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Technological Determinants for the Adoption and Implementation of E-Health Systems: A Comprehensive Analysis

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ABSTRACT

Technology integration into healthcare systems has revolutionised the delivery of medical services, with e-health systems emerging as a critical enabler of more efficient and accessible healthcare. However, various technological factors heavily influence these systems' successful adoption and implementation. The study aimed to comprehensively analyse the Technological Determinants for adopting and implementing E-Health Systems in health facilities. The study adopted a survey research design. A sample size of 54 critical employees of health facilities within Migori County was selected from a target population of 198 employees using a simple random sampling technique. Questionnaires were used as data collection instruments. The validity of the research instruments was tested using IT experts, while reliability was realised using Cronbach's alpha internal consistency coefficient. Findings from the research suggest that successful e-health systems heavily depend on broader technological factors surrounding the systems. Consequently, the study revealed that technological factors should be considered keenly for enhanced adoption and implementation of e-health systems.

Keywords: E-health systems, Technological factors, Comprehensive analysis, Predictive e-health

I. INTRODUCTION

Adopting information and communication technology in healthcare can enhance healthcare delivery by expanding access, productivity, and quality (Agarwal et al., 1999). However, the successful adoption and implementation of e-health systems are influenced by several technological factors (Al-Mamun et al.,2016). This research aims to identify the technological determinants affecting the effectiveness of adopting and deploying e-health systems. This paper seeks to examine the different variables, including infrastructural readiness, user readiness, technical support, and stakeholders' involvement, to establish how these variables impact technology enhancement in health facilities. It is crucial to address these determinants in order to help politicians, employees of the healthcare system, and developers of technology involved in e-health to create and implement better and lasting e-health programs.

Methodology

The study employed a survey research design. The population for this study was employees of all 196 dispensaries found in Migori County. The study employed simple random sampling methods. In the simple random sampling approach, every member of the population had an equal probability of being selected, which helped to eliminate biases and ensure the sample was representative (Mweshi & Sakyi, 2020).

A. *Sample Size:*

Cooper (2008) recommended that 14% of population samples are highly reliable if well chosen. Ogachi (2011) further asserted that reasonable selection is suitable because it is fast, cheap, efficient, and accurate to evaluate information about the population. Therefore, 14% was the representative sample for this study.

B. *Response Rate*

The researcher physically distributed 54 questionnaires to 27 Dispensaries in Migori County. All questionnaires were filled and returned to Kothari (2014), who asserted that a response rate of 60% and above is reasonable, above 70% is very good, and 100% is perfect. Therefore, the response rate was adequate for analysis.

C. ***Demographic Information***

Sample size distribution. The findings are as shown in Table 1 Respondent category below

TABLE 1
SAMPLE SIZE DISTRIBUTION

Strata (Sub-County)	**Number of dispensaries**	**14% of the Dispensaries**	**Sampled**
Awendo	22	3.08	3
Kuria East	15	2.1	2
Kuria West	32	4.48	5
Nyatike	35	3.08	3
Rongo	25	4.9	5
Suna East	22	3.08	3
Suna West	23	3.22	3
Uriri	24	3.36	3

II. STUDY FINDINGS

This chapter provides an analysis and findings from the data gathered via a questionnaire administered to a randomly selected group of 54 respondents. This group includes Clinical officers, Nurses, and Community Health Volunteers.

D. Suitability of Data for Factor Analysis

To assess the suitability of the sampled data for factor analysis, the researcher employed Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. The results are presented in Table 2 below.

Table 2
TECHNOLOGICAL CHALLENGES FACED IN THE ADOPTION AND IMPLEMENTATION OF E-HEALTH SYSTEMS KMO AND BARTLETT'S TEST

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.951
Bartlett's Test of Sphericity	Approx. Chi-Square	7.959
	df	15
	Sig.	.025

As shown in Table 2 above, the Kaiser-Meyer-Olkin measure of sampling adequacy is 0.951, higher than 0.6. Technological Challenges faced in adopting and implementing e-health Systems KMO and Bartlett's Test. Therefore, it can be concluded that the underlying factors explain 95% of the variability. Additionally, Bartlett's test of sphericity shows a significant p-value of 0.025, which is less than 0.05. The results suggest that the dataset is appropriate for factor analysis due to adequate sampling and significant correlations among the variables.

