



Key Factors Influencing the Implementation and Adoption of the Electronic Mastercard Register at Mlangeni Health Centre

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Abstract – The study utilized a mixed-methods research design, combining quantitative surveys and qualitative interviews, to examine the factors influencing the successful implementation and adoption of the EMR. The results revealed a strong relationship between specific factors and the perception of the EMR doing good, which is crucial for successful adoption. Key findings include the significant negative impact of inadequate training and support, concerns about data security and privacy, and the absence of evidence regarding the benefits and value of the EMR. On the other hand, factors like resource availability, user-friendliness, and regulatory and legal considerations were not found to be statistically significant in influencing the perception. These results provide valuable insights for healthcare policymakers, administrators, and other stakeholders. By addressing the identified barriers and leveraging the enablers, healthcare facilities in similar settings can better plan for the successful integration of technology, ultimately improving operational efficiency and patient care. This study addresses a critical problem in the healthcare sector, namely, the lack of a comprehensive investigation into the specific factors influencing the adoption of EMR systems in resource-constrained environments. Its findings contribute to bridging this research gap and offer practical recommendations for enhancing technology adoption, thereby positively impacting healthcare services in Ntcheu District and beyond.

Keywords – “Healthcare,” “Technology,” “Adoption,” “Malawi”

I. INTRODUCTION

In today's rapidly evolving world, technology plays a crucial role in enhancing operational efficiency and effectiveness across various industries (Davenport, 2013). The healthcare sector, in particular, has recognized the potential benefits of adopting innovative technologies to streamline processes and improve patient care (Lluch, 2011). One such technology that has gained prominence is the Electronic Mastercard Register (EMR), which offers a digital platform for managing financial transactions and patient records in healthcare facilities (Johnson et al., 2018). This study aims to investigate the factors influencing the successful implementation and adoption of the EMR at Mlangeni Health Centre, located in Ntcheu District, Malawi. By examining the implementation process and analysing the factors that contribute to the adoption of this technology, this research seeks to provide valuable insights into the challenges and opportunities associated with technology adoption in healthcare operations.

Mlangeni Health Centre, like many healthcare facilities in Malawi, faces numerous operational challenges, including manual record-keeping processes (Malawi Ministry of Health, 2017). The adoption of the EMR has the potential to address these issues by offering a streamlined and automated approach to patient record management. The successful technology implementation and adoption are influenced by various factors, including organizational readiness, user acceptance, system usability, and contextual factors specific to the local setting

(Venkatesh et al., 2003). Therefore, it was crucial to examine these factors and understand how they contributed to the successful implementation and adoption of the EMR at Mlangeni Health Centre.

II. A SUBSECTION SAMPLE

Malawi, like many developing countries, faces significant challenges in its healthcare system, including limited resources, inadequate infrastructure, and inefficient processes (World Bank, 2021). In recent years, the government of Malawi has recognized the potential of technology to address these challenges and improve the quality of healthcare services. The adoption of electronic systems, such as the EMR, has been identified as a promising solution to enhance operational efficiency and facilitate effective management of patient records in healthcare facilities. Ntcheu District, located in the central region of Malawi, is one of the districts grappling with healthcare service delivery issues. Mlangeni Health Centre, situated in Ntcheu District, serves as a primary healthcare facility catering to the local population. However, like many healthcare centres in the region, Mlangeni Health Centre faces operational constraints, including manual record-keeping systems.

Previous studies have highlighted the importance of examining the factors influencing the successful implementation and adoption of technology in healthcare operations. Factors such as organizational readiness, user acceptance, system usability, and contextual factors specific to the local setting have been identified as critical



determinants of technology adoption (Venkatesh et al., 2003). However, limited research has been conducted on the implementation and adoption of the EMR system in the specific context of Mlangeni Health Centre, Ntcheu District, Malawi. Therefore, this study aimed at bridging the research gap by investigating the factors influencing the successful implementation and adoption of the EMR at Mlangeni Health Centre. By understanding these factors, healthcare policymakers, administrators, and other stakeholders can make informed decisions and develop strategies to overcome potential barriers to adoption, thereby improving the effectiveness of technology integration in healthcare operations.

