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Acceptance of Interoperable Electronic Health Record (EHRs) Systems: A Tanzanian e-Health Perspective

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ABSTRACT

The study assessed factors that influence the acceptance of interoperable electronic Health Records (EHRs) Systems in Tanzania Public Hospitals. The study applied a hybrid model that combined the Technology Acceptance Model (TAM) and Technology-Organization-Environment (TOE). Snowball sampling technique was applied and a total of 340 questionnaires were distributed to selected clinics, polyclinics and hospitals, of which 261 (77%) received questionnaires were considered to be valid and reliable for subsequent data analysis. IBM SPSS software version 27.0 was employed for data analysis. Findings indicated that relative advantage, compatibility, management support, organizational competency, training and education, perceived ease of use, perceived usefulness, privacy and security concerns, competitive pressure and regulatory framework have positive and significant effects on acceptance of interoperable EHRs. However, complexity and trading & vendor support were found to have non-significant effects on acceptance of interoperable electronic health records. The study has further provided implications that may assist scholars and policy makers in the implementation of interoperable electronic health systems in the health sector.

Keywords: Acceptance, Interoperable, electronic health record system, EHRs, Tanzania

INTRODUCTION

Today, the advancement of information and communication technology (ICT) and the evolution of the use of information technology (IT) in the health sector has brought a remarkable revolution in the delivery of health services not only in developed countries but also in developing countries, particularly in Tanzania (Esmailzadeh & Sambasivan, 2016). The use of ICT in healthcare can be traced back to the early 1970s when commercial use of computers started. However, it proliferated in the 1990s and played a major role in improving access, efficiency, quality, and therefore the effectiveness of processes related to healthcare service delivery (Aceto et al., 2018). The health and social welfare sector in Tanzania embraces the rapid development of ICT for improving administrative processes, patient/client recording and communication. The sharing of electronic health records information amongst healthcare providers is expected to provide prospective benefits for healthcare users due to the streamlined process of care delivery. The successful process of health information sharing will also offer users new and effective means for cooperating with their healthcare providers than now in the management of their data. These benefits are in line with the strategic directions of the government stipulated in the Health Sector Strategic Plan IV of the Ministry of Health and Social Welfare (MoHSW) on the commitment to stimulating the development and guiding interoperability of health systems (Tanzania Ministry of Health and Social Welfare, 2015). With these goals towards increasing the impact of information technology in the health sector, the use of interoperable electronic health records is becoming unavoidable. Studies show that it is only a matter of time before traditional paper-based record-keeping is replaced by the electronic one (Gillies & Holt, 2003). The target is to establish a shared patient's information throughout their lifetime (Center, 2012).

Interoperability issues represent obstacles and hindrances of high priority in the provision of medical services. Healthcare environments have evolved to become ever more specialized and distributed. Health ICT and especially health information exchange has enabled convergence by removing the boundaries between the activities, sources, and users of healthcare data and information (Gibson et al., 2015). This convergence, or better said, alignment can be outlined as a complex multi-level concept named interoperability. Traditionally, interoperability, particularly electronic health records (EHRs) interoperability, has been viewed from a technical perspective. However, experience derived from countries that successfully implemented interoperable EHRs has shown that other non-technical aspects are of great importance as well (Office of the National Coordinator for Health IT, 2012).

Several studies have been conducted regarding EHRs interoperability in the Tanzania context. Nehemiah (2014) revealed that acceptance of interoperable EHRs depends on security concerns and consumer health involvement. Another study conducted by Kajirunga and Kalegele (2015) found that government effort and support in setting a conducive environment and promoting stakeholders' engagement, inadequate vendor support, budget limitation, security concerns and unreliable power supply influence on achievements of interoperable EHRs. Mzeruand Officer (2016) on the other hand, noted governance and partner coordination have an influence too. Similarly, Mtey and Dida (2019) concluded that infrastructure (network/internet), regulatory framework (strategies, standards, policies and guidelines) and financing (most initiatives are donor-funded which fulfill donor's interest, which causes the existence of fragmented systems) are constraints in adopting interoperable EHRs systems. Lastly, Nsaghurwe et al. (2020) recommended further studies to be carried out by including other factors such as privacy, security, integrity and stakeholders' commitment concerns. These studies merely focused on one side of the coin but not both, i.e., either technical or non-technical aspects of EHRs interoperability, which includes technological, organizational and environmental factors. Despite the existence of these studies and other government initiatives regarding this matter, there is no interoperability between EHR systems in Tanzania's health service providers. This means, there is limited information on how hospitals can best adopt interoperability systems among them. Therefore, this study aims to fill the gap by combining technological, organizational and environmental factors from organizational perspectives on their acceptance of interoperable EHRs in Tanzania.

