used for this study was designed based on the study's conceptual framework by the researcher. It was subjected to critical reviews to guarantee its face and content validity. Data collected through the questionnaires was analyzed using SPSS and the results presented in tables and graphs.

Target Population

According to Ogula (2005), a population refers to any group of institutions, people or objects that have common characteristics. The target population for this study constituted total number of staff in the 30 hospitals in Nairobi County, which are nationally recognized hospitals, comprising of six (6) public and twenty-six (24) privately owned and managed hospitals as provided in the Kenyan Hospital Directory. Hospital information systems are licensed based on the hospital bed capacity. The scope of this study was limited to hospitals with bed capacity of 100 and above. This is because any hospital with a bed capacity of 100 and above would require a robust hospital information system. The table below is a list of hospitals with bed capacity of 100 and above in Nairobi County:

Table 1: Bed Capacity of Major hospitals in Nairobi County

Hospital Name	Bed Capacity
The Nairobi Hospital	355
Kenyatta National Hospital	1800
Aga Khan University Hospital	254
Nairobi Women's' Hospital	225
MP Shah Hospital	200
Mathare Mental Hospital	700
Mater Misericordiae Hospital	600
Nairobi West Hospital	150
The Karen Hospital	103
Mbagathi County Hospital	200
Mama Lucy Kibaki Hospital	120
Total Bed Capacity	**4707**

Source: Hospitals' Websites

Inclusion Criteria

The selected hospitals have a bed capacity of 100 and above and the HIS had been operational for a period of not less than one (1) year. Aga Khan University hospital did not grant permission for the survey and therefore was excluded from the sample calculation despite meeting the inclusion criteria.

Exclusion criteria

Hospitals with bed capacities that are lower than 100 were excluded from the population size. Hospital Information Systems that had not been used for a period exceeding year were excluded from the study.

Sampling Procedure

A sample is a smaller group or sub-group obtained from the accessible population according to Mugenda and Mugenda (1999). This subgroup was carefully selected to be representative of the whole population with the relevant characteristics. Each member or case in the sample is referred to as subject, respondent or interviewee. Sampling is a procedure, process or technique of choosing a sub-group from a population to participate in the study (Ogula 2005). It is the process of selecting a number of individuals for a study in such a way that the individuals selected represent the large group from which they were selected. The study applied random sampling procedures to obtain the respondents for questionnaires. The sample frame of the study included a representative sample of the 30 nationally recognized hospitals comprising of six (6) public hospitals and twenty-four (24) privately owned and managed, according to current directory of hospitals. The sampling frame for this study was a purposive one of the major hospitals in Nairobi County with bed capacities of at least 100. Purposive sampling involves an investigator selecting units that are representative or typical of the population, primarily relying on expert judgment or experiences of the unit (Singleton and Straits, 2005). The total number of employees in the selected hospitals was 16000. The population size was calculated with recourse to the estimated proportion approach since the exact total population of staff in each hospital who use HIS for their daily operations was unknown in accordance to Cochran (1977) and Amponsah. E, (2009). Mugenda and Mugenda (2003) on their part claimed that when the total population is not known, then a sample size of 10-50% is acceptable. They argue that a proportion of 50% indicates a greater level of variability. This sample size calculates to 0.5 representing healthcare workers who are satisfied with HIS. The sample size is therefore calculated using the formula.

$$n = \frac{z^2 pq}{d^2}$$

Where: n = the sample size; Z = the standard normal deviate (1.96); p = the proportion of users estimated to be satisfied with HIS. This is taken as 0.5; $q = 1 - p = 1 - 0.5 = 0.5$; d = margin of error, taken to be 5 % as the acceptable sampling error in this study

$$n = \frac{1.96^2(0.5 * 0.25)}{0.05^2}$$

=384

$$n0 = \frac{n}{1 + \frac{n-1}{N}}$$

$$n0 = \frac{384}{1 + \frac{384-1}{16000}}$$

$$n0 = \frac{384}{1.0239375}$$

$$n0 = 375_{\pm 10\%}$$

Using this formula, a sample size of $375\pm10\%$ was identified. The sample size of each hospital was calculated by getting the proportion of the number of staff in the hospital out of the total population (N).

