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STRATEGIC MANAGEMENT

MODERATING ROLE OF STAKEHOLDERS COLLABORATION ON THE RELATIONSHIP BETWEEN TECHNOLOGY ADVANCEMENT AND PERFORMANCE OF HOSPITALS IN KENYA

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ABSTRACT

Purpose of the study. This study sought to establish the relationship between technology advancement and performance of Hospitals in Kenya with stakeholder's collaboration moderating this relationship.

Problem Statement: High percentage of Hospital capital investment is directly associated with technology advancement and this has been identified as an important factor for clinical and financial performance. Implementation of Hospital technologies interventions such as minimally invasive surgery, robotic surgery and cardiac catheterization has improved the quality of care, reducing recovery times, mortality rate and resulted to revenue generation. Due to these interventions there is dire need to link technology advancement and performance of hospitals seeking immediate return on investments. There is insufficient evidence in literature that exists on the relationship between technology advancement and performance of health care sector. Hence, the relationship remains dim. In addition, limited literature on the role of stakeholder's collaboration on the relationship between technology advancement and performance of hospitals exist. Moreover, scholarly work in this thematic area has been majorly implemented in Developed Nations creating a contextual gap in the body of knowledge. It is against this background that this study was conducted.

Methodology: The study employed moderated multiple regression (MMR) analyses and structural equation modeling (SEM) to test hypotheses and fit the theoretical models. The study sample comprised of 228 Hospitals.

Results: The study revealed that stakeholder's collaboration significantly moderated the relationship between technology advancement issues and performance of hospitals in Kenya.

Conclusion and Policy Recommendation: The study concludes that stakeholder's collaboration moderates the relationship between technology advancement and performance of Hospitals in Kenya and it's the key driver of future cost and major source of economic wealth. Hospitals in Kenya should embrace technology advancement strategies in all its areas of operation as this would result in effective and efficient care for the patient and reduce medical errors experienced in health care. The study recommends that comprehensive electronic health records systems are rare and the role of direct network effects may increase

as formal information exchanges are fully implemented and more sophisticated IT systems are adopted by both Physicians and Hospitals.

Keywords*: Technology advancement, performance, Stakeholder collaboration, Hospitals*

INTRODUCTION

One of the major competitive advantages of the 21st century in business environment is the advancement of technology. This has recently been of great concern to scholars in different fields as they try to figure out how it affects the operations of organizations that rely on it (Cascio & Montealegre, 2016). Additionally, they further explained how globally, technology has been able to shape the life of people and the way they conduct businesses. Murray (2015) finds technological innovations as a major contributor in designing products and services that are required in a world characterized by diversity and open market as a result of globalization.

Globally, the use of electronic medical records (EMR) is still low, but is increasing in primary care in countries like Canada, the United States and Great Britain. Information on medical care in EMRs is an important source for clinical research and policy issues. Information technology infrastructure in hospitals helps to improve customer relationship management by improving the journey of each patient through the healthcare process. The technology of computerized prescription order entry is aiming at reducing communication errors and serving as a platform for treatment guideline automation; it enables the electronic entry of physicians' orders for examinations and treatment of patients, which are communicated over a computer network to the medical staff of the pharmacy, laboratory and radiology departments responsible for fulfilling these orders, and finally the results are communicated back to the physicians (McCullogh, 2008).

The use of information technology such as Medical record automation, electronic appointment scheduling, Internet use for communication purposes, and the use of magnetic cards in hospitals has been adopted by developed and Third world countries. Information Communication Technology has been able to facilitate the creation of new employment opportunities due to its ability to make innovations in the way work is done (Chege, Wang & Suntu, 2019). This implies that organizations that do not embrace technology risk being phased out due to their inability to make innovations that are inevitable in the current business setting. Mans (2011) affirmed that patients now have more choices in many parts of the world as to where they receive their healthcare services, putting additional pressure on hospitals to remain competitive.

Internet penetration rate in Kenya in 2015 was 69.6%, exceeding global and African rates by 48.6% and 28.1%, respectively. Studies have shown that one third of the population (16 million people) have access to at least one mobile device. The use of mobile devices complements current hospital visits and will replace these physical interactions in the future, helping to alleviate the congestion of health facilities and to overcome the limits of geographical barriers. Kenya has already seen numerous MHealth products. In Kenya, health information systems have been recognized as an important part of the health system with a dedicated division at the Ministry of Health which has the responsibility of collecting, collating, analyzing, publishing and disseminating health information to all stakeholders in both public and private sectors for evidence-based decision making (Kenya Government, Ministry of Health, 2014). It has been proposed that health care could be transformed and health status of population improved in developing countries by reducing barriers and implementing adequate health informatics (Oak, 2007).

Hospital services are critical for operation of the hospitals since they are the fundamental functions that warrant the presence of these institutions. Therefore, hospitals should develop a clear service delivery mechanism for them to achieve the expectation related to hospital services. Consistency in healthcare operations is very essential since it allows predictability of the outcomes of hospital services (Buigut, Ettarh, & Amendah, 2015). Healthcare decision makers must find ways in which IT and operations can assist the delivery of high-quality patient care and help hospitals to operate as financially viable organizations. If managers do not leverage IT to improve patient flow, it will hinder their ability to serve a growing patient population and threaten hospitals' financial viability. According to Owino (2017), effective collaboration with healthcare stakeholders in various organs of the government, international agencies, non- governmental organizations and other key stakeholders will help in upgrading healthcare in Kenya

STATEMENT OF THE PROBLEM

Healthcare technology interventions represents a high percentage of hospital capital investment, it has long been identified as an important factor for clinical and financial performance. About 50% of the hospital's capital investment is spent on technological improvement initiatives. The health care sector has the capability to contribute more immensely to the Kenyan GDP towards this, vision 2030 outlines provision of healthcare as key to improving the quality of life for all Kenyans (Republic of Kenya, 2018). The GoK has initiated several reforms to improve healthcare service delivery including devolution of services and introduction of Managed Equipment Services (MES). Information technology integration (ITI) has been recognized by the GoK as one of the pillars that will help create a prosperous country that provides its citizens with high quality of life (Republic of Kenya, 2014). This initiative will help to improve the labor productivity, which leads to higher wage and GDP.

