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Moderating Effect of Operational Efficiency on the Relationship Between Electronic Health Record and Patient Satisfaction in Jos University Teaching Hospital

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Abstract
The aim of this study is to determine the moderating effect of operational efficiency on the relationship between electronic health record and patient satisfaction in Jos University Teaching Hospital, Jos Plateau State. The study employs the survey research design and uses cross-sectional approach of data collection. Krejcie and Morgan (1970) table for determining sample size was used to obtain a sample size of three hundred and thirty-eight (338) patiemts from a population of eight thousand two hundred and fourteen (8,214) patients. Convenient sampling technique was used in selecting the sample size based on the nature of the population. A total of 338 copies of the questionnaires were distributed for data collection only 349 copies were retrieved for analysis. Data collected were subsequently analysed using structural equation modeling techniques SEM-PLS. Findings from the study established that direct function of electronic health record significantly influences patient satisfaction in JUTH. The results also reveal that operational efficiency is a significant and a positive moderator between infrastructure function and patient satisfaction with electronic health record in JUTH. It was therefore recommended among others that, Management of JUTH should intensify their effort to ensure that all general clinical responsibilities of the hospital are performed electronically. More especially the direct care function of EHR, such like, the delivery of everyday healthcare to patients should all be delivered electronically.

Keywords: Direct function, supportive function, information infrastructure, patient satisfaction.

I. Introduction

Patient satisfaction is an important and commonly used indicator for measuring the quality in health care. Patient satisfaction affects clinical outcomes, patient retention, and medical malpractice claims. It affects the timely, efficient, and patient-centered delivery of quality health care.

Patients' satisfaction with health care services began receiving research attention in the 1950s, when it was noticed that increased patient satisfaction was associated with improved appointment keeping, medication use, and adherence to treatment recommendations (Williams, 1994). It was also found to be associated with a decreased likelihood of being sued for malpractice (Hickson et al., 1994). Patient satisfaction has recently grown in importance as the result of the increased marketing of health care services in developing nations and is also being given more attention as a major indicator for quality of health care. A variety of approaches to measuring patient satisfaction with services can be integrated relatively easily into clinic practice (Smith, Schussler-Fiorenza, & Rockwood, 2006).

A rise in global service rivalry has generated a tense climate that affects the inhabited business, notably medical services. As a result of the increased competition among hospitals, the health-care relationship has come to emphasize outstanding healthcare service delivery. This presentation has persuaded patients to make the best decision when choosing a hospital (Bleustein, Rothschild, Valen, Valatis, Schweitzer, Jones, 2014). In order to achieve the necessary satisfaction, most Nigerian elites go on medical vacations to Europe, Asia, North and South America to seek better and more quality services. Patient satisfaction is now an essential and widely used metric for assessing health-care quality, clinical outcomes, patient retention, and medical vacation are all influenced by patient satisfaction.

Hospitals that are committed to providing excellent health care outcomes, including patient satisfaction, implement a variety of programs and initiatives, such as the use of a Hospital Information System (HIS) and the automation of clinical tasks/activities, which have long been used by Chinese hospitals to achieve their objectives (Bleustein, et al, 2014). Measuring performance is an essential task vital for monitoring the results of ongoing efforts to improve quality care and ensuring that hospitals strive towards excellence. Recently, satisfaction metrics have been established and are being used to assess and enhance hospital performance, treatment quality, and physician practice (Anna, Pefoyo & Wodchis, 2013). A more comprehensive assessment of the quality of health care that hospitals are expected to provide in order to satisfy its patient was revealed in a study conducted by the Institute of Medicine (IOM) USA. It identifies six major factors that determine quality health care and patient safety which include safe, equitable, evidence-based, timely, efficient and patient-centered. The latter three factors directly influence patient satisfaction.

In order to guide improvement measures for patient satisfaction, it is vital to assess both individual and organizational aspects that can influence patients' perceptions of health care. For example, President Bush advocated for the universal use of the electronic health record (EHR) within ten years in 2004. Moving from paper to electronic health records (EHRs), which allow hospitals to collect patient information, diagnose data, write prescriptions, administer drugs, and collect money, among other things. Hospitals could achieve these and many more if the direct function, supportive function, and information infrastructure activities of EHR is properly implemented with suitable operational efficient measure put in place.

Patient satisfaction in Jos University Teaching Hospital (JUTH), is an issue of concern to residents of plateau state and neighboring states who are the major beneficiaries of services rendered by the management of the Hospital. Even though the Management of JUTH has made a concerted effort toward enhancing the quality of health care provided to its patients with the view of sustaining loyal patients and attracting new patients, there is still more to do to improve patient satisfaction levels.

Statement of the Problem

With the advent of modern technology that has cut across all section of human endeavour, more hospitals are now adopting EHR as a suitable option for improving health care services. Although management of JUTH has made several efforts by making the health information available, reducing duplication of tests, reducing delays in treatment, and providing information to patients to take better decisions. Also, improved inpatient and outpatients' documentation, meeting with patient's appointments on timely bases and transparent billing system that increases revenue for the hospital were major areas of improvement achieved by the management of JUTH (Afolaranmi, Hassan, Darwar & Wilson, 2020).

