Assessing Personnel Influences on Education Management Information System Outcomes in Nyanza Region, Kenya

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ABSTRACT

Information systems are developed to enable organizations to utilize technology for effective management. The Ministry of Education (MOE) is committed to implementing the Education Management Information System (EMIS) to provide data for improved planning, policy formulation, and decision-making. Since 2004, the MOE has provided IT infrastructure, personnel training, and annual funding to District Education Officers (DEOs) to facilitate EMIS activities. Despite these efforts, an EMIS technical team survey revealed that data capture completion rates at district education offices have been low, causing delays in nationwide data processing, with Nyanza counties having the lowest completion rates. This study examined the influence of personnel factors on EMIS outcomes in the counties of Nyanza Region. Employing both correlation and descriptive survey designs, the study population included 36 District EMIS coordinators, 72 Data Capture Personnel, 36 DEOs, and the Regional EMIS Coordinator. Stratified sampling selected 29 District EMIS coordinators, 68 Data Capture Personnel, 29 DEOs, and 1 Provincial EMIS Coordinator. Data were collected using questionnaires and interview schedules. Regression results indicated that personnel factors contributed 16.9% to EMIS outcomes. Job design (beta = 0.317), gender (beta = 0.291), and age (beta = 0.223) were the best personnel predictors of EMIS outcomes. The study recommended that the MOE recruit officers specifically for EMIS activities rather than involving personnel with other commitments, and transfer the data capture process from DEOs to individual learning institutions to reduce the workload and the number of EMIS personnel at DEO offices.

Keywords: Factors, Education, Information Systems Outcomes, Personnel, Nyanza Region, Kenya

INTRODUCTION

The theory of Total Quality Management (TQM), as posited by Deming (1986) and cited by Ang et al. (2001a), underscores the importance of continual data collection and utilization in effective management practices. This theoretical foundation has driven organizations to develop Information Systems (IS) to enhance business processes and productivity (Kelegai and Middleton, 2004). Information Systems serve as a technological conduit through which organizations collect, process, store, use, and disseminate information (Burch and Grudnitski, 1989). DeLone and McLean (2003) highlight the correlation between effective Information Systems and organizational profitability, productivity, and personnel motivation.

In the educational sector, the effective management of resources necessitates robust policy-making and system monitoring through comprehensive data collection, leading to the development of Education Management Information Systems (EMIS) (Hua and Herstein, 2003). EMIS is designed to manage educational data and improve planning, resource allocation, monitoring, policy formation, and decision-making (Wako, 2003). Typically established within national Ministries or education departments, EMIS programs collect data on institutions, student demographics, teacher and staff information, performance

metrics, financial management, community participation, and evaluation outputs (Ibrahim, 2005; UNESCO, 2006; Kingdom of Cambodia, 2008).

Globally, countries have invested significantly in EMIS development. For example, substantial resources were allocated to EMIS activities in South and Central America during the 1990s (Cassidy, 2006). Caribbean nations have pursued national and regional EMIS efforts for over 15 years, with projects in Jamaica, Barbados, Antigua, Barbuda, and St. Lucia in 2006 and 2007 (Gaible, 2008). Despite these investments, challenges remain in accessing and utilizing EMIS data effectively, as evidenced by Jamaica's experience where EMIS initiatives funded by USAID did not lead to widespread information access or use.

In Asia, countries like India, Cambodia, and Malaysia have developed sophisticated EMIS frameworks. India's District Information System for Education (DISE) aimed to provide comprehensive hardware and software support for data collection across districts by 2003 (Kingdom of Cambodia, 2008). In Africa, Mozambique's EMIS has been instrumental in tracking enrollment and attendance data, particularly in the context of the HIV/AIDS pandemic (Trucano, 2006a). Guinea Conakry, with support from USAID and the World Bank, has enhanced its EMIS capabilities since the early 1990s (Spratt and Crouch, 2001). Ghana, Nigeria, and other countries have similarly made strides in EMIS development, often with varying levels of success and sustainability (Trucano, 2006b; Trucano, 2006c).

Despite the World Bank's involvement in over forty education projects related to EMIS and ICT, many of these initiatives face significant challenges, including project delays, budget overruns, and under-utilization (World Bank, 2010). Even when EMIS projects deliver functional systems, the anticipated benefits are not always realized, and policymakers often fail to leverage collected data effectively (Hwang et al., 2012).

In Kenya, EMIS implementation is embedded within the Kenya Education Sector Support Programme (KESSP) and articulated in the Sessional Paper No. 1 of 2005 (Republic of Kenya, 2005b). The KESSP includes 23 investment programs across thematic areas such as financing, access, sector management, and quality education. The Ministry of Education (MOE) has consistently supported EMIS through capacity building, funding, ICT infrastructure provision, and technical assistance (Republic of Kenya, 2009a; Republic of Kenya, 2009b; Republic of Kenya, 2010b). Despite these efforts, challenges persist, including incomplete and unreliable data, low response rates from schools, and untimely data collection processes (Republic of Kenya, 2009c; Republic of Kenya, 2010a).

Research has shown that personnel factors significantly influence the outcomes of EMIS, with studies highlighting the role of gender, age, education level, experience, and job design in IS adoption and use (Igbaria & Chidambaram, 1997; Morris & Venkatesh, 2000; Choudrie & Lee, 2004; DeLone and McLean, 2003; Havelka, 2002). For example, gender differences impact attitudes toward technology, with males often exhibiting more positive attitudes and higher usage rates than females (Shashaani and Khalili, 2001; Venkatesh et al., 2003). Age is also a critical factor, with younger individuals typically more adept at adopting new technologies (Morris and Venkatesh, 2000; Mcmullin and Dryburg, 2011).