Implementation of Hospital technologies interventions such as minimally invasive surgery, robotic surgery and cardiac catheterization have improved the quality of care, reducing recovery times, mortality rate and resulted to revenue generation. Due to these interventions and integration of technology there is dire need to link technology advancement and performance of hospitals for hospitals seeking immediate return on investments. Besides, there is insufficient evidence in literature that exists on the relationship between technology advancement and performance of health care sector. Hence, the relationship remains dim. In addition, limited literature on the role of stakeholder's collaboration on the relationship between technology advancement and performance of hospitals exist. Moreover, scholarly work in this thematic area has been majorly implemented in Developed Nations creating a contextual gap in the body of knowledge. It is against this background that this study was conducted.

SPECIFIC OBJECTIVES

1. To establish the role of stakeholder collaboration on the relationship between technology advancement and performance of hospitals in Kenya.

2. To establish the moderating role of stakeholder's collaboration on the relationship between technology advancement and performance of Hospitals in Kenya.

In order to address the above objectives, the following null hypotheses were tested

RESEARCH HYPOTHESES

H_{01}: There is no relationship between technology advancement and performance of Hospitals in Kenya.

H_{02}: Stakeholder's collaboration does not moderate the relationship between strategic management practices and performance of Hospitals in Kenya.

THEORETICAL FRAMEWORK

More healthcare facilities are harnessing the benefits of health information technologies (HITs) as they integrate daily clinical and administrative concerns into a single spine digital platform consistent with the specific architecture of their digital needs. The study was founded on the theoretical underpinnings of Technology structuration theory, Theory of Swift and Even Flow (TSEF), stakeholder theories and Resource Based view theory.

Technology Structuration Theory

Technology structuration theory is drawn on the work of Giddens (1984) which look at the role of social systems, structures and practices in the adoption of technologies. Researchers have applied this theory to healthcare settings to explain how the same technological innovation may have similar or different impacts in different organizations and even between different departments within an organization (Barley, 1986; Goh et al., 2011). Rose (1998) points out that structuration theory has been used to theorize the field of information system and to analyze empirical situations.

Orlikowski and Robey (1991) stated that the tenets of structuration theory are applied to help understand the relationship between IT and organizations. The duality of technology is expressed in its constituted nature. Information technology is the social product of subjective human action within specific structural and cultural contexts. Its constitutive role information technology is simultaneously and objective set of rules and resources involved in mediating human action, and thus hence contributing to the creation, recreation and transformation of those contexts.

Barley (1986) described the introduction of computer tomography scanners into American hospitals, exploring how the actions of the stakeholders and the institutionalized traditions within the organization influenced each other as occasions for structuring. The power of structuration theory concepts to illuminate empirical situations has been thoroughly demonstrated by (Barley, 1986; Brooks, 1997; Desanctis & Poole, 1994; Karsten, 1995; Walsham, 1993. In her work Orlikowski (2000) developed the practical lens through which organizational changes, usage and structure affect each other.

In this study the theory showed importance of adoption of technologies. It also explained how technological innovation may have similar or different impacts in different organizations and departments. It helped to understand the relationship between IT and organizations and its empirical situations.

Theory of Swift and Even Flow (TSEF)

Quality pioneer (Deming, 1986) argued that focusing first on getting a process right will lead to higher quality and lower costs. He proposed eliminating barriers between departments and anticipating problems in the production and use of goods or services. Other management theorists have expanded on Deming's ideas to construct theories of how to achieve efficiency by improving process throughput while simultaneously producing high quality products and services. TSEF theory was implemented to frame understanding of how Hospitals can use operations management to reduce process throughput time.

Although early TSEF research used the factory floor as a platform, its tenets of increasing speed of flow and decreasing variation also apply to the service sector (Schmenner, 2004) and to financial services and hospitals. Information systems (IS) research has also recognized TSEF as a useful framework in the context of technology adoption (Venkatesh and Agarwal,

2006). IT investments in Hospital management can lead to improved performance primarily in two areas efficiency and effectiveness. Efficiency relates to the workings of the hospital aimed at producing higher output for a given set of inputs. Effectiveness, on the other hand, relates to doing things in a way that lead to the expected or desired outcomes.

Researchers in healthcare have proposed IT's impact on efficient patient care through process redesign (Devaraj and Kohli, 2000) and in cost control (Menon and Lee, 2000). IT creates efficient processes such as enabling patients to preregister online or via phone to avoid delays in tests or treatment. Similarly, computerized physician order entry (CPOE) systems automate physicians' orders and delivery of test results by integrating laboratory information systems and other clinical services with CPOE. This integration allows physicians to view the results at any time and from anywhere, such as using mobile devices.

Using the lens of the Theory of Swift Even Flow (TSEF), we present an operations management-based perspective on the effect of IT in streamlining hospital operations. Specifically, the theory examined the role of IT on patient flow and its consequences for improved hospital efficiency and performance.

