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Monitoring and Evaluation System Components' and Performance of National Education Management Information System in Public Secondary Schools within Nairobi County, Kenya

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Abstract

Globally, Education management information systems has been embraced widely with the aim of gaining information that can be used to make informed management decisions and thus improve the education sector. The Government of Kenya has invested heavily in the institutionalization of the Kenya national education management information system (NEMIS) as a key system that can be the single source of true data regarding education sector. Despite this, NEMIS data has not been converted into accurate information that informs the general objectives of the system. A 2020 report by Ministry of education to Kenya's National Assembly showed a variance of up 50 per cent of learners in NEMIS as compared to the actual numbers in schools, attributed to data inconsistency, thus affecting the performance of NEMIS with regard to decision making for purposes of allocation of resources to schools. This study was motivated by the need to establish the performance of NEMIS in public secondary schools within Nairobi County, Kenya. Specifically, the study sought to examine how ICT infrastructure, human resource capacity, data management processes and stakeholder participation affect the performance of NEMIS. Systems theory, Program theory and Stakeholder theory were utilized to form the theoretical foundations. A Descriptive research design was employee with a target population of 103 public secondary schools, out of which a sample size of 71 schools was selected from which purposive sampling of three key respondents from each school generated a total of 213 respondents. The study used semi-structured questionnaires as the data collection instrument and achieved a 71 per cent response rate. Data was analyzed using descriptive and inferential statistics, and thus a model developed through regression analysis. The study established that ICT infrastructure was adequate for use in NEMIS, despite challenges of low quality computers and inadequate computers. With regard to human resource capacity for NEMIS, the study established that a majority of NEMIS users were not regularly trained on its use and thus their capacity on key aspects of NEMIS was rated as average. NEMIS data management processes was also examined. The study established that majority of the NEMIS data management processes were user friendly and report submission was done well. Lastly, the study established that stakeholder's involvement with regard to regular feedback meetings for parents and teachers to discuss NEMIS' performance was rarely done. Overall, all the four independent variables accounted for 92.3% of the changes in dependent variable which was performance of NEMIS in public secondary schools within Nairobi County. The study thus concluded that the variables had a significant positive effect on the performance of NEMIS in public secondary schools. The study recommends that The National Government should improve ICT infrastructure in schools through provision of additional computers and maintenance of the existing ones. Regular training for NEMIS users by the Ministry of education should be considered. Creation of awareness through regular meetings for stakeholders is useful to ensure buy-in and sustainability of NEMIS at school and national levels. Lastly, the study suggests that a similar study in private secondary schools will be useful so as to compare findings.

Keywords: Evaluation, Monitoring, system components, performance

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I. INTRODUCTION

1.1 Background of the Study

Globally, the thirst for information has grown tremendously. Information is an essential resource that often helps organizations and project managers make decisions on a daily basis. Without these, policy development, performance of projects and related elements can be affected and thus lead to wastage of resources. A management information system is defined as an organized combination of hardware, software, communication networks and people aimed at collecting data, transforming and disseminating information for use in an institution (Oke, 2009). It is a system that makes available the right information to the right person, at the right place, at the right time in the right format and at the right cost. In the educations sector, information thus forms the basic foundation for management, planning and evaluation (UNESCO, 2016). According to UNESCO, the need for school managers to ensure that the education sector is well managed and performs optimally requires regular monitoring and evaluation. Therefore, Education Management Information System (EMIS) focuses on collection of information that helps in education planning and management.

In Africa, an increasing number of countries have adopted the concept of Education management information systems (Wako, 2003). However numerous challenges have been experienced. Issues around EMIS readiness and utilization, lack of technology applications, computer infrastructure and policies create a need for further research in this field. According to InfoDev (2006), the poor performance of Education Management Information systems in Africa combined with low utilization suggests a need to re-think some of the assumptions that EMIS are based upon (InfoDev, 2006). Most EMIS systems in Africa are donor funded and thus a top-down approach was thought to be the best way to respond to needs of the education system in developing countries. The World Bank acknowledges that a number of education projects have been initiated in Africa through donor funding and which have components related to EMIS. Despite this, a number of programs and especially Government initiated ones tend to fail more so in the developing countries (Bernbaum & Moses, 2011). However, Ghana for example, has made strides in this area by recognition of the role of EMIS in decentralization of education system. The Country has used data from EMIS to support service delivery and assured effective resource allocation.