The remaining sections of this study are organized as follows. The literature review is provided in section two, and section three discusses the conceptual framework and hypotheses of this study. Research methodology and data analysis are provided in sections four and five respectively. A discussion of the findings is provided in section six. The last section is on the conclusion, limitations and future direction on the acceptance of interoperability of EHRs in Tanzania.

LITERATURE REVIEW

Tanzania Public Health Care Hierarchy

The health sector is one of the priority sectors in any country. As far as the Tanzania context is concerned, the government has been increasing its budgetary allocation of funds to this sector. MoHCDGEC Public Expenditure Review data show that the Government health sector budget increased from TZS 577 billion in 2007/08 to TZS 2.8 trillion in 2020/21 in nominal terms (MoHCDGEC, 2021). In addition, the

Tanzania Development Vision 2025 among other things, its main objectives are the achievement of high-quality livelihood for all Tanzanians (URT, 2000). This is expected to be attained through strategies that will ensure the realization of the following health service goals, i.e. access to quality primary health care for all; access to quality reproductive health service for all individuals of appropriate ages; reduction in infant and maternal mortality rates by three-quarters of current levels; universal access to clean and safe water; life expectancy comparable to the level attained by typical middle-income countries; food self-sufficiency and food security; and gender equality and empowerment of women in all health parameters. In line with the Government Development Vision 2025 goals, the Ministry of Health strives to raise and improve the health status and life expectancy of the people of Tanzania by ensuring the delivery of effective, efficient and quality curative, preventive, promotive and rehabilitative health services at all levels (Tanzania Ministry of Health and Social Welfare, 2015). The health care system in Tanzania, adopts diversified complementary health care financing options, which are sustainable, involving Public-Private Partnership and other resources, and ensure availability of required logistics and support services that are affordable and accessible to every citizen; enhance capacity at different levels by implementing comprehensive human resource development plan, which will facilitate deployment and retention of well-trained and motivated staff at the appropriate health service level; as well as create public awareness at all levels through advocacy and International Electrotechnical Commission (IEC) on preventable public health problems and the need for active community involvement in taking care of their health. Furthermore, the public health system follows a hierarchical structure in which the public dispensary is the lowest level and the highest one is the National Hospital called Muhimbili National Hospital.

Technology Acceptance Theories

The success of innovations can be measured by running an analysis of their adoption and acceptance in the target markets by potential users. The literature is rich with many theoretical models which assist in making such analysis, Technology Adoption Model (TAM) (Davis, 1989), Unified Theory of Acceptance and Use of Technology (UTAUT)(Venkatesh et al., 2003; Venkatesh et al., 2012), Diffusion of Innovations (DOI) (Rogers, 1995), the Theory of Reasoned Actions (TRA) from Ajzen and Fishbein (1975), the Theory of Planned Behavior (TPB) of Ajzen, (1985), the Technology-Organization-Environment (TOE) (Tornatzky & Klein, 1990), the Extended Technology Acceptance Model (TAM2) from Venkatesh. Most of these theories are user-based theories except TOE which completely focuses on the adoption of technology innovation in the organization context.

CONCEPTUAL FRAMEWORK AND HYPOTHESES DEVELOPMENT

Based on the literature review, this study integrated TAM-TOE models to develop the conceptual framework for this study as shown in Figure 1. The use of an integrated model provides a working ground not only to investigate the technological, organizational, and environmental contexts of IT adoption in an organization but also factors that combine the strengths of the TAM model in explaining adoption behavior in explaining organizational behavior, particularly in the adoption of interoperable EHRs.

Relative advantage is defined as the degree to which a technological factor is perceived to be an enabler tool for providing greater benefits to the organization (Davis, 1989). Also, it can be defined as the degree to which the innovation is considered to enable more production, cost savings, less maintenance, and efficiency compared to the existing practices. Indeed, relative advantage is one of the key determinants that would influence a person or an organization to adopt information systems (IS) innovation (Elmansori et al., 2017).