Stakeholders Collaboration

Stakeholder theory suggests the need for organizations to satisfy all stakeholders of the organization and recognize the interest of these stakeholders and address them through appropriate strategies (Christopher, 2010). Stakeholder theory is in line with the evolution of corporate governance whereby the concept was broadened to include not just shareholders but also all stakeholders of the organization. This theory operates on the premise that managers will treat the interests of all stakeholders as if they have intrinsic value to the firm. It is argued that this theory is particularly important for developing and implementing adequate governance mechanisms and processes relative to the broader environmental influences and interdependencies of organizations with various internal and external stakeholders (Christopher, 2010).

Healthcare has been facing numerous challenges everywhere in the world from developed countries to developing countries. Some of the challenges include; insufficient funding, in inadequate stakeholders' participation, changes in technology, changes in disease pattern, inaccessibility of health facility, lack of political good will and the risen disease burden which all result in many healthcare projects performance to be minimal (Kumar, 2020). In most developing countries, healthcare structures have been overburdened by the rapid population growth rate and poor education system which results to a population with low economic status hence poor access to health services as well as non-utilization of health services and increase in avoidable risk factors all of which affects healthcare projects negatively (David & Stephens, 2014).

Stakeholders are categorized into three groups; internal, external and interface (boundary). Internal stakeholders are those who operate entirely within the bounds of the organization and typically include management and professional staff (Fottler et al., 1989). External stakeholders are those individuals, groups or organizations that exist independently of the focal organization but have some vested interest in it. Interface stakeholders are linked to both the internal and external environments. Interface stakeholders (physicians, for example) are distinct from internal or external stakeholders because they interact across boundaries and function both internally and externally. This theory was considered important for developing and implementing adequate governance mechanisms and processes relative to the broader environmental influences, also interdependencies of organizations with various internal and external stakeholders (Christopher, 2010). The theory showed the relationship of internal,

external and interface collaboration of stakeholders and how they increase the revenues of firms.

Resource-Based View

The focus of resource-based view is on the relationship between firm resources and firm performance (Penrose, 1959). Firm should select strategy which makes the most effective use of its core resources and capabilities to achieve above normal rates of return. Porter (2001) argues that strategy must not regard competitiveness of a firm to be limited to specific and known forces of the market. According to Penrose, the resource-based view of the firm proposes that firms consist of bundles of productive resources and that different firms possess different bundles of these resources in competitive environments.

Different types of resources including tangible assets, intangible assets and skills have been identified as underlying the distinctive or core competences of a firm (Prahalad & Hamel, 1990). These core competences can only achieve sustainable competitive advantage when underlying resources are valuable, rare, cannot be imitated, and have no substitutes (Barney, 1995; Grant, 1991; Peteraf, 1993; Wernerfelt, 1989). RBV has an inside-out perspective. The main focus is on efficiency in relation to use the organization's internal resources to gain competitive advantage (Teece, Pisano& Shuen, 1997) and value creation, which Peteraf and Barney saw as a key concept in developing the RBV concept (Peteraf & Barney, 2003).

More attention has been given to RBV in public organizations than to Porter's strategic positioning model. Some empirical investigations, for instance, Carmeli and Tishler (2004) show a positive relation between resources (like managerial capabilities and human capital) and the performance of public organizations. Some other studies (Bryson, Ackermann &Eden 2007; Pablo et al., 2007) explore how to use RBV in public organizations. RBV addresses ways to gain profit, achieve a competitive advantage and create strategies that cannot be imitated by others, all seen as problematic in traditional public organizations. However, RBV focuses on value creation, how to use and develop resources to create value. This theory guided this study on how to achieve a competitive advantage and create strategies that are valuable, rare, cannot be imitated, and have no substitutes. Firm should select strategy which makes the most effective use of its core resources and capabilities to achieve normal rates of return.

EMPIRICAL LITERATURE REVIEW

This paper discussed previous empirical literature on the relationship between technology advancement and performance of hospitals. The paper also reviewed empirical work on the relationship between stakeholder collaboration and performance of hospitals in Kenya.

Technological advancement and Performance of Hospitals

Technological have been identified as a key strategic resource that enables firm to remain competitive in the market (Ehigie & McAndrew, 2010). Organizations focus their attention to invest in state-of-the-art facilities and equipment in order to strengthen the operational aspect of the business, as well as to enhance the efficiency of the supply chain, and further support the inter-firm relationship (Abdullah, 2009). Healthcare information technologies (HIT), such as computerized physician order entry systems (CPOE), electronic medical records (EMR), and electronic prescriptions, are widely believed to reduce medical errors, enhance staff productivity, and lower overall healthcare costs (Bates, Leape, Cullen, Laird, Peterson & Teich,2010; Mitchell & Sullivan, 2011).

The journey of a patient's experience will be affected by a variety of factors including clinicians, catering, cleaning, and the health center itself. This is in line with works by Hung,

Chang, Yen and Lee, (2015) who claimed that by integrating medical facility hardware and software and allowing wireless communication, medical staff can access the information they need to keep patients healthy and comfortable with their overall experience at any time. Richardson (2005) further stated that mobile solutions enable practitioners to remain in continuous contact, whether on the patient's bedside, in examination rooms or in emergency treatment centers, to develop and deliver patient assessments effectively, and to make more informed care decisions based on collaborative treatment plans.

A study by Ndawa and Wamitu (2019) on effects of technology adoption on the performance of level five hospitals: a survey of selected level five hospitals in Kenya concluded that level five hospitals in Kenya had automated their management systems, mobile application uptake was high and had no much use of telemedicine in those hospitals and had not invested in record management systems to a great extent. The study recommended that the government should encourage public hospitals to increase their automation and make use of telemedicine to enhance service delivery. It also recommended a study on use of telemedicine for cost reduction.