Despite of all these achievements, patients' satisfaction is still a major problem in JUTH as most patients of the hospital expressed disappointment on the stage of health care which is characterized with inaccurate diagnosis, medication errors, inappropriate or unnecessary treatment, inadequate or unsafe clinical facilities or practices and poor implementation of EHR system. A study conducted by OECD, (2021) observed that the direct function, supportive function and information infrastructure activities in JUTH are inadequate to support effective health care delivery. Although JUTH have earlier adopted the use of EHR system in collection of patient information, diagnose data and collection of revenue for the hospital also, the operational efficiency adopted by JUTH for patients' satisfaction is yet to be determined hence, there is the need to examine the EHR system adopted by JUTH which entails collection, storage, management, retrieval, and communication of health data that is directly related to the delivery of healthcare. The supportive function which includes optimal patient bed assignments, provision of health standards and resources accessible, administrative and financial code assignments, and provision of physicians' placement in the institution are all examples of supportive tasks, the information infrastructure which provides the technical foundation for the successful implementation of direct care and supportive services and finally, the operational efficiency of JUTH entail the use of suitable and right people, procedures, and the right technology to offer quality health care to its patients.

Although, some studies have conducted a study to determine the relationship between EHR and patient's satisfaction, the outcomes of the results was mixed findings, as some of the scholars established a significant and positive relationship, others found a negative relationship. This study, therefore, will differ by introducing operational efficiency as a moderator to determine the moderating effect on the relationship between EHR and patient satisfaction. Therefore, the aim of this study is to determine the moderating effect of

International Journal of Humanities Social Science and Management (IJHSSM)
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operational efficiency on the relationship between EHR and patient satisfaction in JUTH.

Objectives of the Study

The overall objective of this study is to investigate the moderating role of operational efficiency on the relationship between EHR and patient satisfaction in JUTH. Specifically, this study will investigate the following.

i. To examine the direct function of EHR system adopted by JUTH and its impact on patient satisfaction.
ii. To investigate the supportive function of EHR system adopted by JUTH and its impact on patient satisfaction.
iii. To identify the kind of informational infrastructure adopted by JUTH and its impact on patient satisfaction.
iv. To determine the moderating effect of operational efficiency on the relationship between EHR and patient satisfaction.

Research Questions

Based on the problem at hand, the major question which the study seeks to provide answer to is, to what extent do operational efficiency moderate the relationship between EHR and patient satisfaction in JUTH? Specifically, this study will investigate the following:

Based on the major problem, the following specific questions will be raised in order to guide the study.

i. To what extend do the direct function of EHR system adopted by JUTH impacted on patient satisfaction?
ii. How does the supportive function of EHR system adopted by JUTH impacted on patient satisfaction?
iii. To what extend do informational infrastructure adopted by JUTH impacted on patient satisfaction?
iv. What is the moderating effect of operational efficiency on the relationship between EHR and patient satisfaction in JUTH?

II. Literature Review

In order to shed light and to guide the reader of this study towards understanding the major variables and proxies used in this study, the need for conceptual clarification of these concepts becomes necessary.

2.1 Patient Satisfaction

Patient satisfaction has no commonly accepted definition, but in a nutshell, it can be defined as a patient's personal assessment of the care he or she has received, taking into account both care facts and patient characteristics. The condition of pleasure or enjoyment that patients feel when using a health service is referred to as patient satisfaction. As a result, every health-care provider's primary responsibility is to offer patient care (Li, Hou, Lu, Tang & Ma, 2012).

Patient satisfaction is a well-known metric for assessing the effectiveness of hospital health services. One major instrument designed in rating the level of patient satisfaction of services is the SERVQUAL scale that was developed by Parasuraman, Berry and Zeitham (1991) SERVQUAL has five (5) major areas of measurement such as tangibility, reliability, responsiveness, assurance, and empathy. Tangibility is the physical evidence of the service, for instance, the appearance of the tools, equipment, and physical facilities used to provide the service. These have a psychological effect on the recovery process of the individual and hence must be always kept clean. Reliability is the ability to perform the promised service accurately. Responsiveness is the readiness and willingness of employees to assist customers by providing prompt timely services. Assurance is the knowledge of employees and their ability to have trust and confidence toward customers. Hospitals should provide patients with proper diagnosis at first instance. Empathy is the caring, individualized, and customized attention provided to patients by health workers due to the pains that there are passing through (Krogstad, Hofoss & Hjortdahl, 2004).

As a result, the evaluation of health service delivery from the perspective of patients has gotten more attention and has become a core attribute of any health system, as it acts as a valuable indicator of service provision performance, particularly in public sector institutions (Mohd, & Chakravarty, 2014).As a result, adopting and implementing an effective EHR system in both public and private hospitals in Nigeria is a better way to ensure patient satisfaction. In this study, the SERQUAL rating scale for patient satisfaction shall be adopted.