E. Factor extraction

The indicators associated with technological challenges faced by adopting and implementing e-health systems were the focus of this section's analysis. Based on findings where the initial value of the five (5) indicators that had been provided to respondents to rate on a Likert scale ranging from Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), to Strongly Agree (5). The responses were computed and analysed using exploratory factor analysis to identify the principal components and their associated indicators as presented. The constructs are discussed below.

1) E-health System Implementation:

In this study, two indicators were provided to respondents to rate on a Likert scale from Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), to Strongly Agree (5). These ratings were then converted into a System Usability Construct, as detailed in Table 3 system usability construct. Respondents indicated their level of agreement with respect to the three different indicators.

Table 3
E-HEALTH SYSTEM IMPLEMENTATION

	N	Mean	Std. Deviation
Access to Steady Power Supply	54	3.17	1.463
Adequate User Training	54	2.91	1.533
Valid N (listwise)	54		

Research findings regarding Table 3 e-health System implementation reveal varied perceptions among users regarding different aspects of the e-health system's implementation.

Firstly, the component "Access to Steady Power Supply" has a mean score of 3.17 and a standard deviation of

1.463. This mean score indicates a slightly positive perception, supporting the fact that most facilities have access to a steady power supply, which plays a pivotal role in implementing e-health systems. The high standard deviation of 1.463 indicates considerable variation in responses, but not extreme.

Secondly, the component " Adequate User Training " has a slightly higher mean score of 2.91, indicating that the average rating for adequate user training is slightly lower than for steady power supply. The standard deviation for this component is 1.533, which, although still high, is slightly lower than that of the first component. This suggests that while users agree that a steady power supply plays a significant role, there remains significant variability in their experiences.

In Summary, the analysis of the mean scores and standard deviations for "Access to Steady Power Supply" and "Adequate User Training" reveals that while healthcare facilities generally have access to reliable electricity, there is still room for improvement in terms of user training. Both components are essential for the successful implementation of e-health systems, and addressing the identified gaps in user training can significantly enhance the effectiveness and adoption of these systems.

*2) **E-health System Support Construct***

In this study, two indicators were provided to respondents to rate on a Likert scale from Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), to Strongly Agree (5). These ratings were then converted into an E-health System Support construct, as detailed in Table 4. The E-health System Support construct asked respondents to indicate their level of agreement concerning the indicator.

TABLE 4
E-HEALTH SYSTEM SUPPORT

	N	Mean	Std. Deviation
The users receive Technical Support	54	3.17	1.450
Management and stakeholder support	54	3.19	1.415
Valid N (listwise)	54		

Research findings in Table 4 above show that

First, the component "The users receive Technical Support" shows a mean score of 3.17, indicating a slightly negative perception among users regarding the significance of the Technical Support they receive. The standard deviation for this component is 1.450, suggesting moderate variability in how participants rated the technical support they received. This high standard deviation indicates that while some users may find the technical support received helpful, others have a significantly different experience, finding it less useful.

Secondly, the component " Management and stakeholder support " has a slightly higher mean score of 3.19, showing a similar average rating for management and stakeholder support, slightly higher than technical support. The standard deviation for this component is 1.415, which is slightly lower, indicating that the responses for this category are somewhat more consistent. This standard deviation affirmed that most respondents agree that Management and stakeholder support play a big role in implementing e-health Systems.

III. CONCLUSIONS

This study aimed to assess the impact of Technological Factors in The Adoption and Implementation of an E-Health Medical Systems. Respondents were given various indicators to rate their level of agreement on a Likert scale ranging from Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), to Strongly Agree (5)

The study concludes that while some Technological indicators, such as technical support and access to a steady power supply, are viewed slightly positively, many factors, including adequate user training, received neutral to slightly low ratings. The high variability in user responses across all factors suggests inconsistent user experiences, highlighting the need for refocusing to enhance adequate user training and encourage management to embrace the e-health systems, leading to their successful adoption and subsequent implementation.

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