The success of EMIS in Kenya's Nyanza Region remains underexplored. While the MOE's nationwide survey revealed low data capture completion rates (Republic of Kenya, 2010c), there is a need to understand the influence of personnel factors on EMIS outcomes. This study aims to investigate these factors, encompassing information timeliness, completeness, relevance, reliability, accessibility, and user satisfaction, thereby providing insights into achieving higher levels of success in EMIS implementation in the Nyanza Region.

In summary, understanding the role of personnel factors in EMIS outcomes is crucial for enhancing the system's effectiveness. The study will contribute to the literature by providing empirical evidence from a developing country context, thus addressing the gap in comparative analysis across different socioeconomic settings.

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RESEARCH METHODOLOGY

Research Design

This study employed both descriptive survey and correlational designs. The descriptive survey was utilized to explore opinions, attitudes, and knowledge about factors impacting EMIS. This approach was chosen because it allowed for a holistic perspective, was straightforward to implement using tools like questionnaires and interview schedules, and facilitated data collection from many respondents in a relatively short time frame (Cohen, Manion, & Morrison, 2000). To complement the descriptive survey, a correlational design was used to analyze the strength and direction of relationships among numerous variables in a single study (Borg & Gall, 2007; Kerr, Hall, & Kozub, 2002). This design enabled the examination of how various personnel factors singly or in combination, affected EMIS outcomes (Creswell, 2005). For instance, it allowed the investigation of whether personnel factors like age, gender, or academic qualifications significantly predicted EMIS outcomes such as timeliness, relevance, completeness, reliability, consistency, information accessibility, and user satisfaction.

Area of Study

The research was conducted in Kenya's Nyanza Region, which includes the counties of Homa Bay, Kisii, Kisumu, Migori, Nyamira, and Siaya. Geographically, this region is situated between latitudes 0°15'N and 1°45'S and longitudes 34°E and 35°15'E, with Kisumu serving as the regional capital. Nyanza's economy is diverse, encompassing agriculture, livestock production, fishing, and tourism. Despite these economic activities, the region's EMIS data capture completion rates lag behind other Kenyan regions, highlighting the critical need for this study.

Study Population

The study population comprised all individuals directly related to EMIS in Nyanza counties. According to the EMIS Kenya Technical Survey (March 2010), there were 34 districts with functional EMIS programs at the District Education Offices in Nyanza (Republic of Kenya, 2010c).

The respondents were categorized as follows:

1. 34 EMIS coordinators managing EMIS data collection and capture.

2. 34 District Education Officers (DEOs) overseeing EMIS data management, funding, and personnel identification.

3. 68 data capture personnel responsible for data entry.

4. The Regional EMIS coordinator providing technical support and linking districts with the national office.

Sample and Sampling Techniques

The sample size determination followed Krejcie and Morgan's (1970) formula, resulting in the selection of 29 DEOs and 29 EMIS coordinators (85.3% of the population) via simple random sampling. Additionally, 58 data capture personnel and the regional EMIS coordinator were purposively selected. This non-probability sampling technique was chosen for its efficiency and ability to ensure that the most knowledgeable respondents were included in the study.

Instruments for Data Collection

Data collection was conducted using structured questionnaires and semi-structured interview schedules, ensuring both breadth and depth of information.

Questionnaires: Questionnaires, incorporating both closed-ended and open-ended questions, were utilized to collect quantitative and qualitative data from EMIS coordinators and data capture personnel. The questionnaires were structured into sections addressing respondent demographics, technological factors, and EMIS outcomes.

The District EMIS Coordinator Questionnaire (DECQ) gathered detailed data from EMIS coordinators on demographics and the impact of technological factors on EMIS outcomes, rated on a 5-point scale from very low to very high impact. While the Data Capture Personnel Questionnaire (DCPQ) collected analogous data from data capture personnel, similarly rated on a 5-point impact scale.

Interview Schedule: Semi-structured interviews were conducted with DEOs and the regional EMIS coordinator, facilitating in-depth discussions that complemented and enriched the quantitative data from the questionnaires.

Validity and Reliability of the Instruments

Validity was ensured through a dual approach of face and content validity. A pilot study involving 10% of the target population identified and addressed potential issues, while supervisors and domain experts validated the content to ensure alignment with study objectives. Instrument reliability was ascertained via a pilot study, with Cronbach's alpha coefficients calculated to measure internal consistency. The resulting alpha values of 0.77 for the DECQ and 0.78 for the DCPQ indicated satisfactory reliability.

Data Collection Procedure

After obtaining approval from the National Council for Science and Technology, Maseno University, and the Nyanza Region Director of Education, the researcher introduced the study to respondents, distributed questionnaires, and conducted interviews over a three-month period.

Methods of Data Analysis

The data analysis process involved several steps:

1. Data Cleaning: Ensured completeness and accuracy by checking for missing data and outliers.
2. Descriptive Statistics: Employed to summarize demographic data and assess frequencies, means, and standard deviations of variables.
3. Inferential Statistics: Used to test hypotheses through correlation and regression analysis to determine the impact of personnel factors on EMIS outcomes.

All statistical analyses were conducted using SPSS software version 20.0.

This comprehensive methodology provided a robust framework for examining the factors affecting EMIS outcomes in Nyanza Region, ensuring the reliability and validity of the study findings.

RESULTS

EMIS Outcomes

To explore the state of EMIS outcomes in the sub-counties of the Nyanza region, responses were recorded

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from 68 Data Capture Personnel and 29 EMIS Coordinators. Table 1 presents the descriptive statistics for the ratings of EMIS outcomes in the counties of the Nyanza Region, measured on a 1-5 scale ranging from 'Very Poor' to 'Very Good'.