According to El-Kareh et al. (2013) and Walsham (2012), many healthcare providers consider HIT as a solution to medical errors. Healthcare leaders view effective HIT as a remedy to meet the challenges of increased cost, medical errors, and service quality issues (Norton et al., 2019; Waterson et al., 2014. The health sector has experienced rapid growth in hospital services, its support and applications for medical knowledge management comparatively looking at pre-versus-post the turn of the millennium (Pagliari et al., 2005). The advancements have been greatly achieved by increasing the “fiscal space” for health.

The quick transition to telehealth, telework, and online education in response to the coronavirus threat is a reminder that digital technology brings many benefits and can play an essential role in managing and reducing the risks caused by the lockdown during the pandemic and even after the pandemic (Richter, 2020). It is well known that information systems and information technology (IS/IT) play an important role in healthcare, clinical decision support, emergency/crisis response, and risk management (Angst & Agarwal, 2009; Ben-Assuli & Padman, 2020; Thompson, Whitaker, Kohli & Jones, 2019).

Mapesa (2016) studied the effects of HIT on the performance of hospitals and found that the use of IT affects hospital performance in terms of enhanced productivity, increased profitability, and improved quality. Williams, Asi, Raffenaud, Bagwell, and Zeini (2016) did research on the effects of the use of IT in 1,039 hospitals in the United States and found that by giving electronic access to diagnostic results of a test like cardiac imaging, nuclear test, blood test, and radiological exam, hospitals can provide quality health care to their patients.

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

Stakeholders collaboration and Performance of Hospitals

The functionality and development of today’s working environment has evolved to be fully dependent on new technologies and respective innovations (Borowski, 2021; Sadyrova et al., 2021). Not only has innovation been regarded as a key driver for growth and development, but it has also been viewed as an excellent solution to the old problem-solving attempts that failed (Torfing, 2019). Collaboration entails the constructive management of differences to find a proper solution by selecting the promising alternatives proposed, testing and

prototyping, conducting respective risk assessments, mobilizing resources, and undertaking a joint commitment to reach the goal (Sørensen & Torfing, 2011; Torfing, 2019).

A stakeholder is often referred to as the industry in which the organization operates and includes those elements or groups that directly affect and are affected by an organization's major operation. According to Hitt et al. (1999), the industrial organization model challenges organizations to locate the most attractive industry sector in which to compete. Collaboration has become an essential component to implementing health promotion and disease prevention and management (Odum & Whaley, 2012). Due to the high rates of medical errors over the past several decades, inter professional collaboration has emerged as a pragmatic intervention step that can reduce errors and improve care (Inter professional Education Collaborative (IPEC), 2016). More generally, through participation, stakeholders may empower their voice in governance by interacting with hospital decision-making processes and performance, which influence or are influenced by them. On the other hand hospital can develop their stakeholder relationships and better manage them in order to create joint processes of sustainable value (Freudenreich, Freund & Schaltegger, 2019).

Hobbs (2007) argued that hospital collaborations are critical to achieve good health outcomes. Collaboration can aid hospitals' huge challenges to retain and recruit the largest amounts of resources at the lowest possible cost (Loxley, 2008). As institutions, hospitals have a social mission to fulfill their goals by providing quality services to the needy when required. How well their institutional and organizational mission (King, 2015) is accomplished determines their legitimacy in the eyes of the community. In this context, multiple stakeholders and variables in the relationship between hospitals and their environments have a significant impact on the success of the strategies they develop (Meyer, Pascuci, & Mamédio, 2016)

O'Malley, Woods-Jaeger and Dowd (2017) explored how collaborative efforts in a children's hospital and an early childhood education and social center fostered and leveraged the strengths of the different staff and managers in the hospital and the early childhood center towards improvement of services for the children in the two facilities. The study found that collaboration between the staff and managers in the hospital and the early childhood education and social center led to improvements in the provision and quality of services for the children including shelter, safety, food, education and health care. Collaborative also led to the expansion of the services provided to the children. The study also found that the collaboration also improved the level of trust and partnership among the staff in the hospital and early childhood education and care center

A study by (Akwanal et al., 2019) studied Strategies for effective stakeholder engagement in Strengthening Referral Networks for Management of Hypertension across Health Systems in Kenya. The study sought to identify and engage key stakeholders involved in referral of patients in the Ministry of Health, western Kenya. By engaging them the study concluded that stakeholder identification and engagement using the International Association of Public Participation model eased explanation of research objectives, building consensus, and shaping the interventions to improve the referral process.

RESEARCH METHODOLOGY

This study used mixed method research design where qualitative and quantitative data analysis was carried out. Mixed method was used due to its ability to blend elements of both qualitative and quantitative research approaches (Johnson, Onwuegbuzie & Turner, 2007). The target population in this study comprised County Government Hospitals, National Hospitals, faith-based hospitals and private hospitals registered in the ministry of health. The respondents were the medical superintendent or hospital administrators as the chief administrator of the