Electronic Health Records

Several scholars have offered EHRs multiple definitions; however, the International Standard Organization provided the internationally acknowledged definition of EHRs (ISO). "A store of information regarding the health of a subject of care, in computer processable form," according to ISO (2005). Because this definition focuses solely on the structure of EHR systems, Hayrinen, Saranto, and Nykanen (2008) aimed to explain EHRs by expanding the ISO definition's focus on EHRs. According to Hayrinen et al (2008), EHRs should be

viewed as a collection of retrospectives, contemporaneous, and prospective data with the primary goal of facilitating continuous, efficient, and high-quality healthcare delivery. EHRs, according to Luo (2006), encompass the entire management of data essential for patients' care, not just the electronic version of the paper-based record.

A longitudinal electronic record of patient health information generated by one or more interactions in any care delivery context is known as an electronic health record (EHR). Patient demographics, progress notes, issues, prescriptions, vital signs, past medical history, vaccines, laboratory data, and radiological reports are all included in this data. The EHR streamlines and automates the workflow of the practitioner. The EHR can create a complete record of a clinical patient interaction, as well as supporting additional care-related activities such as evidence-based decision support, quality monitoring, and outcomes reporting directly or indirectly via interface (Allen, Ceo, Ouellette, Plante, &Vaillancourt, 2007).

In the context of this study, the impact of EHR on patient satisfaction is measured under three perspectives in line with the study of Dickinson, Fischetti and Heard (2004). These include direct function, supportive function and information infrastructure of EHR.

Direct Function of EHR and Patient Satisfaction

According to Dickinson, Fischetti, and Heard (2004), the direct care function of every EHR system is concerned with performing functions connected with general clinical responsibilities. It also entails the collection, storage, management, retrieval, and communication of health data that is directly related to the delivery of healthcare. The direct care function of EHR, according to Dickinson et al. (2004), ensures the delivery of everyday healthcare to patients. Diagnose, define patient care goals, plan and carry out interventions, examine and evaluate results are all examples of these functions (Bernstein et al., 2005). It also offers stand-alone reminders or alerts that warn patients about contraindications and incorrect pharmaceutical prescriptions (Vesely, Zvarova, Peleska, Buchtela & Anger, 2006).

According to Dickinson et al., (2004), the direct care capabilities of EHR also provide task tracking to assure timeliness in the provision of quality care, which reduces patient waiting time and improves patient satisfaction. Referral; patient current complaint and past medical history; physical examination; diagnosis; tests; procedures; treatment; medication; and discharge are some of the generally known direct care activities of an EHR, according to Hayes and Barnett (2008). As a result, Boudreaux and O'Hea (2004) found that EHRs tailored to provide daily healthcare to patients have a considerable impact on patient satisfaction. Therefore, this study predicts that,

H1: Direct function of EHR system adopted by JUTH have significant impact on patients' satisfaction.

The Supportive Function and Patient Satisfaction

Supporting functions of EHR systems are those that are not directly related to the provision of healthcare but are necessary for the overall delivery of health care (Dickinson et al., 2004). The supported roles aim to improve the quality of healthcare service by providing inputs for medical research and public health promotion. It also helps with administrative and financial management in general (Dickinson et al., 2004). Optimal patient bed assignments, provision of health standards and resources accessible, administrative and financial code assignments, and provision of physicians' placement in the institution are all examples of supportive tasks, according to Grimson (2001). The study by Sammon, O'Connor, and Leo (2014) found that using the EHR platform to pay hospital fees, identify patient beds and wards, receive guides, and subscribe to drugs has a significant impact on patient satisfaction hence, this study proposed that;

H2: Supportive function of EHR system adopted by JUTH have significant impact on patients' satisfaction.

The Information Infrastructure and Patient Satisfaction

The role of the EHR as an information infrastructure is to provide the technical foundation for the successful implementation of direct care and supportive services. As a result, EHR becomes the driving force behind the smooth operation of both direct and support services. It involves security, according to Coeira and Clarke (2018), which entails limiting data access and privacy. It also entails interoperability, or the exchange of clinical and administrative data using standard-based solutions, as well as the sharing of data and records between management and other departments (Dickinson et al., 2004). Although results from studies on the electronic health record as an information infrastructure have been mixed, authors such as (Gillies and Howard, 2015; Wilcke, 2018; Woodside, 2017) contend that managing patient data

International Journal of Humanities Social Science and Management (IJHSSM)
Volume 4, Issue 3, May.-June, 2024, pp: 1624-1636 www.ijhssm.org

with utmost confidentiality within the health facility using an EHR solution improves patient satisfaction. Authors such as (Afolabi, 2019; Chinyemba, & Ngulube, 2015) found that information infrastructure has no substantial impact on patient satisfaction, contrary to their findings. Therefore, the research expects that:

H3: Information infrastructure of EHR system adopted by JUTH have significant impact on patients' satisfaction.