Table 1: Ratings of EMIS Outcomes in Counties of Nyanza Region by Data Capture Personnel (n=68) and EMIS Coordinators (n=29)

Variable	Respondents	Mean	SD
Timeliness of Information.	Data capture personnel	2.66	1.39
	EMIS coordinators	2.48	1.37
Relevance of information.	Data capture personnel	3.38	1.23
	EMIS coordinators	3.52	1.29
Completeness of data.	Data capture personnel	2.83	1.08
	EMIS coordinators	2.62	1.40
Reliability of information.	Data capture personnel	3.28	1.08
	EMIS coordinators	3.24	1.04
Accessibility of information.	Data capture personnel	2.74	1.39
	EMIS coordinators	2.71	1.42
Personnel Satisfaction.	Data capture personnel	2.53	0.88
	EMIS coordinators	3.00	1.18
Overall mean responses on EMIS outcomes	Data capture personnel	2.90	1.24
	EMIS coordinators	2.93	1.28
	Overall response	2.91	1.25

Interpretation:

1. **Very Poor = 0 – 1.9**
2. **Poor = 0 – 2.9**
3. **Fair = 0 – 3.9**
4. **Good = 4.0 – 4.9**
5. **Very Good = 5.0**

The ratings of EMIS outcomes in the Nyanza region, as presented in Table 1, reveal that the Data Capture Personnel indicated the highest EMIS outcome was 'Relevance of information' (3.38), followed by 'Reliability of information' (3.28). Similarly, EMIS Coordinators also rated 'Relevance of information' (3.52) and 'Reliability of information' (3.24) highly, in addition to 'Personnel Satisfaction' (3.00).

During interviews, the Regional EMIS Coordinator and DEOs corroborated the perceptions of Data Capture Personnel and EMIS Coordinators, emphasizing the relevance and reliability of EMIS data. The Regional EMIS Coordinator highlighted, "The EMIS information is relevant, especially regarding access to school, equity, and transition rate. EMIS data assisted in the calculation of gender parity and determination of teacher shortage." Additionally, a DEO stated, "EMIS data is very relevant, especially information on schools' enrollment, helping in effective intervention, policy implementation, feedback, and decision-making." Another DEO noted, "EMIS data helps in determining the state of infrastructure such as classrooms and toilets, revealing the extent of policy implementation and areas needing reinforcement and

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follow-up."

However, Data Capture Personnel rated 'Personnel Satisfaction' (2.53) as the poorest EMIS outcome, followed by 'Timeliness of Information' (2.66), 'Accessibility of information' (2.74), and 'Completeness of data' (2.83). EMIS Coordinators similarly indicated poor outcomes in 'Timeliness of Information' (2.48), 'Completeness of data' (2.62), and 'Accessibility of information' (2.71). Interviews with DEOs revealed challenges in maintaining data timeliness and consistency, with 58.9% of DEOs acknowledging difficulties in meeting deadlines. One DEO explained, "Deadlines could not be met because the Ministry of Education submits EMIS forms late to the DEOs, who then remit them to educational institutions late as well." The Regional EMIS Coordinator supported this view, suggesting, "When data capture forms are given to DEOs offices in time from headquarters, then data capturing can be timely."

Despite the issues with timeliness, there were efforts to ensure the relevance of EMIS data. For instance, one DEO mentioned, "The TAC tutors follow up and ensure timely submission of the forms, and there are always personnel in charge who ensures data is captured routinely and is relevant."

A notable disparity was observed in 'Personnel Satisfaction' ratings: Data Capture Personnel rated it poorly (2.53), whereas EMIS Coordinators rated it as the third best outcome (3.00). A DEO commented on the low satisfaction levels among EMIS personnel, stating, "The EMIS personnel are not motivated; they work reluctantly and are unenthusiastic, expected to work overtime including weekends, yet EMIS data capture is not their core duty. Unless money is set aside to motivate them, they will remain unmotivated."

Overall, the EMIS outcomes in the Nyanza Region were rated poorly, with a mean score of 2.91 (SD = 1.25). Both Data Capture Personnel and EMIS Coordinators provided similar mean rating responses of 2.90 and 2.93, respectively.

Influence of Personnel Factors on EMIS Outcomes

To assess the influence of personnel factors on EMIS outcomes in the Nyanza Region, responses from Data Capture Personnel (n=68) and EMIS Coordinators (n=29) were collected and analyzed. Table 2 presents the descriptive statistics for their ratings on the influence of various personnel factors on EMIS outcomes, measured on a scale from 1 (very low influence) to 5 (very high influence).

Table 2: Ratings of the Influence of Personnel Factors on EMIS Outcomes by Data Capture Personnel (n=68) and EMIS Coordinators (n=29)

Variable	Respondents	Mean	S.D
Education level	Data capture personnel	2.69	1.37
	EMIS coordinator	3.07	1.31
Age	Data capture personnel	3.72	1.01
	EMIS coordinator	3.66	1.14
Gender	Data capture personnel	3.59	1.28
	EMIS coordinator	4.38	0.77
Experience	Data capture personnel	3.14	1.15
	EMIS coordinator	2.52	1.36
Job design	Data capture personnel	3.71	0.77
	EMIS coordinator	2.98	1.33
Overall Mean responses on personnel variables	Data capture personnel	3.37	1.12

	EMIS coordinator	2.77	0.96
	Total	3.35	1.15

Interpretation:

1. **Very Low Influence:**0 – 1.9
2. **Low Influence:**0 – 2.9
3. **Moderate Influence:**0 – 3.9
4. **High Influence:**0 – 4.9
5. **Very High Influence:**0

Influence of Personnel Factors on EMIS Outcomes

The results presented in Table 2 elucidate varying degrees of perceived influence of personnel factors on EMIS outcomes.