hospitals. The target population in this study was 529 hospitals (Kenya Health Sector Strategic plan, 2013-2017). To obtain the desired sample size for the study with the population of 529, Yamane (1967) provides a simplified formula to calculate sample sizes. The study employed stratified random sampling technique in coming up with a sample size of 228 respondents from a target population of 529. The goal of stratified random sampling was to achieve the desired representation from various sub-groups in the population. The study concentrated on the management cadre which is in charge of making crucial financial and strategic decision (Hutzschenreuter, Kleindienst, & Greger, 2012). A total of 190 questionnaires were returned from sample size of 228. A total of 38 hospitals declined to participate in the survey, out of which 10 claimed that the hospital policy does not allow them to participate in the survey, while the rest just could not participate at the time. This resulted in a response rate of 83.33%. Babbie (1990) stated that a response rate of 50% is adequate while Bailey (1987) set an adequate response rate at 75%. Mugenda (2008) avers that a response rate of 50% is adequate, 60% and above good, and above 70% very good. Therefore, a response rate of 83.33%, cognizant of the sensitive nature of the study the response was adequate. IBM Statistical Package for the Social Sciences (SPSS) version 21.0 for Windows 7 was used for data entry, data cleaning, running the initial Exploratory Factor Analysis (EFA). Analysis of Moment Structures (AMOS) software version 21, which is essentially analysis of mean and co-variance structures, was used for Confirmatory Factor Analysis (CFA), Path Analysis, Structural Equation Modeling (SEM) and computation of Goodness-of-Fit Indices.

FINDINGS AND DISCUSSIONS

To ensure that there was no violation of statistical assumptions, this study tested for linearity, homoscedasticity, multicollinearity, non-response bias and common method variance. The results of the tests conformed to the respective thresholds for each test. The data was analyzed using a two-phase process that comprised of confirmatory measurement model and confirmatory structural model as suggested by Anderson and Gerbing (1988). The initial step involved confirmatory factor analysis (CFA) that evaluates the measurement model on multiple criteria such as internal reliability, convergent, and discriminant validity. Before CFA was carried out, the exploratory factor analysis (EFA) was done whose key steps included the computation of factor loading matrix, communalities and principal components analysis (PCA). According to Tabachnick and Fidell (2013) EFA has the ability to narrow down a large data set into smaller one. In other words, it assists the researcher in identifying the belongings of the variables (Emory & Cooper, 1991). Prior to performing EFA, two statistical tests which determine the suitability of data for structure detection were done, that is, Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's Test of Sphericity. Table 1 indicates the results of the test for suitability of structure detection.

Table 1: Results of the Test for Suitability of Structure Detection

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.798
Bartlett's Test of Sphericity	Approx. Chi-Square	6304.360
	df	990
	Sig.	.000

Based on the results in table 1, it is evident that KMO value is 0.798 which is close to 1. This meant that factor analysis was suitable. With p< 0.05 in the Bartlett's Test of Sphericity, this was an indication of suitability of data for structure detection.

This study applied principal component analysis (PCA) in order to validate the construct validity of the items. Three factors, namely, technology advancement (TA), stakeholder Collaboration (SC) and Performance. In addition, the factor loadings for all items ranged from 0.773 to 0.861, which satisfied the minimum criteria of 0.30 (Hair *et al.*, 2010). Confirmatory Factor Analysis (CFA) was employed to test whether there exists a relationship between the observed variables and their underlying latent constructs (Hair *et al*, 2010)). The items for the study variables were examined using confirmatory factor analysis (CFA) on the basis of EFA results to examine the dimensionality of each variable and to test the model fit of the factors of the study variables (Anderson & Gerbing, 1988). Each observed variable was assigned to one and only one latent variable

Confirmatory Factor Analysis was also done to measure the construct validity in the measurement model on multiple criteria such as convergent, internal reliability and discriminant validity. Bahl and Wali (2014) argued that convergent and discriminant validity is both subcategories of construct validity. Evidence that constructs validity exist is demonstrated by presence of both discriminant and convergent validity. None alone is sufficient for measuring construct validity.

For convergent validity, the factor loadings should be 0.5 or higher (Pansuwong, 2009; Hair *et al.*, 2010). In this study, the average loadings are more than 0.7, implying that they are high enough to be convergent, as shown in table 2. Composite reliability (CR) suggests a value of 0.6 for acceptability, which indicates internal consistency of the measurement model (Kline, 2005; Hair *et al*., 2013). As depicted in Table 2. Composite reliability (CR) value of all items ranged from 0.786 to 0.817 suggesting that high internal reliability of the data exist. Therefore, internal reliability was met.

Table 2: Convergent Validity

Code	Constructs	Composite reliability >0.7	AVE (Average Variance Extracted) >0.5
PERF	Performance	0.817	0.598
SC	Stakeholders Collaboration	0.809	0.617
TA	Technology Advancement	0.786	0.741

To establish discriminant validity, one needs to show that measures that should not be related are, in reality, not related (Hair *et al.*, 2010). In table 3, none of the loadings is greater than 0.861 demonstrating discriminant validity.

Table 3: Discriminant Validity

Discriminant validity

	PERF	SC	TA
PERF	**0.773**		
SC	.590***	**0.785**	
TA	.584***	0.264*	**0.861**

Scale reliability was assessed by computing a Cronbach's alpha reliability coefficient for each of the constructs. The overall Cronbach's alpha statistic in this study is greater than 0.7, ranging from 0.773 to 0.861. DeVellis (2003) and Nunnaly and Bernstein (1994) recommended a value of 0.7 and above for the coefficient alpha to infer to the internal consistency of the items. Hulland (1999) suggests items with a loading of less than 0.4 should be dropped Thus reliability is demonstrated as the overall Cronbach's alpha statistic is greater than 0.7.

Confirmatory Structural Model and Hypotheses Testing of the Study Variables

The second step involved answering the study's objectives where AMOS software version 23 was used for confirmatory factor analysis, measurement model and structural equation modeling. Structural equation modeling (SEM) is a very general, chiefly linear, chiefly cross-sectional statistical modeling technique (Schumacker & Lomax, 2004). Jackson, Gillaspy and Purc-Stephenson (2009) argued that SEM is largely a confirmatory technique rather than exploratory and the AMOS software can be used to perform CFA. In the same vein they noted that path analysis, factor analysis and regression are all special cases of SEM. In this study, SEM was used to test hypotheses and to fit the theoretical model.