Research Instruments

Structured questionnaires were the main data collection tools used to obtain important information about the sample. Each item in the questionnaire addressed a specific objective or research questions. The questionnaires were administered through self-infilling (which involved either online or a printed questionnaire) and face-to-face interviews. Face to face filling of questionnaires was essential for those people who needed assistance with understanding them. The questionnaires constituted a number of questions printed in a definite order on a form or a set of forms. Questionnaire design was simple and relatively short. It ensured that the questions asked proceeded in logical sequence moving from easy to questions that are more difficult. It avoided technical terms and vague expressions that could lead to misinterpretations. The questions asked were dichotomous requiring yes or no answers, multiple choices or having alternative answers listed or open-ended questions. Finally, the physical appearance of the questionnaire was good and attractive. As a measure to ensure effectiveness of the questionnaire, a pre-test study was conducted at Kenyatta National Hospital Paediatric Emergency Unit (P.E.U), to test whether the questions were gauging what they ought to measure, the wording was clear, questions were interpreted the same way, presence of research biases and time it took one respondent to fill the questionnaire. The use of questionnaires was preferred in this study because it permitted survey of more participants, eliminated geographical barriers and allowed participants to have sufficient time to think about the questions. The pretest study revealed that some respondents were misplacing the questionnaires while others damaged them and this informed the need to have more questionnaires issued out to help meet the target.

Data Analysis

Data analysis is the process of developing answers to questions through the examination and interpretation of data. The basic steps in the analytic process consist of identifying issues, determining the availability of suitable data, deciding on which methods are appropriate for answering the questions of interest, applying the methods and evaluating, summarizing and communicating the results. Mugenda (2009), maintained that data analysis is essential for understanding results from surveys, administrative sources and pilot studies; for providing information on data gaps; for designing and redesigning surveys; for planning new statistical activities; and for formulating quality objectives. In this study, both quantitative and observed

data originated from the field. Data obtained from the questionnaires were organized and coded according to the research objectives and research questions of the study. Data was analyzed based on descriptive statistics and observations. The descriptive statistics included the usual parameters (frequency, inferential). Statistical Package for Social Sciences (SPSS), version 22.0 and MS Office Excel 2013 were used for analyzing the descriptive data collected.

RESEARCH RESULTS

The study examined the relationship between end user satisfaction and user background, service quality, system quality, information quality and support factors. A population of 374 users from 10 hospitals both public and private participated in the quantitative study.

User Background

User background plays significant role in end-user satisfaction measurement as it looks at critical contributing features of systems use, which include users' experiences, training and skills that associate it with HIS success which leads to end-user satisfaction. This finding agreed with previous research by Prodromos D. Chatzoglou et al, (2012) in the Journal of Biomedical entitled "Informatics Hospital information systems: Measuring end user computing satisfaction (EUCS)". HIS development must be grounded and adapted to users' abilities and requirements for them to accept and be satisfied with its capabilities. The statistics indicate that users' education background, work experience and computer skills have direct effect on end user satisfaction. The relationship between user background and satisfaction is such that the more experienced, skilled and trained by organizations, vendor or college users are; the more satisfied they are likely to be. From the findings, majority of the respondents with above high school qualifications were either moderately satisfied or very satisfied with the quality of services provided by HIS. The level of user training about system use, whether through certified courses, skilled trainings whether in house or on job, user manuals and guides provide users with requisite skills for operating HIS. Once end-users acquire knowledge about the basic functionalities of systems, they accept and use it and that increases their satisfaction levels. However, users without some basic knowledge and technical skills resist systems because of uncertainty and fear of job losses. Until such users undergo training and facilitated with operational skills, their satisfaction levels remain low.

Work experience with Hospital information systems and computers were important features in determining end-user satisfaction with HIS as indicators of the duration and level of individual employees' prior use of computers and systems. With system experience, users were able to evaluate qualities and apply the knowledge to exploit all relevant features in performing duties. The patients benefit from skilled work as recipients of improved services. Computer proficiency and prior knowledge of HIS constitute positive work experiences that determine system acceptability and end-user approval. Users with work experience of 26 years and above indicated lower satisfaction rating with HIS compared to those who have worked for fewer years in their organizations. These findings confirm the findings by Prodromos et.al (2012) that user

background positively affects user satisfaction. Training is an important factor for satisfaction and consequent acceptance of HIS because it provides the skills and competencies of efficient operation and service provision that in itself brings job satisfaction to the users. Furthermore, the relationship between background and user satisfaction was significant to the study. Training, experience and prior knowledge relate directly or indirectly to theory of Total Quality Management. TQM's key principles include educational, training, customer focus, quality improvement, user involvement and empowerment among others, which are among determinant factors of end users' satisfaction.