III. PROBLEM STATEMENT

Despite the potential benefits of technology adoption in healthcare operations, including improved efficiency and quality of care, many healthcare facilities in Malawi, such as Mlangeni Health Centre in Ntcheu District, still rely on manual processes for patient record-keeping. The absence of an integrated electronic system, such as the EMR, hinders the effective management of patient records, leading to inefficiencies and potential errors in healthcare service delivery. The lack of a comprehensive investigation into the factors influencing the successful implementation and adoption of the EMR system at Mlangeni Health Centre further exacerbates the problem. Without a deep understanding of the specific challenges and opportunities associated with adopting this technology in the local context, healthcare policymakers and administrators may struggle to develop effective strategies for technology integration and overcome potential barriers to adoption.

Therefore, it is essential to address the following problem: What are the factors influencing the successful implementation and adoption of the EMR at Mlangeni Health Centre in Ntcheu District, Malawi? By examining this problem, the study seeks to provide valuable insights into the barriers and enablers of technology adoption in healthcare operations and contribute to the development of strategies that can enhance the integration of the EMR system at Mlangeni Health Centre. Addressing this problem will ultimately support the improvement of operational efficiency, and patient care delivery at the healthcare facility, positively impacting the overall healthcare system in Ntcheu District, Malawi.

IV. METHODOLOGY

In this study, a mixed-methods research design was utilized to comprehensively investigate the factors influencing the successful implementation and adoption of the Electronic Mastercard Register (EMR) at Mlangeni Health Centre in Malawi. The research design combined both quantitative and qualitative data collection methods, allowing for a holistic understanding of the subject. Quantitative data was gathered through a structured

questionnaire administered to healthcare staff and administrators, while qualitative insights were obtained through in-depth interviews with key stakeholders. The data analysis involved both descriptive statistics for summarizing survey responses and inferential statistics to identify significant predictors of EMR adoption. Ethical considerations were paramount, with ethical approval sought, informed consent obtained, and measures taken to protect participants' rights and confidentiality throughout the study. This methodology ensures a robust and ethical approach to exploring the complexities of EMR adoption in a healthcare setting.

V. RESULTS

In order to understand the factors driving the implementation and adoption of the EMR at Mlangeni Health Centre, it was crucial to identify the key determinants influencing this process. By uncovering these factors, the study gained valuable insights into the critical elements that contribute to the successful implementation and wide-spread adoption of the EMR system.

1. Identify the Key Factors Influencing the Implementation and Adoption of the Electronic Mastercard Register.

Model Summary

The model summary provides an overview of the regression model's performance in predicting the perception of the EMR doing better than harm based on the included predictors.

Table 1: Model Summary

| Model Summary | | | | |
|---------------|-------------------|----------|-------------------|----------------------------|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | .949 ^a | .901 | .843 | .338 |
| a. Predictors | | | | |

The coefficient of determination (R-squared) value of 0.901 suggests that approximately 90.1% of the variance in the perception of the EMR's impact can be explained by the predictors included in the model. This indicates a relatively strong relationship between the predictors and the dependent variable. The adjusted R-squared value of 0.843 adjusts the R-squared value for the number of predictors in the model, providing a more conservative estimate of the model's explanatory power. It suggests that about 84.3% of the variance in the perception of the EMR can be attributed to the predictors when accounting for the complexity of the model. The standard error of the estimate (0.338) indicates the average distance between the observed values and the predicted values by the model. A lower value suggests that the model's predictions are relatively close to the actual values, indicating good overall model fit. The regression model demonstrates a strong relationship between the predictors (regulatory and legal consideration, evidence of benefits and value, data



security and privacy, training and support, user-friendliness, and resource availability) and the perception of the EMR doing good. The model explains a significant proportion of the variance in the dependent variable, suggesting that these predictors play a crucial role in influencing the perception of the EMR's impact. The ANOVA table provides information about the significance of the regression model as a whole in predicting the perception of the EMR doing better than harm.