In Kenya, prior to 2010, information flow in the education sector flowed from the national level to the schools. Kenya National Education Management Information System (NEMIS) is a monitoring and evaluation system that helped organize data and aid in planning and data driven decision making (Kipsoi et al., 2012). NEMIS was thus developed to ensure that the education sector information was able to be generated directly from the schools to the national level. This was aimed to provide a pool of data that would boost the planning and efficient resource allocation by the Government. (Ministry of Education, 2017).

The Kenya National Education Management Information System (NEMIS) aims to gather data on students in the continuum of their education. Over the years, the Kenya has invested heavily in the EMIS system components such as personnel, Organizational processes and the system outputs. However, there is need to understand whether these resources have translated to the optimal performance of this Monitoring and evaluation system and whether it has aided in the efficient running of schools ultimately leading to satisfaction of all stakeholders.

In Kenya, Education management information systems were implemented since 1999 (Nchunge et al., 2013). This was informed by reforms that were happening in Kenya's education sector such as need to align the education system to Vision 2030 and other national priorities and therefore the development of robust and elaborate information management systems (Ministry of Education, 2017).

Thus, Kenya became among African countries at the forefront in embracing NEMIS being spearheaded by the Ministry of Education, Science and Technology. Despite this, issues such as provision of infrastructure to support its implementation at all levels, training of teachers and funding remain areas that have not been given full support (Nchunge, Sakwa, & Mwangi , 2013).

The Government of Kenya has made tremendous effort in supporting NEMIS to ensure optimal performance such as extending internet and procurement of computers, training of teachers and installing electricity in the rural areas of the country. The problem, however, remains that the penetration of ICT infrastructure, human resource capacity gaps and complex data management processes including stakeholder engagement still remain key issues to be resolved (Walekhwa, Achoka, & Ndiku, 2016).

The need to inform governments and project managers on programs are implemented and thus explain the impact of specific strategic interventions is very key (UNESCO, 2016). Schools are institutions run just like organizations and inherent in them are projects that need to be implemented. Data thus remains a key pillar to their success. Data on elements such as student enrollment, class attendance, syllabus coverage and student academic progress are useful. Their full exploitation and utility can only be enabled sufficiently if National Education Management Information Systems can perform at its optimal levels (InfoDev, 2006). The system helps to know what works and what does not; to make decisions based on objective data; allow efficient utilization of limited resources; monitor goal achievement; enhance transparency and improve public trust; and

to develop institutional memory for future use (Bernbaum & Moses, 2016). Ultimately, what constitutes the performance of NEMIS is its ability to answer the issues and needs that stakeholders and users raise and being consistent in provision of such answers (Bernbaum & Kurt, 2011). The basic foundation of the education system being the school, any system deemed as performing must thus be measured by its positive impact on learners' capabilities and the policy makers' decision making and resource allocation effectiveness. It is for this reason that this study seeks to measure the performance of NEMIS in Nairobi County.

1.2 Objective

To investigate monitoring and evaluation system components and their effect on performance of NEMIS in Public secondary schools within Nairobi County, Kenya.

II. LITERATURE REVIEW

2.1 Theoretical Review

Systems theory deals with the relationship between parts and their connection to the whole. The theory was first advanced and proposed by biologist Ludwig Bertalanffy (Bertalanffy, 1968) and later furthered by W.Ross and G. Bateson (Bateson, 1979). Systems theory attempts to solve problems by looking at the whole rather than the specific elements (Chikere & Nwoka, 2014). In this respect, knowledge on the overall systems is gained through understanding the interrelationship between subsystems. Systems theory thus examines entities at various levels in terms of organizations, processes, relations which cause them to stand together as recognizable entities (Chikere & Nwoka, 2014; Mele et al., 2010). These systems and subsystems at different levels have some common characteristics. Such is the reality of a study involving examination of the performance of an M&E system.

Program theory utilizes the approach of logical framework. However, it's more of detailed logical framework model (Sharpe & Bay, 2011) Such outcomes like in a M&E system could entail elements of how a management information system has achieved its intended objectives. A simple logic model would encompass the resources or inputs such as ICT infrastructure, in which if present one is able to operate the system. Secondly, the activities that is entailed in ensuring that the system can achieve its objectives. These may include, skills training and capacity building of human resources to conduct data entry, among others. Third, was the system outputs, in which if accomplished will deliver the amount of product that the system intended. Thus, these may be the data analysis and generation of reports. Fourth, outcomes which entails the results which will benefit the stakeholders. Lastly, the impact, which, if achieved, stakeholders and the society at large was expected to benefit from (Rogers, 2008).