This study has established that end users' background that comprised of the education background, period of service to the hospital and prior experience with computer systems form the backbone of user background that affected end-user satisfaction. These findings confirm what other researches like those that Prodromos et al (2012) studies revealed about user background as a feature of end-user satisfaction with HIS. In the study, work experience, training and user skills constituted satisfaction although other researchers opposed this position in their past researches.

Service Quality and End User Satisfaction

Service quality of hospital information systems was determined by a number of interdependent factors that included the computing environment, variety of services offered by the Information Technology department, reliability of IT support services, timeliness of service and prioritization of end-user requests by the IT personnel. The organizational and individual factors include the top management support, frequency of system usage, improved work conditions and end-user participation. It was established that user support played an important role in end-user satisfaction with HIS, similar to findings of Vassilios P et al in Journal of Biomedical Informatics (2012).

The study found service quality to be an important feature for measuring end user satisfaction of HIS and its consequential effect on end-user satisfaction is significant. Service quality was assessed in relation to technical support provided by the ICT departments. End users of HIS were found not to be privy to technical aspects of systems and relied entirely on the technical departments to provide support as they use the system. The technical support provided addressed challenges that the system users faced and this caused satisfaction among them. In this study of respondents were satisfied with the computing environment in respect of technical support. Statistics for computing environment had Mean Score of 3.34, standard deviation of 1.11 and confidence interval of 3.32 on the lower limit and upper limit of 3.45 and also P-Value of Chi=121.080, df=4, p=0.000 and a satisfaction index of 58.5% all of which indicated that computing environment was a factor of service quality which indicated satisfaction of the end-users. Evaluation of variety of services provided by IT department demonstrated that support provided by IT departments to system users contributed to their satisfaction of using HIS.

The study found service quality to be a major element in determining user satisfaction of end-user satisfaction with HIS capabilities. Service quality was measured in terms of performance of ICT technical staff's response to support and service requests from system users whenever they experienced any problems with system functionalities or the general IT infrastructure. The results are similar to the findings of Maloca Bossed Ajose (2012) study on Information System users' satisfaction survey of the Post Graduate School portal, University of Ibadan, Nigeria.

Muneer Banu et al, (20103) in the study on "User Involvement in Software Development and System Success", found user involvement to have positive impact on success of software and its eventual acceptance. The findings agreed with the Theory of Behavior in which involvement of users in the development of systems was found to contribute to user acceptance and eventual satisfaction with them. The study further established involvement of users by gathering their views and operational requirements as well as collecting and collating suggestions to be considered when looking for an appropriate system and involvement at implementation stages as well. The institutional management too needs to be involved in system acquisition and implementation for their support and approval to ensure smooth implementation both in terms of funding and goodwill.

The results showed satisfaction index of between 50% and 60% in all service quality measurements implying a level of satisfaction which is in conformity with the SERQUAL model of DeLone and McLean. As stated by Kabir and Carlsson (2010), "if the expectations exceed the perceptions about the services, then the quality of the services is considered poor; if the perceived service behavior exceeds the expectations, then the quality of service would be considered exceptional and if the perceptions meet the expectations then the services will be considered good". In this case, the results from the study indicate that the perceived services exceed end user expectations, and therefore the quality of service is exceptional. Service quality has been proved to be one of the factors that, according to Prodromos D. Chatzoglou et al (2012), in the study of Hospital information systems: Measuring end user computing satisfaction (EUCS), influences end-user satisfaction and hospital information system acceptance and use. The major player in service quality is the IT department of hospitals as the study has established that it is the support services they provide that constitute users' satisfaction. Such support could be sourced either internally or externally from vendors provided solutions are found for user challenges. The other services IT departments provide include data security to ensure availability, currency and correctness of data, both on transit and at rest, connectivity, storage in safe locations and training to equip them with more operational skills of the technological devices. Service quality thus becomes key feature of end-user satisfaction with HIS in hospitals of Nairobi County, Kenya. Results have made relevant the theory of Reasoned Action by establishing that end-users willed to use HIS when support service were made available to them.

System Quality and End-user Satisfaction

System quality refers to the excellence of information processing which comprises software and data resources. According to Narasimha Gloria et al (2009), quality measures the extent to which HIS is technically sound. The study has found system quality to be a significant attribute for measuring end user satisfaction of HIS in hospitals of Nairobi County, Kenya. The findings are in congruence with that of Indah Mohd Amin et al (2011) in their publication "Assessing User Satisfaction of using Hospital Information System (HIS) in Malaysia".