Table 2: ANOVA.

| ANOVA ^a | | | | | | |
|--------------------|----------------|--------|-------------|-------|--------|-------------------|
| Model | Sum of Squares | df | Mean Square | F | Sig. | |
| 1 | Regression | 12.429 | 7 | 1.776 | 15.545 | .000 ^b |
| | Residual | 1.371 | 12 | .114 | | |
| | Total | 13.800 | 19 | | | |

a. Dependent Variable: b. Predictors

The regression sum of squares (SSR) is 12.429, which indicates the total amount of variation in the dependent variable that is explained by the predictors included in the model. This high SSR value signifies that the predictors collectively account for a substantial portion of the variation in the perception of the EMR's impact. The degrees of freedom (df) for the regression are 7, corresponding to the number of predictors in the model. This number represents the independent pieces of information used to estimate the parameters of the model. By dividing the regression sum of squares by its degrees of freedom, we obtain the mean square for the regression, which is 1.776. This value represents the average amount of variation explained by each predictor. The F-value, calculated by dividing the mean square for the regression (1.776) by the mean square for the residual (0.114), is 15.545. The F-value is a test statistic used to determine whether the overall regression model is a good fit for the data. Specifically, it tests the null hypothesis that all regression coefficients are equal to zero, which would imply that the predictors have no explanatory power over the dependent variable. An F-value of 15.545 is quite high, indicating that the null hypothesis is unlikely to be true. The p-value associated with this F-value is less than 0.001, which means that the probability of observing such a high F-value by chance is very low. Therefore, we can conclude that the regression model is statistically significant in predicting the perception of the EMR's effectiveness. The ANOVA (Analysis of Variance) results further support the significance of the regression model. By breaking down the overall variance into components attributable to the predictors and the residual error, the ANOVA table helps to understand the contribution of each component to the total variance. In this case, the results confirm that the regression model, which includes predictors such as regulatory and legal considerations, evidence of benefits and value, data security and privacy, training and support, user-friendliness, and resource availability, significantly predicts the perception of the EMR's impact. These

predictors play a crucial role in shaping how users perceive the benefits and effectiveness of EMR systems, indicating that the model is robust and reliable in explaining the variance in the dependent variable.

Predictor Variables

The table shows the coefficients for various factors that may influence the EMR's adoption and its impact on whether the EMR is perceived to be doing better than harm.

Table 3: Predictor Variables.

| Coefficients ^a | | | | | | |
|---------------------------|------------------------------------|---------------------------|-------|--------|--------|------------|
| Model | Unstandardized Coefficients | Standardized Coefficients | t | Sig. | | |
| | | | | | B | Std. Error |
| 1 | (Constant) | 16.317 | 1.871 | | 8.721 | .001 |
| | Resource Availability | .328 | .605 | .295 | .541 | .598 |
| | User Friendly | .377 | .437 | .363 | .863 | .405 |
| | Training and Support | -1.188 | .211 | -.715 | -5.622 | .000 |
| | Data Security and Privacy | -.746 | .240 | -.746 | -3.107 | .009 |
| | Evidence of Benefits and Value | -.869 | .347 | -.869 | -2.500 | .028 |
| | Evidence of Benefits and Value | -1.442 | .271 | -1.299 | -5.312 | .001 |
| | Regulatory and Legal Consideration | .138 | .217 | .138 | .634 | .538 |

a. Dependent Variable: EMR doing good than harm?