Participation of stakeholders is an absolute requirement for any project from the point of initiation to closure stages (Patiño, 2015). Stakeholder theory thus helps in understanding the importance of key people in a project and how they can be managed. The theory is significant as it relates to organizational management and hence the understanding of MES and NEMIS in particular.

2.2 Empirical Literature Review

Obota et al., conducted a study examining presence of information communication technology infrastructure at public secondary schools in Mumias, Kenya in 2015. Employing a descriptive design targeting head teachers, head of departments and students and showed that computers and related ICT infrastructure were inadequate. Only 33.3% of the schools examined had computers and none of the schools sampled had integrated ICT infrastructure and support application systems (Obota et al., 2015). This study however was conducted in a rural context and thus there is need to investigate the same variables in an urban setting. In a survey of schools in China, Lu et al., (2015) investigated the role of ICT infrastructure and its application for information management systems in classrooms. 4,500 middle and primary schools were surveyed to gather data on ICT infrastructure and their application in education information systems, the study found out that in urban schools had reached a certain level of infrastructure to support education information management systems.

Mugo (2014) studied Education Management Information systems and demonstrated the importance of human resource capacity for an M&E system. The objective was skills and competencies in use of the system by education administrators. Education managers had minimal competency in use of the system. Computer literacy was estimated at 25% among the administrators (Mugo, 2014). The population for the study was limited to education administrators at sub county level. There is need to target actual users of education management information system at the school level. Another study on human resource capacity and performance of NEMIS was done by Kasimiri et al., (2021). The study on secondary school principals' preparedness and adoption of NEMIS in Keiyo North Sub County, Kenya used an explanatory research approach. The target population was 30 secondary schools and two respondents from each school. The study findings showed that the level of preparedness of principals in terms of acceptances, training and skills were useful and had a big effect on the adoption of NEMIS in secondary schools. (Kasimiri et al., 2021). The authors thus concluded that the training of

school principals on NEMIS related technology so as to give the right skills and capacity and thus aid in its adoption and successful performance. In as much as the authors raised the aspect of preparedness and adoption of NEMIS, there is need to examine the actual performance of NEMIS. This study also used explanatory research design which seeks to explain cause-effect of a phenomenon. Current study utilized a descriptive design to assess performance of NEMIS.

Walekhwa et al., (2016) established that manual processes for data management is prevalent in Kenya. In assessing the use of NEMIS in Rarieda in Siaya County, the study employed a descriptive approach. The study findings showed that most schools reported to use paper based processes which are tedious and prone to errors. Despite the wide presence of databases for the education data, there still schools without the basic process of availability of a reference point. This research was however limited in terms of context. The focus on one sub county makes findings less generalizable. Gezahegn and Mandefro (2019) researched on the Utilization of Educational Management Information System among Schools of Guji Zone, Ethiopia. The study revealed that school data collection practices are moderately exercised in secondary schools. Furthermore, there was no uniformity of rating between school managers and teachers throughout all items under study. School managers viewed that there is moderate access to data management tools for EMIS in the secondary schools while teachers explained that there is a problem of access to data management tools for EMIS. Using a descriptive research design, 55 teachers and 37 school management bodies from 7 randomly selected schools were interviewed. Challenges in access to data management tools and generally there was lack of data cleaning and analysis skills by school managers were noted. These was seen as a major factor affecting the performance of EMIS in the targeted schools.

Patino (2015) studied the elements that hinder full EMIS implementation in Mexico was done. Using an explanatory research design, the study proposed factors that impede implementation of EMIS. The study established that Stakeholder involvement and feedback consideration were major factors (Patiño, 2015). The research described the factors that impede implementation of NEMIS and thus generating a gap on how these factors actually affect performance of EMIS. Ariko et al., (2014) conducted on EMIS outcomes. They found out that internal stakeholder satisfaction could be improved by facilitating personnel and that the Ministry of Education should consult with stakeholders to avoid duplication of data collection (Ariko et al., 2014). Descriptive survey was utilized. Management support as well as resource allocation were priority predictors of outcomes. These are predictors that related directly to the internal as well as stakeholder participation. Study's main focus was on outcomes of EMIS. An investigation on system performance would be useful to corroborate these findings and thus this study sought to fill this gap.

