Digital Student Management Systems in East African Higher Education: A Systematic Review of Managerial Practices

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Abstract
This systematic review consolidates insights regarding the management of digital student management systems (DSMS) by university administrators within East Africa. These integrated platforms oversee admissions, registration, record keeping, and communication functions. A comprehensive search was conducted across four key databases: Google Scholar, Scopus, Web of Science, and African Journals Online, employing structured keywords and platform-specific terms, supplemented by reference list reviews to ensure exhaustive source capture. The review included peer-reviewed articles and institutional reports published in English from January 2010 through August 15, 2024, focusing on DSMS or student information systems within higher education institutions across the East African Community (including Tanzania, Kenya, Uganda, Rwanda, Burundi, and South Sudan), as well as Ethiopia and Sudan. Study quality was appraised using the Mixed Methods Appraisal Tool (MMAT). Of the 47 screened records, 15 met all inclusion criteria. Despite the limited and uneven distribution of evidence across countries, the findings suggest a consistent framework: effective DSMS implementation relies on six interconnected managerial practices. These are: visionary leadership with clear policy guidance; ongoing investment in staff capacity building and digital literacy; proactive resource allocation for ICT infrastructure; systematic monitoring and utilisation of student data to inform decision-making; robust cybersecurity and risk management protocols; and active engagement and support for system users. Universities that prioritised these practices and aligned their systems with national digital strategies reported enhancements in operational efficiency and student services. Conversely, institutions with fragmented systems or limited expertise continued to face challenges. The review underscores the need for context-sensitive research and emphasises that strengthening managerial capacity and promoting cross-institutional collaboration will be vital to advancing DSMS in East Africa.

Keywords: *Digital Student Management Systems; Higher Education; Managerial Practices; Student Information Systems; Digital Governance*

INTRODUCTION

Within the framework of global digital transformation, higher education institutions are increasingly integrating digital technologies to enhance service delivery, institutional efficiency, and governance. A central aspect of this development is the management of student data through digital student management systems (DSMS). These systems are comprehensive, integrated platforms that encompass modules such as admissions, registration, course management, assessment, analytics, and communication, consolidating functionalities that, in traditional setups, are often managed by separate student information systems (SIS), which primarily focus on demographic and academic record storage. By unifying these modules, DSMS facilitate real-time access to detailed student data, automate administrative processes, and enable data-driven decision-making. Furthermore, these systems interoperate with learning management systems and other institutional applications to deliver personalized digital services to students and staff. The COVID-19 pandemic, coupled with the African Union's Digital Transformation Strategy (2020–2030), has expedited the deployment of DSMS across the African continent, as universities sought to maintain remote operations and adhere to evolving digital governance standards.

In East Africa, universities within the East African Community (Tanzania, Kenya, Uganda, Rwanda, Burundi, South Sudan) along with Ethiopia and Sudan have initiated DSMS projects. Regional entities like the East African Community (EAC) and the Inter-University Council for East Africa (IUCEA) actively promote harmonised data standards and facilitate cross-border student mobility. Nevertheless, the adoption of DSMS varies across institutions due to differences in infrastructure, managerial capacity, and policy alignment. Many DSMS initiatives rely on donor support and focus primarily on technical deployment, often overlooking the importance of fostering local ownership and ensuring long-term sustainability, which leads to fragmented systems that are underused. Institutions continue to encounter challenges such as unreliable electricity and internet access, resistance to change, insufficient training, and policy misalignment. These contextual factors influence the managerial practices discussed in this review.

Effective DSMS implementation and sustainability depend on managerial practices such as strategic planning, resource mobilisation, staff capacity

building, and performance monitoring. University leaders must align systems with institutional goals, promote digital cultures, and manage resistance to change. However, there is limited consolidated evidence on managerial practices supporting DSMS in East Africa. Existing studies often focus on system functionality, teaching and learning, or user experiences, leaving administrative and governance aspects less examined. This review addresses this gap by synthesising empirical evidence on managerial practices across the region.

This study conducts a systematic review of literature published between January 2010 and 15 August 2024 to synthesize evidence regarding managerial practices that facilitate Digital Service Management Systems (DSMS) within higher education institutions in East Africa. The timeframe from 2010 is selected to coincide with the onset of significant digital reforms and external investments in university information systems across the region. The selection of studies emphasizes institutions within the East African Community (Tanzania, Kenya, Uganda, Rwanda, Burundi, South Sudan), as well as Ethiopia and Sudan, to reflect the broader scope targeted by recent regional harmonization initiatives. By analyzing managerial processes rather than technical characteristics, the review seeks to inform policies on digital governance and capacity-building efforts.