Operational Efficiency and Patient Satisfaction

Operational efficiency refers to an organization's capacity to minimize waste in terms of time, effort, and materials while still delivering a high-quality service or product. According to Apruebo (2010), operational efficiency occurs when the suitable and right people, procedures, and technology are coupled to offer products or services to clients by arranging fundamental activities in response to market pressures. Operational efficiency is measured in terms of flexibility, consistency, productivity, and cycle time and focuses on improving internal customer satisfaction. A business process' flexibility is described as its ability to adapt to changing business situations in order to meet current and/or long-term consumer needs. Healthcare Management Systems (HMS), Hospital Information Systems (HIS), Electronic Medical Records (EMR), and Electronic Health Records (EHR) are examples of computer-integrated systems that allow hospitals to adopt a more flexible way of providing quality services that improves customer responsiveness (Barlan-Espino, 2017). One of the most basic requirements for an automated system to fulfill its goal is for it to be efficient. According to a study conducted by Woodside (2017), the effectiveness of an organization's technology implemented greatly improves consumers' satisfaction with banking services. Barlan-Espino (2017) looked at restaurant operational efficiency and customer satisfaction as a foundation for improving business operations hence, this study further suggests that.

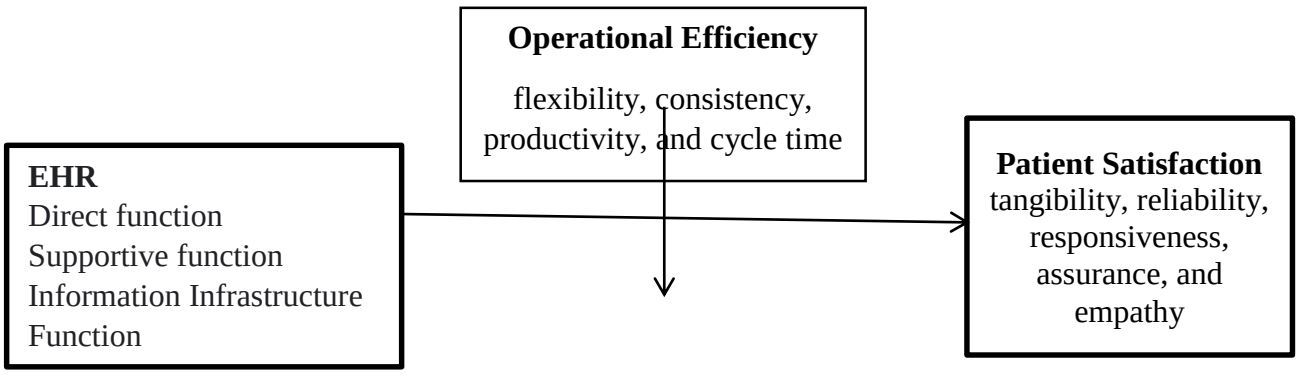
H4a Operational efficiency adopted by JUTH moderates on the relationship between direction function and patient's satisfaction.

H4b Operational efficiency adopted by JUTH moderates on the relationship between supportive function and patient's satisfaction.

H4c Operational efficiency adopted by JUTH moderates on the relationship between infrastructure functions and patient's satisfaction.

In view of evidence linking the direct relationship between operational efficiency and patient satisfaction, this study however developed a conceptual framework in figure 1 that will guide the researchers to investigate the moderating effect of operational efficiency on the relationship between EHR and patient satisfaction.

Fig 2.1 **Conceptual Framework**



Researcher Conceptual framework

III. Methodology

The research design employed for this study is a descriptive survey research design, which is a cross-sectional in nature. Data was collected once during the entire study period, which spanned from February to April 2024. The population of the study consists of 8,214 patients who have visited the hospital for medical attention for the past two months. (February, 2024 to April, 2024). This information was obtained from the record section of JUTH, where all patients obtain their hand cards and medical files before seeing a doctor. The estimated

International Journal of Humanities Social Science and Management (IJHSSM)
Volume 4, Issue 3, May.-June, 2024, pp: 1624-1636 www.ijhssm.org

sample size for the study is 388 patients which was drawn from Krejcie and Morgan (1970) table for determining sample size. The accidental sampling technique was used to select the respondents that participated in the study, the choice of this method is because, not all the patients are inpatients. Data for the study were collected using, a self-administered questionnaire. The questionnaire was divided into two parts. The first part aimed to gather demographic information about the respondents. The second part comprised thirty items that assessed the variables EHR (Direct function, Supportive function, and Information Infrastructure Function)

The inferential data collected for this study is analyzed using structural equation model SEM-PLS techniques in order to achieve all set objectives. The structural equation modeling techniques SEM-PLS is used to check the reliability and validity of the instrument as well as analyzing the relationship between independent, dependent, and moderating variables via bootstrapping techniques.