Each model variable was tested for normality and outliers on variables aspects. This was an exploratory data analysis (EDA) for understanding the structure of the variable before further data analyses was undertaken. This assisted in employing the appropriate analytical data analyses techniques to avoid crucial violations of key assumptions in consequent modeling processes. This was followed by model fit testing. In structural equation modeling, the fit indices establish whether, overall, the model is acceptable, and if acceptable, researchers then establish whether specific paths are significant (Moss, 2009).

The study considered two types of fit indices that are commonly used, that is, absolute fit indices and incremental fit indices (Hair *et al.*, 2010). For absolute fit indices, this study used on Goodness-of-Fit Index (GFI), Adjusted Goodness-of-Fit Index (AGFI) and Root- Mean-Square Error of Approximation (RMSEA). For incremental fit indices Comparative Fit Index (CFI) and Normed-Fit Index (NFI) were used. For the measurement model, table 4.39 shows results of the alternative goodness of fit test statistics for the CFA model. RMSEA for the study was .027. A rule of thumb is that RMSEA < .05 indicates close approximate fit; values between .05 and .08 suggest reasonable error of approximation and RMSEA > 0.10 suggests poor fit (Browne & Cudeck, 1993).

The study's RMSEA was considered a moderate fit. As depicted in Table 4., NFI was found to be a good fit with a value of 0.711. Kline (2005) suggested that the acceptable value of NFI in order to make it a good fit is NFI > 0.90. In the same vein, the inclusion of GFI is also of importance to expound the model fit. According to Kline (2005), GFI = 1.0 indicates a perfect model fit, GFI > 0.90 may indicate a good fit, and values close to zero indicate a very poor fit. However, values of the GFI can fall outside the range of 0 to 1.0. Values greater than 1.0 can be found with just-identified models or with over-identified models with almost perfect fit; negative values are most likely to happen when the sample size is small or when model fit is extremely poor. In consonance with these arguments, the present finding reports GFI > 0.90. This explained that the study's model was within the acceptable range. As for CFI, a rule of thumb for the CFI and other incremental indices is that values greater than roughly 0.90 may indicate reasonably a good fit of the researcher's model (Hu & Bentler, 1999). The study's CFI is near 0.90, which leads to a conclusion that the studies had a good fit for CFI.

Table 4: Confirmatory Factor Analysis Model Fits

Model	CFI	GFI	AGFI	NFI	RMSEA
Default model	.823	0.925	0.988	0.711	0.027
Saturated model	1	1		1	
Independent model	0	0.124	0.021	0	0.065

Influence of technological advancement on performance of hospitals in Kenya

The first specific objective of this study was to establish the Influence of technological advancement on performance of hospitals in Kenya. Normality test on the factors produced Skewness and Kurtosis values of between -1 and +1. The outliers were tested for each of the observations, with observations farthest from the centroid, Mahalanobis distance, being taken into consideration. There were no outliers detected. The values obtained in testing the model fit indices were within the thresholds as shown in table 5.

Table 5: Model- Fit Indices for the Influence of technological advancement on performance of hospitals in Kenya

Model fits for the relationship between technological advancement on performance

Model	CFI	GFI	AGFI	NFI	RMSEA
Default model	.983	0.947	0.956	0.940	0.024
Saturated model	1	1		1	
Independent model	0.000	0.452	0.353	0.000	0.292

Regression analysis for the relationship between technological advancement on performance

Path			B	Beta	S.E.	C.R.	P
technological advancement	<---	Performance	0.932	0.582	0.101	9.247	0.000

The hypothesis to test for this specific objective was:

H_{01}: There is no relationship between technology advancement and performance of hospitals in Kenya

Figure 1 shows there was a positive (regression weight = 0.58) and statistically significant relationship between technological advancement and performance of hospital in Kenya. In this regard H_{01} was rejected. Therefore, this model was significant at 95% significance level (α-level 5% for a 2-tailed test). Popular α-levels are 10% (0.1), 5% (0.05), 1% (0.01), 0.5% (0.005), and 0.1% (0.001) (Fisher, 1926).

Falsteen (2016) study on the Impact of hospital information system quality on the health care quality found that there is a need to increase the awareness about the advantages of information system through training employees in fields of hospital information system. He further stated information communication technology has allowed physicians ability to reduce

the level of prescription error. The study found a positive correlation between hospital information system quality and patient's healthcare quality which was statistically significant. The findings are also consistent with Alolayyan, Alyahya, Alalawin, Shoukat and Nusairat (2020) on the study of health information technology and hospital performance the role of health information quality in teaching hospital that posited that health information quality is a key input of the quality of clinical and administrative decisions and practices the study found a significant positive effect of the quality of HITs on hospital performance and health information.

Health information technology presents numerous opportunities for improving and transforming healthcare which includes; reducing human errors, improving clinical outcomes, facilitating care coordination, improving practice efficiencies, and tracking data over time (Alotaibi and Federico 2017). Findings in this study revealed that internet has become a significant and growing source of information that has dramatically changed the strategies of service line marketing, creating awareness and distribution of hospital services. This means that technological advancement has brought a revolution in the way modern business is being carried out and advances in health care technology have the potential to be major sources of economic wealth as well as forces for change in the organization of health care. This corroborates with study by Wang and Mcleod (2018) entitled health information technology investments impact hospital financial performance and productivity which pointed out that hospitals' health information technology investments are associated with positive financial performance and productivity.