III. RESEARCH METHODOLOGY

3.1 Research Design

A descriptive research design was used. The aim was to accurately describe the study variables thus make predictions and test any relationships (Cooper and Schindler, 2008). In addition, this enabled the gathering of adequate facts as possible to describe the variables under study.

3.2 Target Population

The study targeted all the 103 public secondary schools from all sub counties within Nairobi County. This population was deemed appropriate because of their active involvement in implementing NEMIS. Nairobi County was chosen due to its greater adoption of NEMIS as demonstrated by the high number of learners captured in the system compared to other counties.

3.3 Sample Size and Sampling Procedures

The study utilized simple stratified random sampling technique. This probability method is effective as it ensures all subjects in the target population was represented, especially when the population is not homogeneous (Cooper & Schindler, 2014). It also aims to eliminate bias in the selection of the sample. Therefore, to observe this, the technique was adopted so as to offer every school an equal chance of participating in the study. Through the application of a simple random sampling technique, 71 schools were selected for purpose of study. This formed 69% of the target population and thus distributed across the strata of sub counties. According to Cohen, Manion and Morrison (2007), greater samples increase reliability of the findings. The authors further note that when simple random sampling is employed by a researcher, the sample size needed depends on size of population and extent of heterogeneity inherent in the population and therefore, for population of high heterogeneity, the larger the sample size is needed (Cohen, Manion, & Morrison, 2007). This is the case for this study where the context is within public secondary schools in the same county. The extent to which the sample would accurately represent the population would require a larger sample size. In each of the 71 sampled public secondary schools, purposive sampling was done to obtain the key respondents for the study. These were, the school principal, Deputy Principal and Head of ICT Department. A total of 213

respondents was arrived at. The three cadres were chosen since they were likely to use NEMIS regularly in their schools and thus rich in knowledge and information relevant for the study

3.4 Research Instruments

Questionnaire with both open and close-ended questions was utilized. Questionnaires are good since they can be sent and reach respondents within a short time and responses can be collected easily. A five-point key using, 1 = SD (Strongly Disagree), 2 = D (Disagree), 3= N (Neutral), 4 = A (Agree), 5= SA (Strongly Agree) enabled the researcher capture responses appropriately. It was self-administered since all the respondents were deemed literate as they comprised school managers.

IV. RESULTS AND DISCUSSION

4.1 Effect of Monitoring and Evaluation System Components on Performance of NEMIS

To establish the extent to which M&E system components affect the performance of the National Education Management Information system, the study utilized a multiple regression analysis to establish the existence of a significant relationship between the system components and performance of NEMIS in public secondary schools within Nairobi County. The results were presented below.

Effect of M&E System components on Performance of NEMIS

Table 1: Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.961a	**.923**	**.921**	**.133**	**.923**	**438.592**	**4**	**146**	**.000**

Table 2: ANOVA

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Regression	30.874	4	7.719	438.592	.000[b]
Residual	2.569	146	.018		
Total	33.444	150			

Table 3: Coefficients

	Unstandardized Coefficients		**Standardized Coefficients**	**T**	**P Value**	**95.0% Confidence Interval For B**	
	B	Std. Error	Beta			Upper Bound	
Intercept	.75	0.62		76.618	.000	5.628	5.928
ICT Infrastructure	.473	.043	.913	14.270	.000	2.992	3.954
Human Resource Capacity	-.632	.035	-.672	-17.889	.000	-.702	-.562
Data Management Processes	.147	.053	.090	2.774	.003	.042	.251
Stakeholders Participation	.350	.036	.364	9.784	.000	.279	.421

From the analysis, the regression analysis model is presented as; NEMIS performance = 0.75*X1+. -632*X2+.147*X3+.350*X4 the equation shows that holding all other independent variable constant, thus changing the variable under consideration by a unit leads to change in NEMIS performance by the indicated coefficient with a positive sign showing positive relationship while negative sign donates a negative relationship between a specific variable and NEMIS performance. A p-value less than 0.05 shows significance.

Therefore, the study's first objective of determining the effect of ICT infrastructure on NEMIS' performance in Nairobi County, the regression analysis as shown in table 4.21 above deduces that ICT infrastructure has a significant influence on the NEMIS performance, since its value is 0.00 which is less than the p value of 0.05. The two variables are positively related, if other variables are held at a constant and by changing ICT infrastructure by single unit score it would change NEMIS performance by 0.437.