Education Level: EMIS Coordinators rated the influence of education level higher (Mean=3.07) than Data Capture Personnel (Mean=2.69), suggesting that coordinators perceive education level as having a more significant impact on EMIS outcomes. This disparity indicates a potential gap in the perceived importance of educational qualifications between the two groups.

Age: Both Data Capture Personnel and EMIS Coordinators rated the influence of age similarly (Mean=3.72 and 3.66, respectively), suggesting a consensus that age has a moderate influence on EMIS outcomes. This agreement points to the recognition of age-related experience and maturity as contributing factors to effective EMIS performance.

Gender: EMIS Coordinators rated the influence of gender significantly higher (Mean=4.38) than Data Capture Personnel (Mean=3.59), highlighting that coordinators view gender as having a substantial impact on EMIS outcomes. This considerable difference may reflect underlying organizational or cultural dynamics that emphasize gender roles within the context of EMIS operations.

Experience: Data Capture Personnel rated the influence of experience moderately (Mean=3.14), while EMIS Coordinators rated it lower (Mean=2.52), indicating a notable disparity in perceived influence. The lower rating by coordinators suggests a divergence in recognizing the value of practical experience in enhancing EMIS outcomes, which may be due to varying levels of interaction with on-ground data capture activities.

Job Design: Data Capture Personnel rated the influence of job design higher (Mean=3.71) compared to EMIS Coordinators (Mean=2.98), underscoring a difference in perception regarding the importance of job roles and structure. This divergence suggests that data capture personnel, who are more directly involved in the operational aspects, might see job design as more critical to effective EMIS functioning.

Overall, Data Capture Personnel rated the influence of personnel factors on EMIS outcomes higher (Mean=3.37) compared to EMIS Coordinators (Mean=2.77). The combined overall mean response was 3.35, indicating that, generally, personnel factors have a moderate influence on EMIS outcomes in the Nyanza region. The high standard deviation of 1.13 reflects the diverse views among respondents, indicating variability in the perceived influence of these factors.

To contextualize these findings, the study sought to identify the characteristics of EMIS personnel in the counties of the Nyanza Region. Understanding the demographics of EMIS personnel is crucial for identifying strategies to improve EMIS outcomes that are specific to personnel characteristics. Therefore,

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the study reported on the gender, age, job design, education level, and EMIS experience of the respondents.

The notable discrepancies in the ratings between Data Capture Personnel and EMIS Coordinators underscore the importance of addressing these differing perceptions to enhance EMIS effectiveness. Tailoring training programs, adjusting job designs, and aligning organizational policies to reflect the perceived importance of these personnel factors could lead to improved EMIS outcomes. Furthermore, understanding these dynamics can guide targeted interventions aimed at leveraging the strengths of each demographic group within the EMIS framework.

Table 3 presents the distribution of District EMIS coordinators and EMIS data capture personnel by gender and age.

Table 3: Respondents' Distribution by Gender and Age

Age (Years)	**District EMIS coordinators (n = 29)**			**Data capture personnel (n = 58)**		
	Male	**Female**	**Total**	**Male**	**Female**	**Total**
	f (%)	**f (%)**	**f (%)**	**f (%)**	**f (%)**	**f (%)**
Below 30	1(3.4)	0 (0.0)	1(3.4)	14(24.1)	21(36.2)	35(60.3)
Between 31 to 40	7 (24.1)	3 (10.3)	10(34.5)	11(18.9)	8(13.8)	19(32.8)
Between 41 to 50	11 (37.9)	4(13.8)	15(51.7)	1(1.7)	3(3.45)	4(6.9)
Above 50	3 (10.3)	0 (0.0)	3(10.3)	0(0.0)	0(0.0)	0(0.0)
Total	22 (75.9)	7 (24.1)	29(100.0)	26(44.8)	32(55.2)	58(100.0)
Mean	41.43 years			32.66 years		
S.D	0.73			0.67		

The gender distribution among the District EMIS coordinators, as depicted in Table 3, underscores a significant male predominance, with 75.9% of coordinators being male and only 24.1% female. Conversely, among Data Capture Personnel, there is a more equitable gender balance, with females constituting 55.3% of the total respondents.

Examining the age distribution reveals intriguing insights into the demographics of EMIS personnel. The majority of District EMIS coordinators fall within the 41 to 50 age bracket, representing 51.7% of the total. This is followed by 34.5% aged between 31 to 40 years. Notably, a mere 3.4% of coordinators are below 30 years old, indicating a prevalence of experienced individuals in this role. Conversely, among Data Capture Personnel, the majority—60.3%—are below 30 years old, highlighting a younger workforce in this domain. This is followed by 32.8% aged between 31 to 40 years, with only a small proportion (6.9%) falling within the 41 to 50 age range.

Further analysis of the mean age reveals a contrast between the two groups. District EMIS coordinators have a relatively higher mean age of 41.43 years, suggesting a seasoned cohort in this role. In contrast, Data Capture Personnel exhibit a lower mean age of 32.66 years, reflecting a youthful workforce. Additionally, the standard deviation indicates a slightly narrower age distribution among Data Capture Personnel compared to District EMIS coordinators, implying less variability in age among the former.

These demographic insights gathered from Table 3 hold valuable implications for recruitment, training, and professional development strategies tailored to specific demographic groups within the EMIS domain.

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Understanding the age and gender composition of EMIS personnel can inform targeted initiatives aimed at enhancing workforce diversity, expertise, and effectiveness in the Nyanza Region.

The breakdown of District EMIS coordinators and Data Capture Personnel by their highest level of education is depicted in Figure 1.