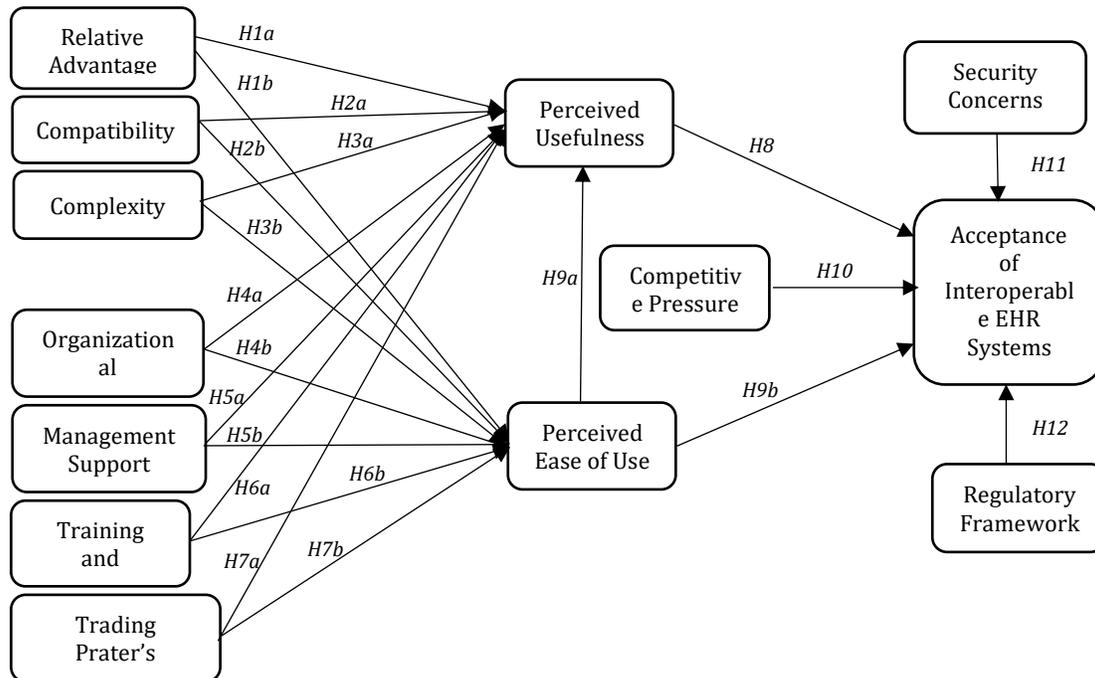


Figure 1. Proposed Conceptual Framework

Interoperability in EHRs systems is an urgent need and has many benefits. These benefits include the ability of patients to access their medical history or any medical data at any time at any clinic or hospital; reductions in healthcare cost, workflow management, rapid medical decision-making, reducing clinical risks, and reducing duplication to save time (Adel et al., 2019). Several studies have been conducted to ascertain the influence of relative advantage on perceived usefulness and perceived ease of use and concluded that relative advantage had a positive impact on both perceived usefulness and perceived ease of use (Abbad et al., 2009). Conflicting findings were found by Tan et al. (2007) which showed that relative advantage has only a positive effect on perceived usefulness and perceived ease of use. Based on the previous findings, this study postulates:

H1a: *There is a positive and significant relationship between the relative advantages and perceived usefulness of interoperable EHRs.*

H1b: *There is a positive and significant relationship between relative advantages and perceived ease of use of interoperable EHRs.*

Compatibility refers to the level at which an innovation is recognized as consistent with the existing systems, workflows, and the health organization's processes. The more EHRs are recognized as being compatible with existing systems and processes; the more likely organizations are to think about the decision to implement the EHRs system. The same is inferred from the adoption of interoperable EHRs systems as it allows for organizations to keep up with new technology without affecting existing legacy systems, aligned with their different organizational, managerial, and operational needs. Several studies in IT adoption have concluded that compatibility has a significant effect on perceived ease of use and perceived usefulness (Gangwar et al., 2015; Peng et al., 2012). When considering the decision to adopt EHRs, it is essential to understand if the technology is compatible with the existing architecture of technology in medical organizations. Based on the above arguments, the following hypotheses are proposed:

H2a: *Compatibility has a positive and significant influence on the perceived usefulness of interoperable EHRs.*

H2b: *Compatibility has a positive and significant influence on the perceived ease of use of interoperable EHRs.*