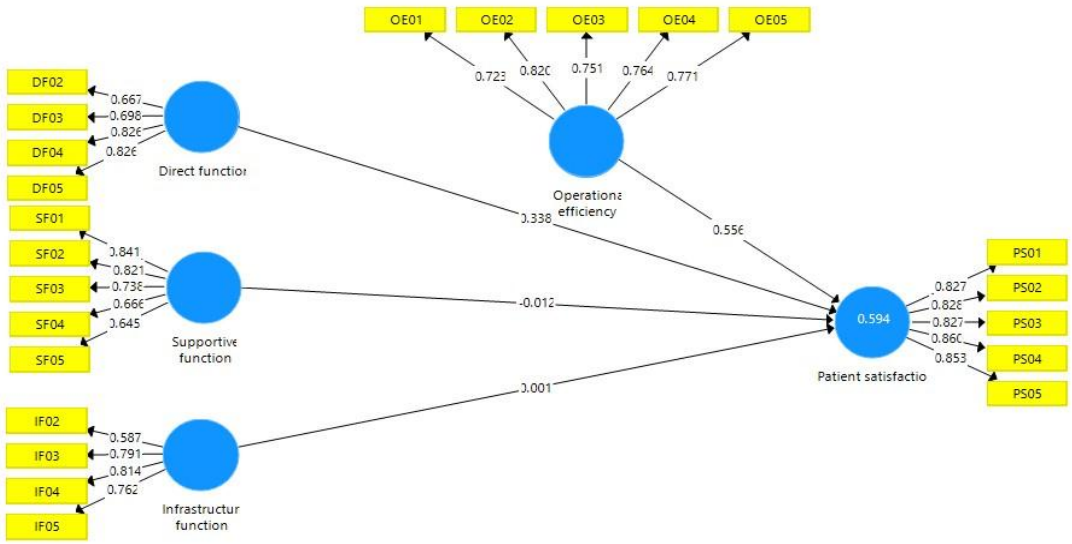
The measurement of all the latent constructs (variables) were adapted from the existing literature after making some modifications as suggested by Netemeyer et al. (2003). A methodical and well-structured method was used in selecting the items. Though the items in the questionnaire have been modified to suits the requirements and setting of Nigeria, yet, it has been ensured that each item in the questionnaire captures the real essence of that latent variable. Patient satisfaction was measured using the popular SERVQUAL developed by Parasuraman, Berry and Zeitham (1991), EHR was measured by adapting the instrument used by Sahney and Sharma, (2018) while the operational efficiency variable was adapted from the study of Penson and Wei, (2007).

Data analysis and Result

The latest version of SmartPLS (v. 3.2.9) software (Ringle et al., 2015) was used to run PLS–SEM on the model. PLS–SEM can analyze complex models involving many structural paths, indicators and/or latent variables (Hair et al., 2019). The technique is not stringent upon the conditions of normality and distribution of residuals (Liu and Yang, 2014). Also, the moderation effects can be easily included in the model and analysed with the help of PLS– SEM software (Kiani and Laroche, 2019). Moreover, the causal–predictive nature of the study made this technique best fit (Sarstedt et al., 2017).

Analysis of the measurement model

The individual item reliability of the instruments was used to determine the stability and consistency of the instruments (Creswell, 2005). Individual item reliability was measured by assessing the outer loadings of a construct (Hulland, 1999; Duarte & Raposo, 2010; Hair et al., 2016; Hair et al., 2012). Following the rule of thumb regarding the retaining of items with loadings between 0.40 and 0.70, it was observed that all the 23 items reached the level of acceptable reliability. Therefore, the items were retained because they are within the recommended loadings (Chin 1998; Hair et al., 2016).



International Journal of Humanities Social Science and Management (IJHSSM)
Volume 4, Issue 3, May.-June, 2024, pp: 1624-1636 www.ijhssm.org

Internal Consistency and Reliability

The internal consistency and reliability are the assessment of the reliability and validity of the reflective outer model. The Cronbach alpha and Composite reliability coefficient are the most common estimators of internal consistency and reliability (e.g., Bacon, Sauer & Young, 1995; McCrae, Kurtz, Yamagata & McCrae, 2011; Peterson & Kim, 2013). In this study, therefore, the composite reliability coefficient was used to measure internal consistency and reliability of the latent constructs. The interpretation of internal consistency and reliability using composite reliability coefficient depends on the rule of thumb proposed by Bagozzi & Yi (1988) and Hair et al. (2011). They suggested that the composite reliability coefficient should be at least 0.70 or more for a model and any value below 0.60 indicates poor internal consistency and reliability suggesting that the model is not fit. Table 4.1 presents the standard loadings, composite reliability coefficients and the Average Variance Extracted (AVE) of the latent constructs with all above the required points.

