

# Framework for Evaluation of Effectiveness of Integrated Financial Management Information Systems Architecture Implemented in Public Hospitals in Kenya

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## ABSTRACT

Integrated Financial Management Information System (IFMIS), is an enterprise resource planning application that captures all functional processes and relevant financial flows within Public expenditure management. IFMIS is being adopted by the Public hospitals to promote efficiency, effectiveness, accountability, transparency, security of data management and comprehensive reporting. However the Public hospitals are losing a lot of money through scandals and this has compromised service delivery to the Public. Therefore, the purpose of this study was to investigate the effectiveness of IFMIS as used in Public procurement services in Public Hospitals in Kenya and come up with an enhanced secure technical architecture. The objectives of the study were: to assess the extent to which IFMIS has been implemented in Public procurement services in Public hospitals in Kenya, to evaluate the effectiveness of IFMIS in enforcing logical access and technical controls in Public procurement services in Public Hospitals in Kenya and to develop a framework that will evaluate the effectiveness of IFMIS architecture that is implemented in Public procurement services in Public hospitals in Kenya. The study used mixed method research design targeting users of IFMIS. Stratified sampling was used to select the target population of 132 in 4 hospitals in Kenya. The target population was from 5 homogeneous stratum comprising of 44 Procurement Assistants, 36 Finance Assistants, 12 Audit Assistants, 28 Medical Practitioners and 12 ICT Staff. Proportional allocation method was used to calculate the sample size which was 99 respondents. The data was collected through questionnaires and direct observation. Content validity was done to ascertain the validity of the research instruments. Reliability of the instruments was carried out using test-retest technique. Internal consistence of data was computed using Cronbach Alpha Computation. Analysis of Quantitative and qualitative data was through descriptive and inferential statistics methods and content analysis respectively. The study developed a framework of enhanced technical architecture of IFMIS that would streamline procurement services in Public hospitals and improve provision of quality health care.

**Keywords:** IFMIS, Technology architecture, logical access controls.

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## I. INTRODUCTION

In most organizations an information system is used as operational support, where the system consist of a set of components that interact, cooperate to form overall integration in order to achieve certain goals . The system runs in an organization must be adapted to the procedures established by the company of any existing operations. The company therefore need a coordinated information system that can help improve the efficiency and effectiveness of the running system, so that output can be produced in accordance with the organization's target. The role of information systems has become an important component of an organization to support running business operations. Loudon and Loudon asserts that information systems is components that are related and work together to collect, process, store and disseminate information to support decision making and control of an organization (C.Laudon, 2006).Information System according to Bentley and Whitten states that the information system is a unity of human, data, processes, and information technology that interact to collect, process, store, and provide information output that is necessary to support an organization (L.Bentley, 2007).Enterprise Resource Planning systems are large scale Information systems that aid management in strategic planning through enhanced decision making. According to the APICS dictionary, Enterprise Resource Planning (ERP) is a: "...framework for organizing, defining, and standardizing the business processes necessary to effectively plan and control an organization so the organization can use its internal knowledge to seek external advantage." With the increase in the volume of information in the modern organisations and the complexity of the form of today's business world, the organisations'

environment has been transformed into a dynamic environment. Therefore Public hospitals should adapt themselves with these dynamic changes so as to survive, and to be able to develop in these dynamic and changing environments.

## II. Literature Review

(Chene, 2009) asserts that IFMIS is the most common financial management reform practices aimed at promotion of efficiency, effectiveness, accountability, transparency, security of data management and comprehensive financial reporting. He further asserts that the purpose of using an IFMIS is to improve budget planning and execution by providing timely and accurate data for budget management and decision making. In the present situation the IFMIS system being used by public hospitals in Kenya integrates data and information into a centralized database that is accessed over a network. However there are technical architectural problems such as absence of: biometric login facility and data management services that has compromised the security aspect of this application. This loop hole in the technical architecture has led to escalating fraudulent activities where millions of taxpayers' money has been lost hence compromising quality healthcare provision in public hospitals in Kenya.

## III. Related work

There are local studies that have been carried out these include:

Kaindi (2012) in her study found out that IFMIS influences the impact of internal control systems on the financial performance. Her study however fails to outline the specific benefits of adopting IFMIS

particularly on public financial management systems and how the respective benefits enhance the financial performance of state agencies. Despite the limitation, the current study sought to apply some of the approaches in her findings. Wamuyu (2013) in her study found out that ICT and technology have a significant bearing on financial system efficiency in the public sector hence the call for IFMIS. Her study is however limited to the extent that it does not cover the technology architecture of IFMIS.

#### IV. Problem Statement

The health system in Kenya is struggling with the rise in demand for quality healthcare services against frequent medical stock outs in County Public Hospitals. Transformations in healthcare delivery is key towards supporting human capital development so that all citizens are able to lead economically and socially productive lives Government of Kenya GOK, (2009).

The existing framework upon which IFMIS is implemented appears to have technical loop holes with its architecture that have been exploited to fraud the system further complicating the provision of quality healthy services. GOK: Auditor General Audit Report, (2016) indicates that there is lack of appropriate logical access and technical controls to safeguard IFMIS from fraudsters who undermine the system and compromise effectiveness of service delivery. To address this gap, this study aims to study the technology architecture and develop a framework that will evaluate the effectiveness of IFMIS architecture and seal the architectural loopholes that have been used to undermine the system.