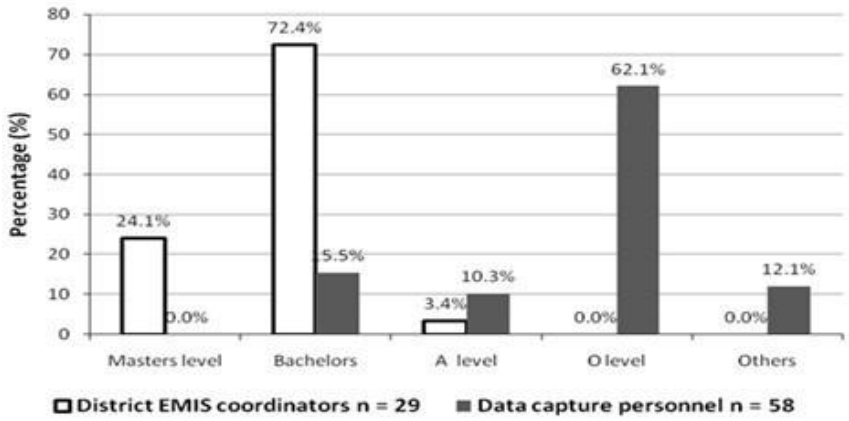

Figure 1: Distribution of Respondents by Education Level

Among District EMIS coordinators, the majority hold Bachelor's degrees (62.1%), followed by those with Diplomas (20.7%). A smaller proportion possess Master's degrees (10.3%), while a negligible percentage have Doctorate degrees (6.9%).

Conversely, among Data Capture Personnel, the educational distribution is more varied. The largest proportion hold Diplomas (41.4%), followed closely by Bachelor's degrees (34.5%). A notable percentage have completed their secondary education (20.7%), while a smaller fraction possess Master's degrees (3.4%).

This breakdown sheds light on the educational qualifications of EMIS personnel in the Nyanza Region, indicating a diverse range of educational backgrounds. Understanding the educational profile of personnel is crucial for designing targeted training and capacity-building programs tailored to the specific needs and qualifications of EMIS staff.

Figure 2 illustrates the distribution of District EMIS coordinators (n = 29) and Data capture personnel (n=58) by their experiences with EMIS

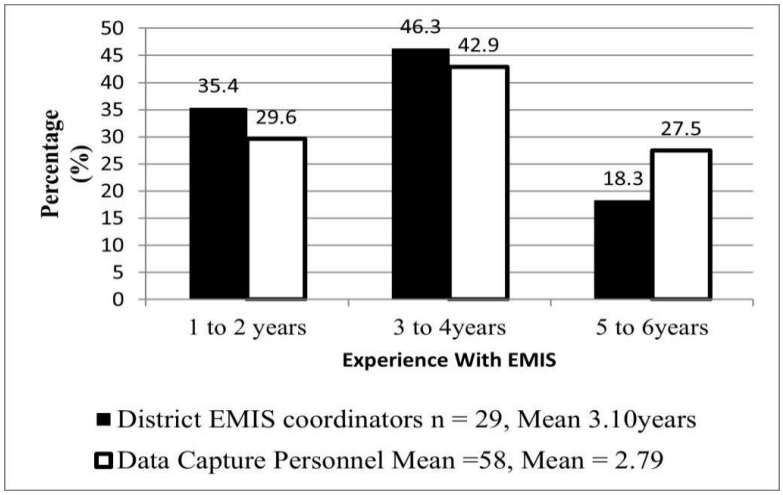

Figure 2: Distribution of Respondents by Experience with EMIS

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The histogram presented in Figure 2 illustrates the distribution of District EMIS coordinators and Data Capture Personnel based on their experiences with EMIS.

Among District EMIS coordinators, the highest percentage (46.3%) had an experience with EMIS ranging between 3 to 4 years. This is followed by those with experience ranging between 1 to 2 years (21.9%) and between 5 to 6 years (18.3%). A smaller proportion had experiences outside this range.

Similarly, Data Capture Personnel also displayed varied experiences with EMIS. The majority (42.9%) had an experience of 3 to 4 years, followed by those with experience ranging between 1 to 2 years (29.6%) and between 5 to 6 years (27.5%). A smaller fraction had experiences beyond this range.

From Figure 2, it can be inferred that, on average, District EMIS coordinators have approximately 3.1 years of experience with EMIS, while Data Capture Personnel have an average experience of about 2.79 years. This insight into the distribution of experience levels among EMIS personnel is vital for understanding their proficiency and expertise in handling EMIS-related tasks and responsibilities.

The distribution of the respondents by designation was also captured and presented in Table 4.

Table 4: Distribution of Respondents by Designation

Designation	**District EMIS coordinators n = 29**	**Data capture personnel n = 58**
	f (%)	**f (%)**
Support staff	0 (0.0)	5 (8.6)
Clerks	0 (0.0)	31 (53.4)
Secretaries	0 (0.0)	22 (37.9)
Staffing officer	15 (51.7)	0 (0.0)
Education officer	6(20.7))	0 (0.0)
Quality assurance & standards officer	8 (27.6)	0 (0.0)

The distribution of respondents by designation is presented in Table 4, showcasing the roles held by District EMIS coordinators and Data Capture Personnel.

Among the District EMIS coordinators, the majority (51.7%) held the designation of District Staffing Officer, indicating a predominant involvement in staffing-related functions within the educational system. This was followed by Quality Assurance and Standards Officers (27.6%) and Education Officers (20.7%).

In contrast, Data Capture Personnel were predominantly comprised of Clerks, constituting more than half of the sample (53.4%). Secretaries accounted for 37.9% of the respondents, while Support Staff represented a smaller proportion (8.6%).

Insights from interviews with District Education Officers (DEOs) revealed the criteria used in identifying personnel for EMIS program involvement. Technical expertise in IT and computer basics was cited by the majority of DEOs (72.4%) as a key consideration. One DEO emphasized the importance of diligence, attention to detail, and the ability to work long hours, underscoring the complexity and demanding nature of EMIS data capture processes. Additionally, concerns were raised about the insufficient number of EMIS staff, with over half of the DEOs expressing the need for more training and refresher courses to enhance

proficiency. The Regional EMIS Coordinator highlighted challenges stemming from a shortage of staff proficient in computers, leading to delays in data entry processes.