Table: 4.1

Constructs	Items	Factor loading	Cronbach's alpha	Composite reliability	Average Variance Extracted (AVE)
Patience	PS01	0.827	0.895	0.922	0.704
Satisfaction	PS02	0.828			
(PS)	PS03	0.827			
	PS04	0.860			
	PS05	0.853			
Direct	DF02	0.667	0.758	0.842	0.574
Function	DF03	0.698			
(DF)	DF04	0.826			
	DF05	0.826			
Supportive	SF01	0.841	0.804	0.861	0.557
Function	SF02	0.821			
	SF03	0.738			
	SF04	0.666			
	SF05	0.645			
Infrastructure	IF02	0.587	0.725	0.830	0.553
Function	IF03	0.791			
	IF04	0.814			
	IF05	0.762			
Operational	OE01	0.723	0.828	0.877	0.587
Efficiency	OE02	0.820			
	OE03	0.751			
	OE04	0.764			
	OE05	0.771			

measurement model was evaluated in line with the steps laid down in Henseler et al. (2016) and Hair et al. (2019). This includes the assessment for construct consistency and reliability, convergent and discriminant validity. The convergent validity is measured by assessing the average variance extracted (AVE) of each latent construct as recommended by Fornell & Larcker (1981). The AVE value is calculated as the mean of the squared loadings for all indicators associated with a construct.

Thus, all the indicators were retained because the average variance extracted (AVE) for the latent variables were higher than 0.50 (Table 4.1). Moreover, the values of composite reliability were more than the acceptable level of 0.70 (Diamantopoulos et al., 2012). Hence, the consistency and reliability of all the laten variables was achieved.

Discriminant Validity

The discriminant validity is the extent to which the construct differs empirically from one another. It is the rate of changes between one construct and the other (Hair et al., 2014). The estimation of the discriminant validity can be done through cross loading of indicators known as Fornell & Larcker criterion or Heterotrait monotrait

International Journal of Humanities Social Science and Management (IJHSSM)
Volume 4, Issue 3, May.-June, 2024, pp: 1624-1636 www.ijhssm.org

(HTMT) ratio of correlation. The Fornell-Lacker criterion for evaluating the discriminant validity compares the square root of the AVE with the other latent constructs (Hair et al., 2014). Fornell-Lacker (1981) recommended that the latent constructs should explain the variance of its indicator. Thus, the square root of AVE should have a higher value than other latent constructs. Therefore, the correlations between the latent constructs of the model were compared with the square root of AVE. The findings indicate that all the square root of AVE were higher compared to the correlations between the latent constructs indicating adequate discriminant validity within the latent constructs in the model ((Hair et al., 2016).

Table 4.2. Fornell & Larcker criterion

	DF	IF	OE	PS	SF
Direct Function	0.758				
Infrastructure function	0.566	0.774			
Operational efficiency	0.490	0.347	0.766		
Patience satisfaction	0.602	0.379	0.715	0.839	
Supportive function	0.754	0.553	0.606	0.580	0.746

Moreover, the values of heterotrait–monotrait (HTMT) ratios (Henseler et al., 2015) were found to be less than prescribed limit of 0.85 (Table 4.3).

Table 4.3: Heterotrait–monotrait (HTMT) ratios

	DF	IF	OE	PS	SF
Direct Function					
Infrastructure function	0.743				
Operational efficiency	0.579	0.454			
Patience satisfaction	0.693	0.460	0.797		
Supportive function	0.638	0.712	0.735	0.646	

Next, results for cross loadings were also evaluated (Table 4.5), and the outer loadings of the indicators were found to be higher on their own latent variable in comparison to the other latent constructs (Hair et al., 2017). Hence, the discriminant validity is sufficiently established.

Table 4.5: Cross Loadings

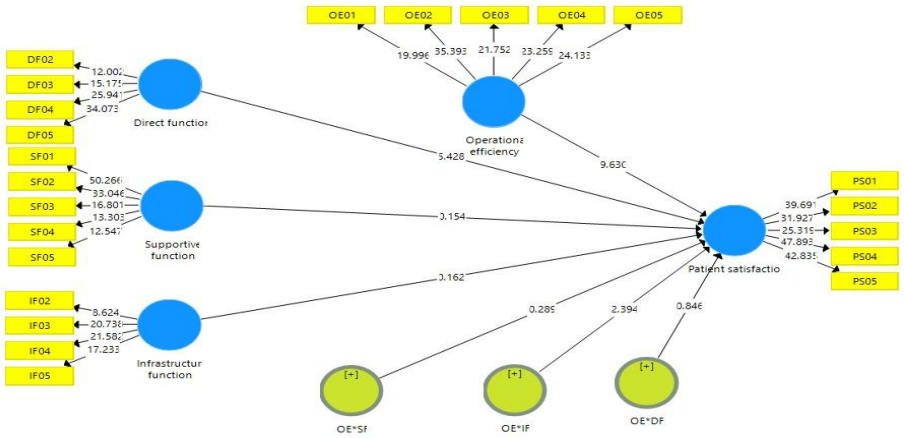
	DF	IF	OE	PS	SF
DF02	**0.667**	0.412	0.296	0.265	0.500
DF03	**0.698**	0.315	0.301	0.387	0.536
DF04	**0.826**	0.518	0.419	0.524	0.625
DF05	**0.826**	0.460	0.435	0.560	0.616
IF02	0.360	**0.587**	0.186	0.262	0.346
IF03	0.410	**0.791**	0.296	0.278	0.413
IF04	0.510	**0.814**	0.303	0.341	0.499
IF05	0.370	**0.762**	0.228	0.218	0.351
OE01	0.464	0.188	**0.723**	0.664	0.540
OE02	0.401	0.255	**0.820**	0.633	0.502
OE03	0.301	0.313	**0.751**	0.416	0.416
OE04	0.293	0.325	**0.764**	0.462	0.396
OE05	0.365	0.292	**0.771**	0.469	0.417
PS01	0.490	0.299	0.580	**0.827**	0.428
PS02	0.581	0.403	0.568	**0.828**	0.454
PS03	0.528	0.247	0.581	**0.827**	0.451
PS04	0.482	0.295	0.636	**0.860**	0.563
PS05	0.444	0.317	0.632	**0.853**	0.536
SF01	0.674	0.454	0.477	0.563	**0.841**
SF02	0.622	0.454	0.481	0.530	**0.821**
SF03	0.565	0.387	0.441	0.383	**0.738**