Sonnenwald et al. (2001) defined complexity as the perceived degree of difficulty in understanding and using a system. This means innovations that are simple to comprehend are more likely to be adopted by organizations. The complexity of an innovation is expected to influence negatively the adoption of IS innovations in

organizations. Hence, less complex IS innovations are believed to be adopted faster and propagate a smooth implementation process, thereby achieving the efficiency anticipated. In e-Health context, the literature shows complicatedness i.e., the term interchangeably referred to as complexity has an important role in accepting and adopting new technologies such as electronic medical records (EMRs). Abdekhoda et al. (2016) and Gangwar et al. (2015) concluded that complexity has a negative influence on perceived ease of use and perceived usefulness. Furthermore, Adel et al. (2019) pointed out that achieving EHRs, semantic interoperability is even more complex due to the existence of diverse frameworks in various healing centers and clinics that have distinctive standards which in turn are furnished by different vendors with different standards and modules. The study calls for careful systematic implementation of interoperable EHRs while preventing its partial and stacking at the middle of the technology adoption. Based on the above arguments, the following hypotheses are proposed:

- H3a:** *Complexity has a negative and significant effect on the perceived usefulness of interoperable EHRs.*
- H3b:** *Complexity has a negative and significant effect on the perceived ease of use of interoperable EHRs.*

Tan et al. (2007) described organizational readiness as “managers” perception and evaluation of the degree to which they believe that their organization has the awareness, resources, commitment, and governance to adopt an innovation and/or new IT. The term organizational competency is intangibly referred to as organizational readiness (Gholami et al., 2018). Broadly, the term has been described with two dimensions, i.e. financial readiness (financial resources for interoperable EHRs implementation and ongoing expenses during usage), and technological readiness (infrastructure and human resources) (Musawa & Wahab, 2012; Oliveira & Martins, 2009). The researcher is arguing that firms that have effective infrastructure, expertise in their employees, and financial support can increase the system's ease of use and can implement interoperable EHRs to their benefit. Therefore, the following hypotheses are proposed:

- H4a:** *Organization competency has a positive and significant influence on the perceived usefulness of interoperable EHRs.*
- H4b:** *Organizational competency has a positive and significant influence on the perceived ease of use of interoperable EHRs.*

IT adoption literature has also recognized the role of top management support in the initiation, implementation and adoption of several innovation technologies. Tornatzky and Klein (1990) explained it as the perceptions and actions of top

officials on the usefulness of technological innovation in creating values for the firm. It ensures long-term vision, reinforcement of values, commitment of resources, optimal management of resources, cultivation of favorable organizational climate, higher assessments of individual self-efficacy, support in overcoming barriers and resistance to change (Jang, 2010; Wang et al., 2010). From the literature, top management support has been found to have a significant and positive influence on perceived ease of use and perceived usefulness in the adoption of information systems (Hasan et al., 2015). Therefore, the following hypotheses are projected:

H5a: *Management support has a positive and significant influence on the perceived usefulness of interoperable EHRs.*

H5b: *Management support has a positive and significant influence on the perceived ease of use of interoperable EHRs.*

Training is described as the degree to which a company instructs its employees in using a tool in terms of quality and quantity (Schillewaert et al., 2005). Since interoperable EHRs a complex information system, an organization needs to train and educate its employees before implementing them. It reduces employees' technophobia, anxiety, and stress about the use of it, and provides motivation and better understanding about its benefits for their tasks. It also reduces ambiguity and helps employees develop knowledge for effective usage in the long run. Training and education were found to have a significant and positive impact on perceived ease of use and perceived usefulness (Gangwar et al., 2015). Hence, the following hypotheses are proposed:

H6a: *Training and education have a positive and significant on the perceived usefulness of interoperable EHRs.*

H6b: *Training and education have a positive and significant on the perceived ease of use of interoperable EHRs.*

Organizations often rely on the experience and skills of trading partners when considering system adoption. Trading partners can offer knowledge, advice, and lessons learned to organizations intending to adopt a technology system (Popela et al., 2019). Trading partner support related to interoperable EHRs are required to ensure system and data availability all the time or rather, at the time when they need to be used. Expert, technical, executive and external (vendor) support have been a critical factor in the success of EHRs implementations (Fennelly et al., 2020a). Physicians are concerned about the qualifications and availability of vendors after sales support services i.e. will they go out of business and disappear from the market and leading to a lack of technical support and a large financial loss thereafter (Ajami