The results of the study support Rose (1998) arguments who pointed out that structuration theory has been used to theorize the field of information system and to analyze empirical situations. Hospitals should embrace technological advancement in all areas of operations.

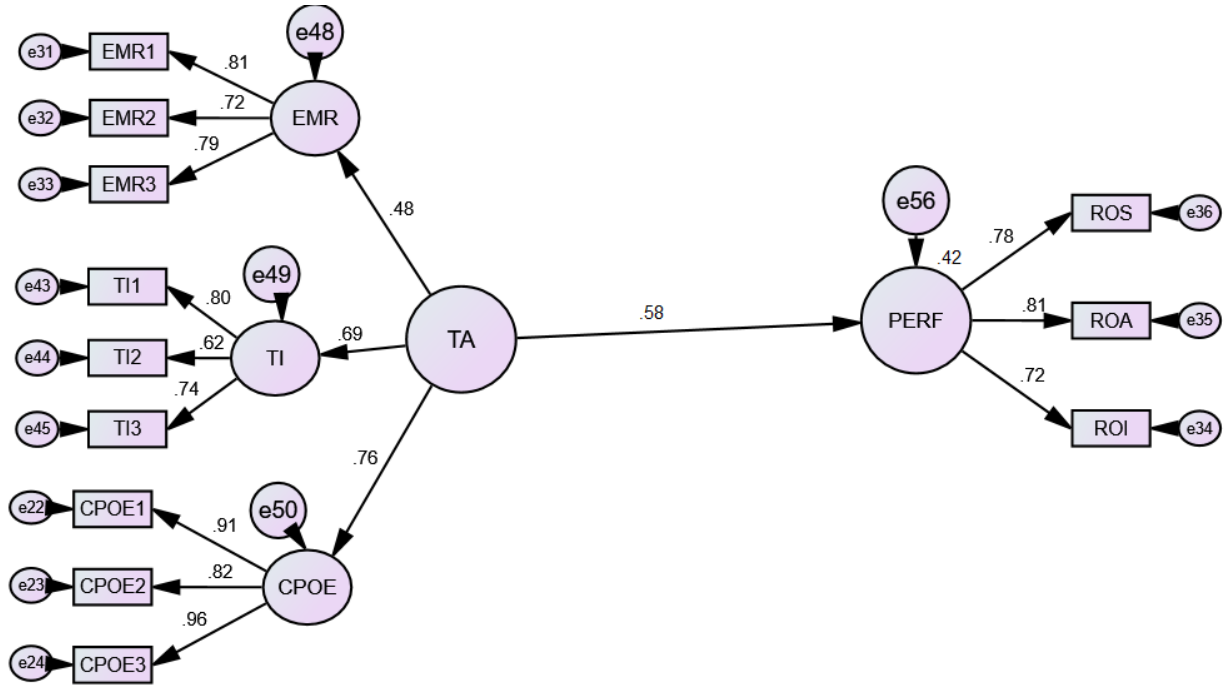

Figure 1: Significance Test for Technology Advancement.

Moderating Effect of stakeholder's collaboration on the Relationship between technology advancement and Performance of hospitals Kenya

Using product indicator approach analysis in this study, the moderating effect of the variable (interaction term) was analyzed by interpreting the R^2 change in the models obtained from the model summaries, and by interpreting the regression coefficients for the interaction term obtained from the coefficient's tables. It involves multiplying each indicator of the exogenous construct with each indicator of the moderator (Chin et al., 1996). Hence, the product indicators become the indicators of the interaction term. Specifically, the notion of product indicator approach is the product term (X * Z) which is used to examine the influence that the moderator Z would have on the relationship between predictor X and the dependent variable of interest Y.

The R^2 was used to show the proportion of variation in dependent variable explained by the structural equation modeling (SEM) model. Aiken and West (1996) posited that moderation occur when variable M alters the relationship between the variables X and Y, by enhancing, strengthening / weakening or changing direction of the relationship. In order to determine the function of the moderator, difference in R^2 as recommended by Carte and Russell (2003).

Table 6: shows the moderating effect of stakeholder's collaboration on the relationship between technology advancement and performance of hospitals in Kenya. From figure 2, shows that R^2=0.513, and from figure 1 R^2= 0.42. The value of R^2 with a change of 0.093 indicates that 9.3% variance of performance of hospitals can be accounted by technology advancement and stakeholder's collaboration. This implies that the goodness of fit improves with the introduction of stakeholder's collaboration hence a conclusion that stakeholder's collaboration has a positive moderating effect on the relationship between performance of hospitals and technology advancement.

In table 7, Model 1 indicates that technology advancement was statistically significant (p = 0.000; Beta value = 3.271; Stakeholders Collaboration was also statistically significant (p = 0.000; Beta value=2.489). Equation 3 shows that for a 1-unit increase in technology advancement terms, the performance of hospital is predicted to increase by 3.271 units, given that the stakeholder's collaboration is held constant. The regression coefficient associated with stakeholder's collaboration means that the difference in performance of hospitals between firms with high stakeholders' collaboration and firms with low stakeholders' collaboration is 2.489 units, given that technology advancement is held constant.