International Journal of Humanities Social Science and Management (IJHSSM)
Volume 4, Issue 3, May.-June, 2024, pp: 1624-1636 www.ijhssm.org

SF04	0.459	0.368	0.407	0.288	**0.666**
SF05	0.434	0.407	0.491	0.288	**0.645**

Analysis of structural model

The evaluation of the structural model includes the assessment of the exogenous variables; significance of path coefficient β values; values of R^2 and adjusted R^2; effect size (f^2) and value of blindfolding based Q^2 for predictive relevance (Hair et al., 2019; Henseler et al., 2016; Wong, 2016). The significance of ß values was tested using the bootstrapping procedure to generate the t-statistics (Preacher and Hayes, 2008).



A total of 5000 bootstrapped samples were utilized (Henseler et al., 2016). All the results are analyzed at the significance level (α) of 0.05 and t-table statistics is 1.96. The structural model was analyzed for Model with the moderator (operational efficiency). All the exogenous latent variables had VIF values of less than three. As a result, there was no problem with multicollinearity. All three latent variables, i.e. direct function, supportive function and infrastructure function explain significant variance of 59% (R2 =0.594). The predicted positive relationship between direct function and patient satisfaction turned out to be quite significant with the use of EHR in JUTH (ß=0.065, t value=5.428, p-value=0.000; ß=0.054, t-value=2.394, p value=0.017). Thus, supporting hypothesis H1 and H4c are supported. However, supportive function and patient satisfaction has no impact on the use of EHR in JUTH ((ß=0.065, t value=0.154, p-value=0.878; ß=0.045, t value=0.162, p-value=0.871). Also, the latent moderating effects on the relation between IF → OE→ Pat Sat (ß=0.054, t value=2.394, p-value=0.017) indicates a positive, strong and significant moderating impact. On the other hand,

DF → OE→ Pat Sat and DF → OE→ Pat Sat (ß=0.075, t value=0.846, p-value=0.397; ß=0.068, t value=0.289, p-value=0.772) (ß= 5 0.610, t-statistics=5 16.763) indicates a negative relationship hence, moderation is not achieved.

Table 4.6 Path Coefficient

Hypothesized Path		Mean	Standard Deviation	T-Statistics	P-Value	Decision
H_1.	DF -> PS	0.355	0.065	5.428	0.000	Supported
H_2	SF -> PS	0.011	0.075	0.154	0,878	Not supported
H_3	IF -> PS	-0.004	0.045	0.162	0.871	Not supported
H_{4a}	DF*OE ->PS	-0.068	0.075	0.846	0.397	Not supported
H_{4b}	SF*OE ->PS	0.025	0.068	0.289	0.772	Not supported
H_{4c}	IF*OE -> PS	0.126	0.054	2.394	0.017	Supported

Note: ***Significant at 1%, **Significant at 5%, *Significant at 10%

The Effect size (f^2) is used in evaluating the relative impact of one construct (variables) in terms of its predictive relevance. The effect size for each path model can be determined by calculating Cohen's f^2. The f^2 is estimated by recording the changes in coefficient of determination R^2 when a

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specific construct (variable) is deleted from the model. The f^2 is calculated using two PLS path models. The first PLS path model should be the full model as defined by the hypotheses of the study, yielding the R^2 of the full model called R^2 Included. The second path model should be identical with the first path model but with an eliminated construct generating a new R^2 from the reduced model called R^2 Excluded as expressed in the following formula (Chin, 1998). Based on the value of f^2, the effect size of the omitted variable for a particular endogenous construct (dependent variable) can be determined. If the independent variable strongly contributes to explaining the dependent variable, the difference between R^2 Included and R^2 Excluded will be leading to a high f^2 value.

$$\text{Effect Size } (f^2) = \frac{R^2_{\text{Included}} - R^2_{\text{Excluded}}}{1 - R^2_{\text{Included}}}$$

Cohen (1988) further describes f^2 as weak, moderate and has strong effects, respectively. This is expressed as follows:
$0.02 \leq f2 < 0.15$ = Weak effect
$0.15 \leq f2 < 0.35$ = Moderate effect
$f2 \geq 0.35$ = Strong effect
This study, therefore, shows the f^2 of the latent variables of the structural model as indicated in Table 4.5.