#### V. METHODS AND MATERIAL

The study used mixed method research design targeting users of IFMIS. Stratified sampling was used to select the target population of 132 in 4 hospitals in Kenya. The target population was from 5

homogeneous stratum comprising of 44 Procurement Assistants, 36 Finance Assistants, 12 Audit Assistants, 28 Medical Practitioners and 12 ICT Staff. Proportional allocation method was used to calculate the sample size which was 99 respondents. The data was collected through questionnaires and direct observation. Content validity was done to ascertain the validity of the research instruments. Reliability of the instruments was carried out using test-retest technique. Internal consistence of data was computed using Cronbach Alpha Computation. Cronbach Alpha Computation. Analysis of Quantitative and qualitative data was through descriptive and inferential statistics methods and content analysis respectively.

#### VI. RESULTS AND DISCUSSION

The researcher used descriptive statistics which include measure of central tendency; mean, mode and the median, measure of variability; standard deviation and variance. Descriptive statistics was used to develop indices and measures to summarize the collected data Kothari C., (2010). Inferential statistics involved use of correlation, for analyzing the degree of relationships between two variables and its correlation significance had a contribution towards finding out generality of the results Analysis of variance was used to determine whether there would be significant differences in satisfaction of effectiveness of the IFMIS application used in Public procurement services in Public Hospitals in Kenya. Inferential statistics was used to determine the user satisfaction in relation to IFMIS applications.

The researcher conducted multiple regression analysis to ascertain how these factors determine the adoption of Secure IFMIS for use in Public procurement systems at the Public Hospitals in Kenya. The researcher applied SPSS for coding and computation of the measurements of the multiple regressions for the study as shown in table 2.1 below

Table 2.1 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.719 <sup>a</sup>	.517	.589	.025

Predictors (Constant) access controls (biometric login system), services management, and Administrator disables user accounts

Table 2.2 Analysis of Variance (ANOVA)

Model		Sum of Squares	Df	Mean Square	F	P Value.
	Regression	9.119	4	2.280	47.899	.001
	Residual	1.000	46	.0476		
	Total	10.119	50			

Predictors: (Constant) X1, X2, X3

Dependent Variable: Y

Table 2.2 indicates that the independent variables significantly predict the dependent variable (4, 46) = 47.899,  $p < .0005$ , this shows that the overall model was significant.

The significance value is 0.0179 which is less than 0.05, hence the model is statistically significant in predicting how services management control, access control and Administrator's control over users influence adoption of Secure IFMIS to enhance effective Public procurement systems used by Public Hospitals in Kenya. The F critical at 5% level of significance was 23.456. Since F calculated is greater than the F critical value (value = 9.475), this shows that the overall model was significant. The reports

summary ANOVA and F statistic (47.899) is significant at 0.05 confidence level. The significance value is 0.000 and the value of F is large enough to F critical and we conclude that the set of independent variables; services management control, administrator's control and access control influence Effectiveness of IFMIS as used in Public procurement systems in Public Hospitals in Kenya.

Table 2.3 Regression Coefficients

Unstandardized	Standardized	T	P.values
Coefficients			

.654	.108	.012	.0185	.002
.701	.654	.109	1.0718	.004

Dependent Variable: Effectiveness of IFMIS

Findings in table 2.3 indicate that, the results of the test of beta coefficients which indicates that the significant relationship between independent variables notably; (x1) Services management control, (x2) Administrator's control over users and (x3) Access control and dependent variable Y = Effectiveness of IFMIS. As presented in table 5.5 (x1) services management control coefficient of 0.654 was found to be positive at significant level of 0.002 and this shows that Services management control has a positive influence on effectiveness of IFMIS. (X2) Administrators control over users control coefficient of 0.701 was found to be positive at significant level 0.004 and this indicates that it has a positive influence on effectiveness of IFMIS. (X3) Access controls coefficient 0.553 was found to be positive at significant level of 0.001 and this indicates that it has a positive influence on effectiveness of IFMIS. This clearly demonstrates that all the independent variables significantly influenced effectiveness of IFMIS but the relative importance of each independent variable was different. However, since

the significance values were less than 0.005, all the coefficients were significant and thus the regression equation was  $Y = 12.008 + 0.0654X_1 + 0.701X_2 + 0.553X_3$ . The results presented also shows that taking all other independent variables at zero, a unit increase in services management leads to 0.654 increase in effectiveness of IFMIS, a unit increase in administrators control over users leads to 0.701 increase in effectiveness of IFMIS and a unit increase in access control leads to 0.553 increase in effectiveness of IFMIS. The regression model above has established that taking all the independent variables into account notably: (x1) Services management control, (x2) Administrator's control over users and (x3) Access control, inferences can therefore be made that access controls followed by services management and Administrator control over users influences effectiveness of IFMIS.

## VII. CONCLUSION

ERP technology requires proper management for it to effectively serve the purpose. The researcher proposes restructuring of IFMIS logical access and technical controls to enhance proper resources utilization and in turn provision of quality healthcare by the Public Hospitals in Kenya where it is implemented.

The researcher proposes that for IFMIS to effectively enhance procurement services in Public Hospitals in Kenya, there is need to automate all procedures involved in procurement of goods and services and properly configure the decision support system to foster strategic planning and in turn realization of quality healthcare provision. This research proposes and validates a tool to evaluate effectiveness of IFMIS that is implemented at the Public Hospitals in Kenya and gives room for refinement of its technical architecture in terms of its practical applicability.

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