PRE = 3.271 TA + 2.489 SC + ……. E

Model 2 shows the result after interaction term (TA* SC) was introduced in the model. Technology Advancement was found to be significant (p=000<0.05, Stakeholders collaboration was found to be significant too with p= 0.000<0.05, technology advancement * stakeholders' collaboration was also found to be significant (p = 0.000< 0.05, β = 3.007) as shown in table 6. On substituting of the coefficients in equation 2, we obtain the findings of the compounding effects which means that the slope of the relationship between the independent and dependent variable varies decreases by 3.007

PRE = 3.271 TA + 2.489 SC + 3.007 (TA*SC) +……. E

The findings demonstrated that stakeholder's collaboration moderates the relationship between technology advancement and performance of hospitals in Kenya. This is in line with findings by Karan (2021) on his study on effects of stakeholder involvement on performance of telemedicine project in Nairobi County found out that stakeholder's involvement was positively correlated with performance of the telemedicine projects he posited that increased

stakeholder's involvement resulted in enhanced performance of telemedicine project. This implied that healthcare should continue leveraging on stakeholders as they positively influence performance of telemedicine. Stakeholders' collaboration makes valuable contributions in implementation of technology advancement of healthcare services and the Top managers of hospitals must keep management abreast with positive contribution by stakeholders affecting their operations for them to make strategic decisions aimed at achieving above normal returns in the market. Transforming health service exercises using Internet technology is a complex procedure because it comprises numerous stakeholders and the vigorous tasks executed in the system (Jung & Padman, 2015).

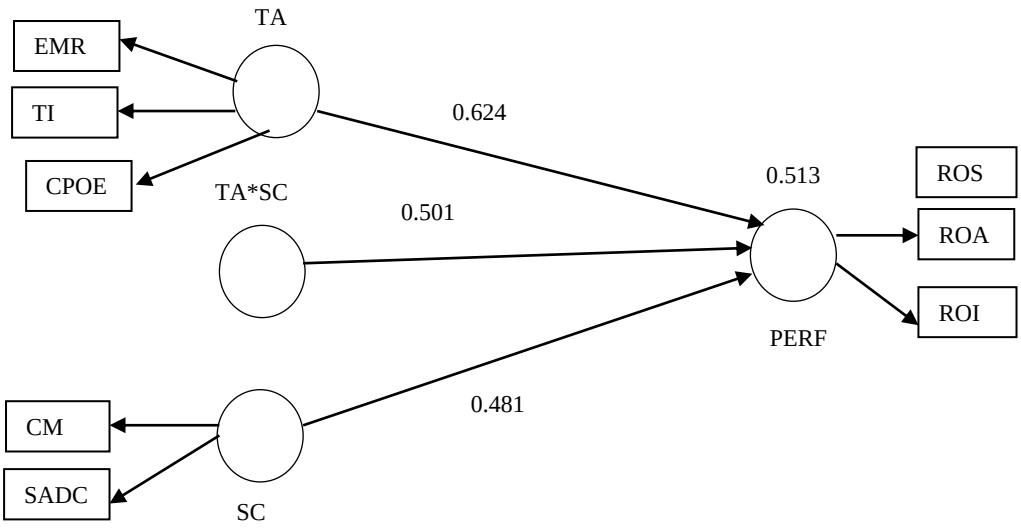

Figure 2: Moderating effect of technology advancement on performance of Hospitals

Figure 6: Model fits for the Moderated Regression analysis for the relationship between technological advancement and performance

Model	CFI	GFI	AGFI	NFI	RMSEA
Default model	.979	0.943	0.951	0.945	0.027
Saturated model	1	1		1	
Independent model	0.000	0.441	0.347	0.000	0.284

Table 7: Moderated Regression analysis for the relationship between technological advancement and performance

	Path		B	Beta	S.E.	C.R.	P
Technological advancement	<---	Performance	3.271	0.624	0.94	3.478	0.000
Stakeholder's collaboration	<---	Performance	2.489	0.481	0.661	3.772	0.000
TA*SC	<---	Performance	3.007	0.501	0.466	6.455	0.000

CONCLUSION

Technology advancement had a positive influence on performance and statistically significant relationship between technological advancement and performance of hospital in Kenya. Technology is a major component of current health care costs and perhaps the key driver of future cost. Advances in health care technology have the potential to be major sources of economic wealth as well as forces for change in the organization of health care. There is great community interest in technology, especially technology that has important implications for health. Hospitals in Kenya should embrace technology advancement strategies in all its areas of operation this would result in effective and efficient care for the patient and would reduce the medical errors experienced in health care which would lead to value based care. For better service delivery implementation and adoption of ICT strategy is a necessity, it provides efficient access and dissemination of information.

Stakeholder's collaboration moderates the relationship between technology advancement and performance of hospitals in Kenya. Stakeholders' collaboration makes valuable contributions in implementation of technology advancement of healthcare services and the Top managers of hospitals must keep management abreast with positive contribution by stakeholders affecting their operations for them to make strategic decisions aimed at achieving above normal returns in the market. Transforming health service exercises using Internet technology is a complex procedure because it comprises numerous stakeholders and the vigorous tasks executed in the system (Jung & Padman, 2015).

RECOMMENDATION

The study recommends adoption of comprehensive electronic health records systems by both physicians and hospitals this would guarantee formal information exchanges are fully integrated. The measurement of 'value' rather than 'volume' by health organizations implies the use of relevant health outcome performance indicators as well as patient-reported outcome measures which can assess the value to the patient of the outcomes of treatment. It may also imply consideration of bundled payment mechanisms across the continuum rather than payment for discrete services as the drivers of quality improvement and health system reform (Porter et al., 2016). Hospitals should therefore come up with electronic measurement performance that are relevant and based on value not volume which results to patient centered outcomes.

Together with better, more comparable and comprehensive data on health system performance hospitals should increase the potential to learn from each other and to apply policies, which are conducive to high-quality care at a price that societies can also afford to pay in future through stakeholders' collaborations. An organization that links strategy to financial projections demonstrates that it is using a disciplined process to set priorities and make tough decisions about required profit margins, capital expenditures, debt levels, and other financial issues. The absence of such financial projections that prove affordability completely discredits an organization's strategy.

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