The finding concurs with Kipsoi et al., (2012) who examined the use of ICT for managing schools in Kenya and the study found out that the majority of Kenyan schools hardly have access to ICT infrastructure. It can thus be said that based on the minimum requirements for NEMIS, as outlined in its user guide, the need for infrastructure to support the system is important. The findings are also in agreement with Ndichu (2013) who showed a positive association between ICT adoption and implementation of Education Management systems in

schools. It also concurs with Walekhwa et al., (2016) who found out that the presence of computers and other ICT gadgets affects the performance of NEMIS.

Secondly, the study set out to determine the effect of human resource capacity on NEMIS' performance in Nairobi County, Kenya. Regression analysis results as shown in table 4.21 above show that the variable scored p value of 0.00 (p=0.05) Thus the two variables are positively related. If other variables are held at a constant and by changing human resource capacity by single unit it would change NEMIS performance by 0.632. The finding is supported by other studies such as Mugo (2014) who studied Education Management Information systems and his study demonstrated the importance of human resource capacity for an M&E system. Equally, the findings concur with Walekhwa et al., (2016) who studied the Establishment of EMIS Infrastructure in Rarieda, Kenya, noted user technical capacity and computer literacy being below average and this had a big role in the performance of NEMIS. It also agrees with Omariba et al., (2015) who examine the integration of ICT into the training of teachers in Kenya. They concluded that there was a low capacity for use of computers by teachers and there was a fear of technology and this had an effect on the success of NEMIS.

Thirdly, the study set out to examine data management processes and how it affects NEMIS' performance in Nairobi County, Kenya. Multiple regression analysis results demonstrate that data management processes have significant effect on the NEMIS performance. (P Value is 0.03) which is less than 0.05. Thus the two variables are positively related. This finding concurs with Odhiambo, (2017) who conducted a study on NEMIS and its role in management of schools in Nairobi County. The study established that the use of the EMIS modules for curriculum and instruction affected NEMIS positively and that the processes in the modules ought to be easy to navigate and thus affecting performance of NEMIS. (Odhiambo, 2017). The study recommended that there is a need for training of teachers on NEMIS data management processes.

Lastly, the study had an objective of determining the effect of stakeholder involvement on NEMIS' performance in Nairobi County, Kenya. Results as shown in table 4.21 above show that stakeholder involvement have a significant influence on the NEMIS performance. (Value is 0.00) and thus less than 0.05. Thus the two variables are positively related. Further, the regression shows that if all other variables are held at a constant a single unit change in stakeholder participation would result in change of NEMIS performance by a factor of 0.350. These finding concurs with Ariko et al., (2014) who concluded that internal as well as external stakeholders significantly predicted the performance of NEMIS in secondary schools. However it contradicts findings by Mugo (2014) who found out that stakeholders in education such as the parent ministry played an insignificant role in the performance of NEMIS. The study concluded all stakeholders need to participate in EMIS to promote its effectiveness.

V. CONCLUSIONS

NEMIS was developed to ensure that the education sector information was able to be generated from the schools. This would give a pool of data that was to boost the planning and efficient resource allocation by the Government. The study had its first aim to determine how ICT infrastructure affected NEMIS's performance. The study findings demonstrated that ICT infrastructure has a significant effect on NEMIS' performance. The study thus concludes that ICT infrastructure significantly affects NEMIS' performance.

The study also considered human resource capacity and its effect on NEMIS's performance in Nairobi County, Kenya. The study established that human resource capacity affects NEMIS's performance in Nairobi County, Kenya. The study concludes that human resource capacity has a significant effect on NEMIS and that the two variables are positively related. If other variables are held at a constant and by changing human resource capacity by single unit, it would change NEMIS performance.

Considering the third objective, the study established that data management processes affects NEMIS' performance. The regression analysis demonstrated that data management processes have a significant effect on NEMIS performance with a P value of 0.03. This means that when all the other independent variables are held at a constant, a unit increase in the data processes will lead to a change in performance of NEMIS. The study hence concludes that data management processes has an effect on NEMIS' performance. Thus following that the data management processes in NEMIS need be simple and user friendly.

Finally, the study established that stakeholder involvement has a significant effect on NEMIS' performance. The regression analysis demonstrated a score of is 0.00, a score less than the p value of 0.05. Thus showing that the two variables are positively related. This means that if all other variables are held at a constant a single unit change in stakeholder involvement would result in change of NEMIS performance by a factor of 0.350. Therefore, the study concludes that stakeholder involvement is useful in enabling the performance of NEMIS.

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