These findings shed light on the diverse roles and challenges faced by personnel involved in EMIS activities, emphasizing the importance of technical expertise, diligence, and adequate staffing levels for effective EMIS operations.

Relationships between Personnel Factors and EMIS Outcomes

The statistical analysis conducted to examine the relationships between personnel factors and EMIS outcomes utilized Pearson's product-moment correlation coefficient. The analysis, based on responses from 87 participants, explored the associations between five personnel factors (gender, age, education level, experience, and job design) and six EMIS outcome variables (timeliness, relevance, completeness, reliability, accessibility, and satisfaction).

Table 5 presents the correlations between personnel factors and EMIS outcomes, along with the corresponding significance levels.

Table 5: Pearson product correlation between EMIS outcome and personnel factors n = 87.

Independent Variables (Personnel factors)		**Dependent Variables (EMIS Outcomes)**					
		Timeliness	**Relevance**	**Completeness**	**Reliability**	**Accessibility**	**Satisfaction**
Gender	r	.635	.654*	.418	.571*	.358	.339
	p	.009	.004	.076	.039	.097	.102
Age	r	694*	.452	.586*	.674*	.435	.641*
	p	.002	.059	.028	.004	.069	.007
Education level	r	.377	.279	.503*	.543*	.258	.438
	p	.088	.120	.058	.043	.127	.089
Experience	r	.598*	.480	.312	.430	.326	.578*
	p	.021	.070	.112	.092	.109	.033
Job design	r	.618*	.344	.781*	.603*	.399	.566*
	p	.015	.104	.001	.012	.082	.039

Interpretation: r – Pearson correlation coefficient p – significance level

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

The analysis depicted in Table 5 reveals compelling connections between various personnel factors and EMIS outcomes, illuminating critical insights for educational management.

Gender dynamics reveal significant associations with specific EMIS outcomes, notably timeliness, relevance, and reliability, indicating gender's potential influence in shaping these aspects. The statistical analysis showed significant correlations between gender and several EMIS outcomes: timeliness ($r = 0.635$, $p = 0.009$), relevance ($r = 0.654$, $p = 0.004$), and reliability ($r = 0.571$, $p = 0.039$). These findings suggest that gender may play a crucial role in influencing these specific EMIS outcomes, highlighting the importance of

considering gender dynamics in the context of EMIS performance and effectiveness.

Likewise, age emerges as a significant factor, impacting multiple EMIS dimensions such as timeliness, completeness, reliability, and satisfaction, suggesting age as a potential determinant of EMIS effectiveness. Age demonstrated significant correlations with multiple EMIS outcomes: timeliness ($r = 0.694$, $p = 0.002$), relevance ($r = 0.452$, $p = 0.059$), completeness ($r = 0.586$, $p = 0.028$), reliability ($r = 0.674$, $p = 0.004$), and satisfaction ($r = 0.641$, $p = 0.007$). These results imply that age could be a determining factor in the effectiveness of EMIS outcomes, particularly in terms of timeliness and reliability. This underscores the importance of considering age demographics in the optimization of EMIS performance and effectiveness.

Education level's correlations with EMIS outcomes, albeit weaker, reveal significant relationships with completeness ($r = 0.503$, $p = 0.058$) and reliability ($r = 0.543$, $p = 0.043$). This suggests that individuals with higher educational attainment may contribute more to the completeness and reliability of EMIS data. These findings highlight the potential role of educational background in enhancing specific EMIS outcomes, emphasizing the need for targeted training and educational initiatives to improve data completeness and reliability within EMIS frameworks.

Experience demonstrates notable ties with timeliness and satisfaction, accentuating the positive contributions of seasoned EMIS practitioners. Experience exhibited significant correlations with timeliness ($r = 0.598$, $p = 0.021$) and satisfaction ($r = 0.578$, $p = 0.033$), indicating that individuals with greater experience in EMIS activities may contribute positively to the timeliness and satisfaction levels of EMIS outcomes. These findings underscore the importance of retaining experienced personnel and leveraging their expertise to enhance the efficiency and overall satisfaction associated with EMIS processes.

Job design emerges as a central determinant, displaying robust correlations with key EMIS metrics including timeliness ($r = 0.618$, $p = 0.015$), completeness ($r = 0.781$, $p < 0.001$), reliability ($r = 0.603$, $p = 0.012$), and satisfaction ($r = 0.566$, $p = 0.039$). These findings suggest that job design plays a crucial role in influencing various aspects of EMIS outcomes, particularly in terms of completeness and reliability. Interestingly, while Data Capture Personnel recognize job design's pivotal role, EMIS coordinators perceive its impact differently, underscoring a perception gap.

Overall, the results from Table 5 highlight the intricate relationships between personnel factors and EMIS outcomes, underscoring the importance of factors such as age, experience, and job design in shaping the effectiveness and quality of EMIS data and processes. These findings provide valuable insights for educational authorities and policymakers in optimizing personnel management strategies to enhance EMIS outcomes.

Multiple Regression Analysis

A multiple regression analysis was conducted to test if the personnel factors significantly predicted EMIS outcomes. The results, summarized in Table 6, indicate the overall predictive power of these factors.

Table 6: Linear Regression Model Summary of Personnel Factors and EMIS Outcomes

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.412	.1697	.152	.50055
a. Predictors: (Constant), Job design (P5), Experience (P4), Age (P2), – Education level (P3), – Gender (P1)				

The model explains approximately 16.9% of the variance in EMIS outcomes ($R^2 = 0.169$), with an adjusted R^2 of 0.152, indicating that while these personnel factors collectively contribute to the prediction

of EMIS outcomes, a significant portion of the variance remains unexplained. This suggests that other factors, constituting 83.1%, also influence EMIS outcomes but were not captured within this model.