Table 4. 5 Effect Sizes of Using Cohen's (1988)

	R- Squared (R^2)	Included	Excluded	F^2	Effect Size
1	Direct Function	0.594	0.324	0. 44	Strong Effect
2	Supportive Function	0.594	0.541	0.04	Weak Effect
3	Infrastructure Function	0.594	0.572	0.02	Weak Effect
4	Operational Efficiency	0.594	0.455	0.51	Strong Effect

Assessment of the Predictive Relevance (Q^2)

According to Daurte and Raposo (2010), aside determining the magnitude of the impact of each of the exogenous constructs, Stone and Geisser test of predictive relevance should also be applied which is usually used as a supplementary assessment of goodness of fit in partial least squares structural equation modelling (PLS-SEM) to ascertain the predictive relevance of the research model by using blindfolding procedures (Geisser, 1974: Stone, 1974). In PLS-SEM, the Stone-Geisser test is usually utilized as a corresponding assessment of the model goodness-of-fit (Hair el., 2014). Hence, a cross-validated redundancy criterion was employed to examine the predictive relevance (Q^2) for the reflective endogenous latent variable of this model (i.e patient satisfaction). The Q^2 value was obtained using the blindfolding procedure as recommended by Stone and Geisser for the endogenous variable used in the present study since it had reflective indicators, to determine the predictive relevance of the model, Henseler et al, (2009), further assert that a research model with Q^2 statistics greater than zero is considered fit and relevant to predictions. Moreso, models with higher Q^2 values suggest better prognostic relevance. However, if $Q^2 > 0$, the model has predictive relevance. On the contrary, if it is $Q^2 < 0$, the model will lack predictive relevance. Thus, Q^2 can be used to measure the relative impact of the structural model on the observed measures for each dependent latent variable through cross-validation (Tenenhaus et al., 2005). Table 4.6 presents the results of cross-validated redundancy test.

Table 4.6 Construct Cross-Validated redundancy (Q^2 Value)

Total	**SSO**	**SSE**	**I-SSE/SSO**
Patient Satisfaction with EHR	1745	1016	.454

As can be observed from Table 4.6 result of the cross-validation redundancy was retrieved from blindfolding output of the PLS-SEM. The cross-validated redundancy evaluates the capacity of the model to predict the endogenous variable and explain the quality of the model. Thus, the cross-validation redundancy measures Q^2 for the endogenous latent variable (Patient satisfaction with EHR) was above zero. This is indicating the predictive relevance of the research models (Chin, 1998; Henseler et al., 2009).

IV. Discussion

This study attempts to test and validate the consumer behaviour theory. Specifically, the study has made significant contributions to patient satisfaction literature in the following ways.

First, the study contributed by exploring the relationship between direct function, supportive function, infrastructure's function, and patient satisfaction with the electronic health record adopted by JUTH. Secondly, the study contributed towards determination of whether operational efficiency moderate the variables in the model.

The research reveals that direct function of electronic health record significantly influences patient satisfaction in JUTH. Thus, the result of the finding concurs with the study of Bourgeois and Yaylacicegi, (2010).

Besides this, the results demonstrated that operational efficiency existence is a significant moderator in infrastructure function and patient satisfaction with electronic health record in JUTH this result is consistent with the finding of Mohammeda, Mehrezb and Aladel, (2021).

Hence, hospital and other health service providers can enlarge their investment base on electronic health record win patient's satisfaction, confidence, and patronage.

The study also uncovered that, supportive function and infrastructure function as dimensions of electronic health record have no significant impact on patient satisfaction. The result varies with the outcome of Probst, (2019).

However, the result further, shows that operational efficiency did not moderate supportive and infrastructure function. Hence, the result is not in line with the study of Johnson and Brownlee, (2018).

V. Conclusion and Recommendations

This study is one of the different attempts to discover whether electronic health record can influence patient satisfaction in JUTH. The research reveals that electronic health record dimensions namely direct function significantly influence patient satisfaction with the quality of service provided by JUTH. Besides this, the results demonstrated that existence of operational efficiency is a significant moderator in infrastructure function and patient satisfaction with the quality of service provided by JUTH. Hence, hospitals and health service providers should intensify effort toward the adoption and implementation of electronic health records.

Based on the findings from the study, the study therefore recommends that:

i. Management of JUTH should intensify their effort to ensure that all general clinical responsibilities of the hospital are performed electronically. More especially the direct care function of EHR, such like, the delivery of everyday healthcare to patients should all be delivered electronically.

ii. Management should deliberately ensure that supporting functions of EHR which are not directly related to the provision of healthcare but are necessary for the overall delivery of health should also be linked and performed electronically. This will enhance efficiency in service delivery.

iii. Since information infrastructure is meant to provide the technical foundation for the successful implementation of direct care and supportive services. Management should as a matter of necessity, ensure that all information infrastructure link-up and delivered electronically.

iv. Management should ensure that procedures for the delivery of health services are effective and efficient. It should be consistent, time bound, productive and flexible to meet the aspiration and satisfaction of customers.

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