& Bagheri-Tadi, 2013). The same has raised concerns over the effectiveness of the system in question. Kim (2009) argued that the adoption of high-availability architecture, and tested platform and applications provide 100% availability of the data. Also, the authors mentioned that Service Level Agreements (SLA) and a combination of precautionary measures are the main driving factors to ensure desired levels of availability. From trade partner support healthcare organizations can determine the level of EHRs usefulness and ease of use. Thus, subsequent hypotheses are proposed:

H7a: *Trading partners' support has a positive and significant influence on the perceived usefulness of interoperable EHRs.*

H7b: *Trading partners' support has a positive and significant on the perceived ease of use of interoperable EHRs.*

Perceived usefulness is defined as an individual perception that using a specific system will increase job performance within an organizational context (Davis, 1989; Susanto & Aljoza, 2015). When an organization perceives that using a specific technology innovation could increase the performance of the organization, the likelihood of adoption of that technology will be very high (Davis, 1989). Previous studies have shown that perceived usefulness has a significant and positive influence on the adoption of technology (Fayad & Paper, 2015; Henderson & Divett, 2003; Renko & Druzijanic, 2014). Similarly, when health service providers perceive that using interoperable EHRs could improve their performance in service delivery, the likelihood of adopting it would be very high. Based on the previous findings, this study postulates that:

H8: *Perceived Usefulness has a positive and significant effect on the acceptance of interoperable EHRs.*

Davis (1989) defined perceived ease of use as the extent to which individuals and/or organizations expect the target system to be free of effort. The TAM model suggests that perceived ease of use influences perceived usefulness because technologies that are easy to use are likely to be more useful (Chiu & Ku, 2015). Previous studies have shown that perceived ease of use has a significant and positive influence on the adoption of technology (Fayad & Paper, 2015; Henderson & Divett, 2003; Renko & Druzijanic, 2014). Likewise, when health service providers believe that using interoperable EHRs does not require extra effort, they will perceive it to be useful and hence their likelihood of being adopted will be very high. Based on this, the following hypotheses are proposed:

H9a: *Perceived ease of use has a positive and significant influence on the perceived usefulness of interoperable EHRs.*

H9b: *Perceived ease of use has a positive and significant influence on the acceptance of interoperable EHRs.*

From the early stages of research in technology adoption, the role of competitive pressure is recognized as an effective motivator (Lin & Lin, 2008a; Lippert & Ph, 2006). Zhu et al. (2006) defined competitive pressure as the degree of pressure that the company feels from competitors within the industry. Competition in the industry is generally perceived to positively influence IT adoption especially when technology directly affects the competition and it is a strategic necessity to adopt new technologies to compete in the market (Ramdani et al., 2009). This fact is applicable in the context of interoperable EHRs. Adopting information systems is useful for a firm to alter the competitive environment in terms of rules of competition, industry structure and outperforming their competitors (Porter & Millar, 1985). Thus, first movers in implementing interoperable EHR tend to derive considerable advantages in terms of competitive advantages and smooth survival. Subsequently, this study hypothesizes that:

H10: *Competitive pressure has a positive and significant influence on the acceptance of interoperable EHRs.*

Many researchers agree that the use of EMRs such as EHRs bears an issue that may have a negative effect on patient privacy (Earnest et al., 2004; Jha et al., 2009; Rahal et al., 2019). Physicians doubt whether EHRs are secure stores for patients' information and records, and fear that data in the system may be accessible to those who are not authorized to obtain it (Bates, 2005). Consequently, inappropriate disclosure of patient information might lead to legal problems. Furthermore, there is, in some countries, a lack of clear security regulations that could help to ensure patient privacy and confidentiality. According to Bates (2005), physicians are more concerned about this issue than the patients themselves. Loomis et al. (2002) confirmed that even among the physicians who do use EHRs, most believe that there are more security and confidentiality risks involved with EHRs than with paper records. The study also shows that perceived threats to professional autonomy have a significant negative impact on physicians' decision to accept EHRs. This shows that concerns about the privacy and security of patient data are experienced as a barrier to EHRs usage. A study on the Austrian nationwide implementation of EHRs found that while health data is protected from unauthorized access within the trusted domain of the original institution, it automatically loses the high protection standards when being transferred to another medical institution (Dorda et al., 2008). Threats to security and privacy of health information increase with higher numbers

of people having access. Usually, these threats occur due to inadequate legal regulations or careless technical system design and implementation (Steininger & Stiglbauer, 2015). Recent acceptance research revealed that not only patients but also doctors are concerned about privacy and security in inter-institutional EHRs, which can be a determinant for less adoption of interoperable EHR systems (Haas et al., 2011). Based on these considerations, this study hypothesizes that: -

H11: Privacy and security concerns had a negative and significant influence on the acceptance of interoperable EHRs.