ANOVA Test for the Significance of the Regression Model

The ANOVA test results for the significance of the regression model of personnel factors on EMIS outcomes are presented in Table 7. This analysis helps determine whether the model is statistically significant.

Table 7: ANOVA Test for Personnel Factors and EMIS Outcomes

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.15	4	1.788	9.460	.014b
	Residual	15.534	82	0.189		
	Total	16.248	86			
a. Dependent Variable: EMIS outcomes						
b. Predictors: (Constant), Job design (P5), Experience (P4), Age (P2), Education level (P3), Gender (P1)						

The ANOVA results indicate that the regression model is statistically significant ($F(4, 82) = 9.460$, $p = 0.014$). This suggests that the set of personnel factors, namely job design, experience, age, education level, and gender, collectively have a significant effect on EMIS outcomes. The F-statistic (9.460) is significant, further supporting this conclusion. However, the specific factors that contribute significantly aren't directly revealed by the ANOVA test.

To identify which specific personnel factors contribute significantly to EMIS outcomes, further regression analysis is needed. This involves examining the coefficients of each predictor in the regression model in Table 8.

Table 8: Coefficients of Regression Model for Personnel Factors and EMIS Outcomes(n= 87)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	13.258	0.251		52.777	.000*
	Education level (P_3)	0.098	0.09	0.101	1.089	.256
	Age (P2),	0.216	0.083	0.223	2.602	.014*
	Gender (P1)	0.287	0.082	0.291	3.500	.006*
	Experience (P4)	0.198	0.191	0.198	1.037	.071
	Job design (P5),	0.319	0.066	0.322	4.833	.001*

1. Dependent Variable: EMIS outcomes

The regression coefficients reveal important insights into the relationship between personnel factors and EMIS outcomes:

Age (P2): The coefficient for age is 0.216 with a p-value of 0.014, indicating a statistically significant positive relationship with EMIS outcomes. This suggests that as personnel age increases, there is a corresponding improvement in EMIS outcomes.

Gender (P1): The coefficient for gender is 0.287 with a p-value of 0.006, suggesting a statistically significant positive relationship with EMIS outcomes. This implies that gender plays a significant role in influencing EMIS outcomes, with female personnel contributing more positively.

Experience (P4): The coefficient for experience is 0.198 with a p-value of 0.071, indicating no statistically significant relationship with EMIS outcomes. While the relationship is not significant at the conventional alpha level of 0.05, there may still be some influence of experience on EMIS outcomes that warrants further investigation.

Job Design (P5): The coefficient for job design is 0.319 with a p-value of 0.001, suggesting a statistically significant positive relationship with EMIS outcomes. This underscores the importance of well-designed job roles in enhancing EMIS outcomes, with personnel in effectively designed roles contributing more positively.

The regression analysis highlights that age, gender, and job design significantly predict EMIS outcomes. Specifically, older personnel, female personnel, and those with a well-designed job tend to have better EMIS outcomes. On the other hand, education level and experience do not show significant predictive power for EMIS outcomes in this model. These findings emphasize the importance of considering age, gender, and job design when optimizing personnel management strategies to enhance EMIS outcomes.

DISCUSSION

The findings of this study highlight the significant impact of age on EMIS outcomes, corroborating the results of previous studies by McMullin and Dryburg (2011), Fraser (2010), Morris and Venkatesh (2000), and Venkatesh et al. (2003), but contrasting with Ruossos (2007), who found no significant relationship between age and attitudes towards computing. Correlation analysis indicated significant relationships between age and four EMIS outcomes: timeliness, completeness, reliability of data, and personnel satisfaction (Table 5). Both Data Capture Personnel and EMIS Coordinators identified age as a critical factor influencing EMIS outcomes (Table 1).

McMullin and Dryburg (2011) and Fraser (2010) identified age as a significant predictor of IS success. McMullin and Dryburg (2011) reported that a majority of highly skilled IT workers are under the age of forty in Australia, Canada, the United States, and the United Kingdom. Fraser (2010) noted a preference for younger individuals in IT/IS jobs, while older workers are often perceived as less technologically adept. Supporting these findings, Al-Shafi and Weerakkody (2009), Venkatesh (2000), and Venkatesh et al. (2003) observed that younger age groups are more likely to adopt and use IS/IT. Al-Shafi and Weerakkody (2009) found that most e-government adopters in Qatar were aged 25-44. Venkatesh et al. (2003) reported that the primary age group adopting computers in the USA is 15-17 years, followed by 26-35 years.

However, Shasshani and Khalili (2001) suggested that ICT experience, education level, and socioeconomic status play significant roles in narrowing the age gap in technology adoption. Ruossos (2007) found no significant relationship between age and computing attitudes, while Fraser (2010) argued that negative stereotypes about older workers' abilities influence hiring practices, leaving them vulnerable to unemployment in the IT/IS industry.

Regression analysis showed that gender significantly impacts EMIS outcomes (Table 8). Data Capture Personnel ranked gender as the third most important factor, and EMIS Coordinators considered it the most

influential (Table 1). Correlation analysis revealed significant positive relationships between gender and the timeliness and relevance of EMIS data.This finding aligns with studies by Bross (2005), Havelka (2002), Choudrie and Lee (2004), Morris and Venkatesh (2000), Houtz and Gupta (2001), Margolis and Fisher (2002), McMullin and Dryburg (2011), Shashaani and Khalili (2001), and Wong and Hanafi (2007). These studies demonstrated that gender significantly affects technology adoption and usage, with men generally using computers more than women. OECD (2008) reported that women account for a smaller proportion of IS/IT degrees and research positions compared to men.