On Resource Availability (0.598), the coefficient indicates a positive relationship between resource availability and the perception of the EMR doing good. However, the coefficient is not statistically significant ($p > 0.05$), meaning the relationship may not be meaningful or reliable. Sufficient resources, including financial, technological, and human resources, are vital for successful implementation. The results agree with Quaasar and Rahman (2021) who further stated that Adequate funding, appropriate hardware and software infrastructure, and trained personnel are necessary for a smooth adoption process.

On User Friendly (0.405), the coefficient suggests a positive relationship between user-friendliness and the perception of the EMR doing good. However, the coefficient is not statistically significant. The usability and user-friendliness of the Electronic Master card Register are critical factors. The results concur with Ilieva et al. (2023) who discussed further that if the system is intuitive, easy to navigate, and aligned with the existing workflows, it is more likely to be adopted.

On Training and Support (0.001), the coefficient indicates a negative relationship between training and support and the perception of the EMR doing good. It is



statistically significant ($p < 0.001$), suggesting that inadequate training and support can negatively impact the perception of the EMR. Comprehensive training programs tailored to the needs of different user groups (e.g., healthcare providers, administrative staff) are essential for successful adoption according to the study by Samardzic et al (2020) who further discussed that ongoing technical support and guidance after implementation can also address any issues or challenges that may arise.

On Data Security and Privacy (0.009), The coefficient suggests a negative relationship between data security and privacy and the perception of the EMR doing good. It is statistically significant ($p < 0.05$), indicating that concerns about data security and privacy may impact the perception of the EMR. Healthcare facilities must prioritize the security and privacy of patient data when implementing an Electronic Mastercard Register as also reported by Almalawi et al. (2023) who also evaluated that ensuring compliance with data protection regulations and implementing robust security measures builds trust among staff and patients, facilitating adoption.

Evidence of Benefits and Value (0.028) this coefficient suggests a negative relationship between the availability of evidence of benefits and value and the perception of the EMR doing good. It is statistically significant ($p < 0.05$), indicating that the lack of evidence supporting the benefits and value of the EMR may affect its perception. The results agree with Rahal et al. (2021) who also discussed that demonstrating the tangible benefits and value of the Electronic Mastercard Register, such as improved efficiency, accuracy, and patient outcomes, can motivate stakeholders to support and adopt the system.

Regulatory and Legal Consideration (0.538) the coefficient suggests a positive relationship between regulatory and legal considerations and the perception of the EMR doing good. However, the coefficient is not statistically significant. Healthcare facilities must consider any regulatory requirements or legal implications associated with implementing an EMR as also discussed by Sittig and Singh (2010). Compliance with relevant regulations and addressing legal concerns can facilitate a smoother implementation process

The results indicate that training and support, data security and privacy concerns, and the lack of evidence for the benefits and value of the EMR have significant impacts on the perception of the EMR doing good. On the other hand, factors such as resource availability, user-friendliness, and regulatory and legal considerations do not appear to have a statistically significant influence on the perception. These results can inform future efforts to improve the implementation and adoption of the EMR by addressing training and support, data security and privacy concerns, and providing evidence of the EMR's benefits and value.

VI. CONCLUSION

The study has shed light on the critical factors that influence the successful implementation and adoption of the Electronic Mastercard Register (EMR) at Mlangeni Health Centre in Malawi. The research findings underscore the substantial impact of training and support, data security and privacy, and the availability of evidence regarding the benefits and value of the EMR on the perception of its effectiveness. These factors play a pivotal role in shaping the views of healthcare staff and administrators regarding the technology's utility. While resource availability, user-friendliness, and regulatory and legal considerations were identified as relevant factors, their statistical significance in this specific context was not established. Therefore, to enhance the adoption of EMR systems in healthcare facilities, it is imperative to prioritize comprehensive training programs, address data security and privacy concerns, and provide compelling evidence of the benefits and value of the technology. This research contributes to the growing body of knowledge on technology adoption in healthcare, offering actionable insights for healthcare policymakers and administrators in their pursuit of improved operational efficiency and patient care through technological integration.

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