Chang et al. (2007) and Yusif et al. (2020) discovered that government regulations benefit hospitals attempting to implement new technology innovations. The regulatory environment's support is critical for innovation uptake (Mazumdar, 2016a). Government rules and laws have been identified as significant drivers affecting the adoption of novel technologies such as cloud-based enterprise resource planning, particularly in developing nations (Mahyar et al., 2014). According to Li (2008), an organization is more likely to embrace new technology innovation if the government has clear guidelines and regulations to guide its implementation. Compliance with data and environmental requirements are additional challenges that interoperable EHRs' confront, and there is insufficient legislation to address them. Thus, favorable regulatory regimes contribute favorably to the introduction and uptake of information technology (Mazumdar, 2016). Based on the foregoing data, the following hypothesis is advanced:

H12: Regulatory framework has a positive and significant effect on the acceptance of interoperable EHRs.

METHODOLOGY

Research Instrument Development

In this research, a questionnaire was designed to aid the collection of data from the respondents. The questionnaire consists of two parts. The first part consists of items for collecting demographic information while the second part was measurement items for the constructs that measure the acceptance of interoperable EHRs systems. Five (5) items for relative advantages were adopted from Cheng (2021) and Oliveira et al. (2014a), four (4) items for compatibility were adopted from Cheng (2021) and Oliveira et al. (2014a). Four (4) items for complexity were adopted from Abdekhoda et al. (2019) and Cheng (2021), five (5) items for trading partners were adopted from Abdekhoda et al. (2019) and Cheng (2021). Five (5) items for privacy

and security concerns were adopted from Oliveira et al. (2014a) and Cheng (2021). Management support and organizational competency were measured by using four (4) and five (5) items respectively adopted from Oliveira et al. (2014a) and Cheng (2021). Organizational competency was measured by using four (5) items adopted from Abdekhoda et al. (2019). Training and education as well as competitive pressure were measured by five (5) items adopted from Abdekhoda et al. (2019) and Masana (2019). The regulatory framework was measured by five (5) items adopted from Ghaleb et al. (2021) and Masana (2019). Perceived usefulness and perceived ease of use were measured by using four (4) items adopted from Abdekhoda et al. (2019) and Masana (2019). Three (3) items for acceptance were adopted from Van Der Heijden (2004). All measurement items adopted were further adjusted to fit the context of this current study. Moreover, the five-point Likert scale was used to measure the extent to which the respondent agrees or disagrees with item statements. The scales were organized as follows: 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree. A pretesting study using 30 respondents was conducted to establish if the contents of the questionnaire were clearly understood by respondents. All items with issues were adjusted and the final questionnaire was generated.

Sampling and Sample Size

This study was conducted in Tanzania in which clinics, polyclinics and hospitals were used as the center for data collection. Data were collected from Zanzibar, Dar es Salaam, Mwanza, Arusha, Dodoma and Mbeya which are considered to be key business areas. The identified areas have a large population and therefore their health care are highly populated, also most of the hospitals in the identified areas have several electronic medical systems installed to facilitate the provision of medical services to patients. A purposive sampling was employed to identify 80 health service providers in the visited areas. Balloun et al. (2011) recommended the usage of multiple respondents in survey research of organizations. Therefore, four to five respondents who are in managerial positions were identified using the snowball sampling technique in each health provider institute. Studies show that the usage of multiple respondents in organization survey research is recommended since it will ensure detection of individual differences which may affect the output of findings (Balloun et al., 2011). The designed questionnaire was physically distributed to the identified healthcare service providers. A total of 340 questionnaires were distributed and only 281 questionnaires were received which is 82.6% response rate. All received questionnaires were examined and 20 questionnaires were found to have large percentages (more than 10%) of unanswered values and pattern responses. Therefore, all questionnaires with large percentages of missing values and response patterns were discarded. Schönbrodt and Perugini (2013) recommended that for the study to produce stable estimates, a

sample size above 250 is adequate. Therefore, a sample size of 261 valid questionnaires was considered to be adequate and used for subsequent data analyses.