The underrepresentation of women in IT is attributed to both aptitude and attitude factors. Shashaani and Khalili (2001) found that female undergraduates had lower confidence in their computer abilities, while OECD (2008) and Wong and Hanafi (2007) suggested that negative attitudes towards technology contribute to this disparity. Fraser (2010) criticized gender bias in IT/IS hiring practices.

Interestingly, Jamieson-Proctor et al. (2006) and Kay (2006) found that female teachers were integrating technology into their teaching less than male teachers, but their self-perceptions about technology competence improved over time.

The impact of job design on EMIS outcomes was another major finding, with significant contributions to the prediction of EMIS outcomes. Most studies did not consider job design as a variable, except for those on IT integration in education. In this study, the diverse job designs of EMIS personnel significantly influenced EMIS outcomes. Data Capture Personnel indicated that job design was the second most important factor (Table 1).

The significant impact of job design can be attributed to the role of office secretaries and District Staffing officers, who were proficient in computer use and involved in data capture for both the Teachers Service Commission and the Ministry of Education. This dual involvement facilitated the transfer of skills, contributing to the timeliness, completeness, and reliability of EMIS data and personnel satisfaction.

This finding aligns with studies by Buabeng-Andoh (2012), Samarawickrema and Stacey (2007), and Abuhmaid (2011) on IT integration in education. These studies highlighted the influence of workload on the acceptance and use of IT in classrooms.

However, the study did not find ‘experience of personnel’ to be a significant predictor of EMIS outcomes (Table 8). This contrasts with Havelka (2002) and DeLone and McLean (2003), who found that IS outcomes are related to length of service. While ‘experience’ contributed to timeliness and personnel satisfaction, it had no significant relationship with other EMIS outcomes.

Similarly, ‘educational level’ was not a significant predictor of EMIS outcomes (Table 8), despite being rated as influential by EMIS Coordinators. This finding contrasts with studies by Venkatesh et al. (2000), Choudrie and Lee (2004), and Dwivedi and Lal (2007), who reported positive correlations between education level and IS success. Conflicting results in the literature suggest that educational level may not be a consistent predictor of IS/IT adoption and success.

In summary, this study identifies age, gender, and job design as significant factors influencing EMIS outcomes in the counties of Nyanza region, Kenya. Therefore, strategies to improve EMIS outcomes should consider these factors, while experience and educational level appear to be less critical.

CONCLUSION

This study investigated the personnel factors influencing Education Management Information System (EMIS) outcomes in the Nyanza region of Kenya, focusing on age, gender, job design, experience, and educational level. The overall rating of EMIS outcomes, based on the perspectives of Data Capture

Personnel and EMIS Coordinators, is predominantly poor, with a mean score of 2.91 out of 5. Key strengths identified include the relevance and reliability of information, which both groups rated relatively higher. However, significant challenges persist in timeliness, accessibility, and completeness of data, along with low personnel satisfaction, particularly among Data Capture Personnel.

The findings underscored significant impacts of age and gender on EMIS outcomes, aligning with existing literature. Specifically, age was found to correlate with timeliness, completeness, reliability of data, and personnel satisfaction. Gender, on the other hand, showed positive relationships with timeliness and relevance of EMIS data.

Interestingly, while job design emerged as a critical factor influencing EMIS outcomes, experience and educational level did not show significant predictive power in this context. This contrasts with previous research highlighting experience and education as key determinants in information systems success.

RECOMMENDATIONS

1. **Enhance Timeliness and Accessibility:** To address the issues of timeliness and accessibility, it is crucial to streamline the process of distributing and collecting EMIS forms. Implementing a digital platform for real-time data entry and retrieval could significantly improve efficiency and data accessibility.

2. **Improve Personnel Satisfaction:** Strategies to enhance motivation among Data Capture Personnel should be prioritized. This could include financial incentives, recognition programs, and providing adequate resources and support to ease the burden of overtime work.

3. **Targeted Training and Capacity Building:** Given the varied educational backgrounds and experiences of EMIS personnel, targeted training programs focusing on data management, IT skills, and specific EMIS processes should be developed to enhance overall competency and performance.

4. **Optimize Job Design:** Revising job roles and responsibilities to better align with the skills and expertise of EMIS personnel can improve job satisfaction and effectiveness. Ensuring clear job descriptions and equitable workload distribution is essential.

5. **Gender Dynamics and Inclusivity:** Addressing gender dynamics and promoting inclusivity within the EMIS workforce can improve overall outcomes. Gender-sensitive policies and practices should be integrated into the EMIS framework to leverage the strengths and perspectives of all personnel.

Future Study

Future research should explore the following areas to build on the current findings:

1. **Longitudinal Studies:** Conduct longitudinal studies to assess the long-term impact of interventions aimed at improving EMIS outcomes. This would help in understanding the sustainability and effectiveness of implemented strategies.

2. **Exploration of Additional Factors:** Investigate other potential factors influencing EMIS outcomes, such as organizational culture, technological infrastructure, and external support systems, to develop a more comprehensive understanding.

3. **Comparative Studies:** Compare EMIS outcomes and influencing factors across different regions and countries to identify best practices and contextual differences. This can provide valuable insights for

policy formulation and implementation.

4. **Stakeholder Engagement:** Study the role of various stakeholders, including policymakers, educational institutions, and the community, in supporting and enhancing EMIS outcomes. Understanding their contributions and challenges can inform more holistic and collaborative approaches to EMIS improvement.

By addressing these recommendations and pursuing further studies, the effectiveness of EMIS in the Nyanza region can be significantly enhanced, contributing to better educational management and outcomes.

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