Quality is a significant aspect of HIS that impacted on end-user satisfaction and is measurable by ease of use, system speed, data display, documentation, security and recovery of errors among others. System quality was measured in this study in terms of its outputs, ability to offer chance for reversal and correction of errors, ease of use in regards to its menus and customization, communication and exchange of data among users, reduction of waiting time, security protocols, network connectivity, information needs modification and ease of database access. Results show that all the above criteria had acceptance ratings ranging between 56.1% and 83.2% culminating into an overall average of 77.8% and Chi2=115.679, df=1, p=0.000. It is evident from results of this study that HIS users needed a system that allowed modification for efficient and effective patient care and ease of use in terms of menus and customization that are key satisfaction factors, which conformed to supposition of Davis et al (1989) in The Technology Acceptance Model (TAM) on Perceived ease-of-use. For end users, HIS must be able to present outputs in designed layouts and graphical formats that make it easy to read and interpret. The users also required HIS with ability to offer chances for reversal and correction of errors made during operation to minimize them. It also featured prominently from the study that HIS should enable users to freely communicate and exchange data amongst themselves. This has the potential of reducing paper work in healthcare organizations and by extension reduce stationery budgets, allowing such funds to be reallocated to other budgetary concerns. With growth in the hospitals and increasing number of patients requiring different services in a fast-developing County, it is imperative that systems have speed to enable quick delivery of service to the clients. The results obtained confirm that there is a positive correlation between system quality and end user satisfaction with hospital information systems. This finding supports the earlier study by Prodromos D. Chatzoglou et al (2012) who referenced DeLone et al (1992), basing their arguments on DeLone et al (2003) model Information Systems success. The results of this study confirm the findings of Maloca Bossed Ajose (2014) in "Information Systems User Satisfaction" which postulated that system quality and user satisfaction perceived ease of use as the most common measures of system quality in conformity with Davies' (1989) TAM, in research. The study also singled out system flexibility, ease of use, reliability, user friendliness and fast response as factors of user satisfaction.

Results of this study have proved the theory of Total Quality Management (TQM) confirming the role of healthcare providers as human resources that devote time, energy, value systems and skills to use IT infrastructure as tools for processing data and providing services to the patients in satisfactory manner collectively. Further, based on assessed quality features, the study proved that system quality contributes significantly to end-user satisfaction with hospital information systems. The findings are similar to suppositions of Vassilios P. Aggelidis et al (2012) where they measured end user computing satisfaction with Hospital Information Systems.

Information Quality and End User Satisfaction

Information quality denotes measures of HIS outputs that comprise of accuracy, content, format, timeliness and data security among others. The study measured information quality of HIS in relation to accuracy, completeness, provision of timely information, security of data, clarity of content and availability of information that are significant features for quality decision making.

Complete and accurate information lead to making of sound decisions by management that contribute to the betterment of healthcare provision in hospitals. The content of information generated by HIS satisfies users when it meets their requirements. System speed too helps in processing data in good time for timely decision making in hospitals. The screen formats help in quick and correct entry of data into the system for processing. The study revealed that information quality, completeness and security contribute significantly to satisfaction with hospital information systems. It is evident that there is a high positive relation between information quality and end user satisfaction. It can be concluded that if HIS provides sufficient, accurate, understandable and, timely information that is vital for quick decision-making and which is also secure with clear content then users will be satisfied with it. The findings on information quality measures and their influence on HIS end-user satisfaction are similar to the findings by Prodromos D. Chatzoglou et al (2012), in their study of "Hospital information systems: Measuring end user computing satisfaction (EUCS)" whose results indicated that system quality and information quality, are statistically significant and had a positive relationship with the overall end-user satisfaction.

Hospital Information System Success Model Dimensions

End-user satisfaction with HIS has proved to be a factor of system quality, information quality and service quality, which all determine whether systems used are satisfying and beneficial to users. Results of this study show that different Hospital Information Systems used in hospitals of the Nairobi County, Kenya, respond positively to satisfaction attributes.

Quality of the system was evaluated by output designs, graphical format of presentation, ability to offer a chance to reverse and correct mistakes. It was further meted in terms of ease of use in terms of menus and customization, ability to communicate and exchange data among user departments, provision of complete and secured information, reduction in waiting time, system

access protocols, network connectivity, chances for improvements in system efficiency and effectiveness and ease of accessing patient database to solve problems. The overall system quality satisfaction index indicated end user satisfaction. Information quality of the system was measured in relation to whether it provided sufficient information that is accurate, clear and understandable, timely and improved quality of decisions by making information readily available. The study showed there was average satisfaction with information quality of HIS but which still was an above average acceptance rate.