DATA ANALYSIS

The Cronbach's Alpha coefficient value was used to measure the reliability of the research instrument. Studies show that for the research instrument to be reliable, Cronbach's Alpha should range between 0.67 and 0.99 (Frost et al., 2007; Mohamad et al., 2015). Findings from this study show that two items from compatibility, one item from complexity, one item from Trading Partners support, and one item from regulatory framework had loading values below 0.6 as a result, Cronbach's values produced were below the suggested thresholds. Therefore, all measurement items with loading values below 0.6 were discarded one after another. The final reliability test shows that the overall Cronbach's alpha values range from 0.708 to 0.921. Furthermore, Barrett et al. (2012) claimed that for data to be normally distributed, the absolute value for skewness and kurtosis should be 2 and 7 respectively. Findings from this study indicate that skewness values ranged between -1.464 and 0.460 while kurtosis ranged between -1.018 and 3.732. This result indicates that data are normally distributed and therefore further analysis can be conducted. To examine the hypothesized relationship, simple linear and multiple regression analyses were conducted. Table 1 shows the results of the simple linear regression and multiple regression analyses of which ten (10) hypothesized relations out of twenty (20) were found to have statistically significant effects.

FINDINGS AND DISCUSSION

Findings show that relative advantage has a positive and significant relationship with perceived usefulness. Furthermore, the results indicate that relative advantage has a positive significant relationship with perceived ease of use. The above findings are supported by Chwelos et al. (2001) and Musawa and Wahab (2012) who explained that perceived benefits were the most influential determinants of technology usage. This is also in line with the findings from Amoako-Gyampah and Salam (2004) who found that relative advantage has a positive influence on the adoption of enterprise resource planning systems. In this case, relative advantages will allow users to understand various ways that the interoperable EHRs system will make them productive and to perceive the system to be useful and more meaningful in day-to-day routines.

Table 1. Hypotheses Results

Hypotheses				Unstandardized Beta	Coefficients Std. Error	Standardized Beta	t-Value	Sig.	Remark
H1a	RA	→	PU	.441	.047	.538	9.322	0.000	Supported
H1b	RA	→	PEOU	.019	.087	.013	.221	0.825	Supported
H2a	CP	→	PU	-.007	.058	-.008	-.118	0.906	Not Supported
H2b	CP	→	PEOU	-.092	.108	-.061	-.855	0.394	Not Supported
H3a	CX	→	PU	-.016	.035	-.022	-.453	0.651	Not Supported
H3b	CX	→	PEOU	.011	.069	.009	.161	0.872	Not Supported
H4a	OC	→	PU	-.003	.032	-.005	-.095	0.924	Not Supported
H4b	OC	→	PEOU	.509	.063	.467	8.019	0.000	Supported
H5a	MS	→	PU	.251	.056	.288	4.523	0.000	Supported
H5b	MS	→	PEOU	.362	.104	.235	3.495	0.001	Supported
H6a	TE	→	PU	-.027	.064	-.029	-.428	0.669	Not Supported
H6b	TE	→	PEOU	.241	.119	.147	2.022	0.044	Supported
H7a	TP	→	PU	.408	.053	.456	.018	0.429	Not Supported
H7b	TP	→	PEOU	.131	.109	.127	2.043	0.042	Supported
H8	PU	→	AUOI	.982	.037	.977	26.237	0.000	Supported
H9a	PEOU	→	PU	-.183	.033	-.323	5.487	0.000	Supported
H9b	PEOU	→	AUOI	.018	.020	.031	.873	0.383	Not Supported
H10	CS	→	AUOI	-.032	.033	-.045	-.995	0.320	Not Supported
H11	PC	→	AUOI	-.064	.042	-.072	-1.521	0.130	Not Supported
H12	RF	→	AUOI	.131	.049	.137	2.666	0.008	Supported

Note: RA: Relative Advantage; CP: Compatibility; CX: Complexity; OC: Organization Competency; MS: Management Support; TE: Training and Education; TP: Trading Partner; PU: Perceived Usefulness; PEOU: Perceived Ease of Use; CS: Competitive Pressure; PC: Privacy Concern; RF: Regulatory Framework

In addition to that, Gangwar et al. (2015) explained that the adoption of electronic health records in public hospitals is influenced by relative advantage and compatibility in the sense that the facilities possess relative gains because of several actors' benefits. This is the case because service providers benefit due to flexibility and simplicity while beneficiaries gain through service quality provision and the government successfully facilitating the service delivery to the public. Compatibility on the other hand is attained through the government focus being in line with the service delivery pattern concerning the electronic records requirements.

The findings show that management support has a significant and positive relationship with perceived usefulness ($p < 0.001$). Furthermore, the results indicate that management support has a positive and significant relationship with perceived ease of use ($p < 0.001$). These findings are similar to findings from Schillewaert et al. (2005), Low et al. (2011), Ramdani et al. (2009) and Teo et al. (2009). Apart from that, Aceto et al. (2018) suggested that electronic health records in public hospitals are also facilitated with management support of the organization and also competence of the entity through resources financial and human capital. This is the case because resources are the drivers of the technologies and their applications in organizations since they are expensive and require investments and maintenance measures. On that note, as the management supports the initiatives and the capability of the organization is certain in terms of resources then technology innovation may be accepted and executed.

This result indicates that organization competency has a positive and significant relationship with perceived ease of use ($p < 0.001$). The results support previous findings from Lin and Lin (2008), Durbhakula and Kim (2011), Wang et al. (2010), Oliveira and Martin (2010) and Musawa and Wahab (2012). This means, the organization should have adequate competency which will enable the usage of interoperability EHRs.

The findings show that Training and Education had a positive and statistically significant influence on perceived ease of use ($p < 0.001$). This result is similar to those of Lee et al. (2010), Amoako-Gyampah and Salam (2004), and Kerimoglu et al. (2008). Also, Liang et al. (2021) suggested that electronic health records in public hospitals may be difficult to pursue and accepted especially when the level of awareness is limited either by ignorance or limited training facilities. This is the case in most developing countries which tends to affect technology innovation adoption. Despite that, the nature of most technologies to run massive records tends to be complex which requires skills and means to master it.

The findings show that regulatory framework has a positive and significant relationship with acceptance of interoperable EHRs systems ($p < 0.001$). The results are not in line with Ghaleb et al. (2021) and Yusif et al. (2020). This is the case because any initiative is bound to be useful and effective in the public sector provided that the practice is well institutionalized as it is being enforced to be articulated in practice. This is the platform that creates automatic compliance such that the effecting of the practice is without question. This is the case because the institution gives room for the design and formulation of rules, regulations and procedures which are synonymous with the law. Furthermore, the results indicate that trading partners have a positive and significant influence on perceived ease of

use ($p < 0.001$). The results are similar to those of Fennelly et al. (2020), Awa et al. (2016), Oliveira et al. (2014), Wang et al. (2010) and Low et al. (2011). Vendor Support both peer and technical support reportedly helped end-users to optimize their use of the EHRs and helped solve IT issues respectively.

Perceived usefulness was found to have a very strong, significant positive relationship with acceptance of interoperable EHRs systems ($p < 0.001$). This is also supported by several studies on IT adoption. Moreover, Garde et al. (2007) suggest that electronic health records in public health care facilities are influenced by the perceived usefulness of the technology and trading partners because the technology is essential since it possesses gains to the beneficiaries and service providers. Also, it is a platform for the business that benefits several other actors, the technology is deemed useful to influence the beneficiaries to benefit as a result of the initiatives.

CONCLUSION, LIMITATION, AND FUTURE STUDY

This study examined the acceptance of interoperable EHRs in clinics, polyclinics and hospitals in Tanzania. The study integrated TAM and TOE theories to examine the acceptance of interoperability EHRs. The findings show that perceived usefulness and regulatory framework are the main determinants of the acceptance of interoperable EHRs in Tanzania. This means, that for clinics, polyclinics and hospitals in Tanzania to adopt interoperable EHRs, the benefits to be acquired from using interoperable EHRs must be clearly understood. Also, Ministries and other regulatory bodies that oversee the implementation of various health care systems in Tanzania should put in place standards and guidelines to guide the implementation and utilization of interoperable EHRs in Tanzania.

Despite the findings presented above, this study has several limitations. Firstly, the study used cross-sectional data. This means the findings of this study may be different from a similar study due to changes in the environment which may affect the opinion of the respondents. A longitudinal study may be conducted in the future to address the challenges of using cross-sectional data. Secondly, the study used non-probability sampling which may affect the generalization of the findings. A future study that deploys probability sampling may be conducted.

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