Service quality of HIS was assessed in relation to recording of patient medical data, ability to consult information from external systems, allowing entry of administrative data concerning the patient, availing medical data concerning patients, obtaining and analyzing statistical information about the hospital and individual units and displaying of clinical practice guidelines. It too was subjected the manner in which it supported conduct of clinical research, displaying administrative data about patients, support of communication between departments, ability to analyze trends and develop budget forecast and support Medical Decision Support (MDS) about diagnosis and treatment of patients.

The study results showed that system acceptance by users is influenced by a number of mediating factors that are part of its operational activities. These factors include both internal and external support by IT professionals who provide support to users as and when they required it and ensure that systems run smoothly in their organizations. Sometimes the technical staff may seek help from contracted firms or system vendors to provide other services that are not available within their ranks. Training of users on system operations has proved to be crucial to users because it facilitates them with requisite operational skills and competencies that help to build knowledge base for hospitals and ensure efficiency in their usage. When properly trained, end-users tend to accept HIS and accept it as an operational tool in service delivery to the clients. Documentations and guidelines on the systems features and usage provide reference materials for users and helps to reduce waiting time since instead of waiting until IT professionals attend to their requests, they can read and resolve problems on their own and continue attending to clients.

Lyn A Hammer et al, (2010), in their Multi-Method Study of Factors Associated with Hospital Information System Success in South Africa, established other mediating factors like support by top management and their commitment to success of HIS implementation which confirmed postulations of the Theory of Reasoned Action. Ergonomics, which ensure that computer workstations, chairs and displays are appropriate for the end-users' work environments. In selecting Hospital Information Systems, it is important to consider ease of using them, involvement of end-users by taking their operational needs into consideration among other factors are sure ways of ascertaining satisfaction with HIS. Without the aforementioned mediating factors, users can reject systems even when they respond to their operational requirements but they are not comfortable working with them.

Net benefits of Hospital Information Systems are that they contribute to effective and efficient service delivery of healthcare to patients for their wellness, which also is factor of productivity to the County, and Country as a whole. When the people are healthy, then they are able to work and create products that lead to increase in growth of the Gross Domestic Product (GDP) of the country and that can help the Country to become Middle Level Income Economy by the year 2030.

CONCLUSIONS

Hospital Information System plays a vital role in modern healthcare service provision. On the other hand, end user satisfaction is critical for the existence of information system itself. This study assessed the relationships between service quality and end-user satisfaction, information quality and end-user satisfaction and system quality and end user satisfaction. The study looked at three relevant theories and analyzed several existing literatures contained in previous studies to meet its objectives. The sample comprised of 10 hospitals of Nairobi County, Kenya that were drawn from both public and private institutions. This study targeted all categories of healthcare workers who use HIS in various departments they are deployed. A total of 374 human participants took part in the study by filling and returning the questionnaires. Statistical Package for Social Sciences (SPSS) was used to analyze responses received and test relationships between the independent and dependent variables identified in the conceptual framework. The results of this study have shown that service quality, Information quality and system quality positively affect end-user satisfaction in varied degrees, based on determinant factors for every independent variable, in conformity with findings of Prodromos D. Chatzoglou et at (2012) on Hospital Information Systems evaluation. In their study, they concluded that user background directly affects user satisfaction. They also proved that Information quality and service quality had impact on end user satisfaction. Triantafillou Dump (2009) in her Thesis on Hospital Information System Evaluation, also confirmed the same results.

In conclusion, end-user satisfaction has proved to be a dependable assessment measure for Hospital Information Systems Capabilities in hospital of Nairobi County, Kenya and even beyond. This was revealed by overall results which indicated that nearly all categories of end-users were satisfied with overall functionalities of HISs. Some users also expressed dissatisfaction with their systems in some cases user involvement was restricted during the design and implementation, inability to address certain basic user operational needs by the IT personnel and failure of networks.

RECOMMENDATIONS

The findings of this study should lead healthcare institutions to appreciate the importance of information technology healthcare service delivery. It is also important to for hospital managements to recognize that information technology is only useful when end-users of Hospital Information Systems are satisfied with their functionalities and accept them. Finally, there is

need to conduct comparable studies in the future to attain all-out sustainability of Hospital Information System capabilities.

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