LITERATURE REVIEW

The following literature review outlines conceptual definitions and the global context for DSMS and managerial practices, establishing a foundation for the East Africa-specific systematic review that comes afterwards.

Conceptualising Digital Student Management Systems in Higher Education

Digital Student Management Systems (DSMS), occasionally designated as student information systems, constitute integrated platforms that facilitate the entire student lifecycle, from initial admission through to graduation. Unlike conventional SIS, which primarily serve to store student records, modern DSMS incorporate functionalities such as admissions, course registration, timetable management, assessment, analytics, communication, and workflow automation. These systems are increasingly cloud-based and modular, interfacing seamlessly with learning management systems and other campus services to foster a cohesive digital environment. Within the East African region, prevalent DSMS include ARIS, SARIS, and AIMS; these platforms not only manage institutional data but also offer self-service portals and dashboards for both students and

administrators. Consequently, DSMS represent a critical component of institutional infrastructure, underpinning data-driven governance and student support mechanisms.

Managerial Practices and Digital Transformation in Universities

Implementing a Digital School Management System (DSMS) extends beyond mere technological deployment; it necessitates robust managerial practices, including strategic leadership, institutional planning, change management, and capacity development. University leadership must ensure alignment of DSMS implementation with overarching institutional objectives and foster an organizational culture receptive to digital innovation. Effective leaders articulate a compelling vision for digital transformation and secure stakeholder buy-in across all levels (Hashim et al., 2022; Musa, 2023). For instance, successful cases of Student Information System (SIS) adoption in East Africa have involved university administrators establishing dedicated ICT governance committees and championing interdisciplinary initiatives, thereby mitigating resistance and promoting interdepartmental collaboration (Mayanja et al., 2019; Mugeni et al., 2020). Conversely, weak or fragmented leadership has been associated with project stagnation and user resistance (Musa, 2023; Sabiraguha et al., 2023). Therefore, managerial practices emerge as critical determinants of success in translating technological systems into enduring organizational change. This perspective corroborates research on change management strategies emphasizing that technological transitions should be congruent with institutional goals and involve key stakeholders (Guerra-López & Dallal, 2021).

Adoption and Challenges of DSMS in African Higher Education

While the adoption of Digital Student Management Systems (DSMS) is progressively increasing across the African continent, institutions frequently encounter significant obstacles to achieving full-scale implementation. Predominant challenges encompass inadequate information and communication technology (ICT) infrastructure, unreliable electricity and internet connectivity, limited technical expertise among staff, financial constraints, and fragmented policy environments (Gkrimpizi et al., 2023). In numerous instances, systems are introduced with support from external donors but lack institutional ownership and comprehensive planning for sustainable long-term maintenance (Musa, 2023; Gkrimpizi et al., 2023). Furthermore, implementation efforts are often characterized by a top-down approach, with minimal engagement from end-users or mid-level managers, resulting in underutilization and resistance to change. These dynamics underscore the critical importance of

integrating digital solutions within broader institutional change processes, fostered through inclusive leadership. Empirical investigations within African universities have documented cases where new student information systems were technically operational but were minimally utilized due to staff reliance on parallel manual processes (Anyeko, 2016). Such challenges highlight that technology adoption in higher education is equally a managerial and human issue as it is a technical one (Ntorukiri et al., 2022).

Institutional Leadership and ICT Governance in East Africa

East African nations such as Tanzania, Kenya, Uganda, and Rwanda have enacted national digital education policies aimed at promoting the integration of ICT within higher education. Nonetheless, the practical implementation of Digital Student Management Systems (DSMS) exhibits considerable variation among universities in the region. Some institutions have established centralized e-campus systems that consolidate multiple functions, whereas others continue to operate with semi-manual or fragmented digital platforms. Empirical evidence indicates that universities possessing robust ICT governance frameworks and committed leadership tend to demonstrate more effective DSMS deployment, while deficiencies in leadership and misaligned policies often hamper digitalization initiatives (Hashim et al., 2022; Musa, 2023; Sabiraguha et al., 2023). For example, Ugandan universities that have implemented explicit ICT policies and established governance bodies inclusive of stakeholder representatives report smoother implementation of Student Information Systems (SIS) (Ochwo et al., 2018). Conversely, a recent investigation in Burundi revealed that the lack of strategic leadership and coherent policy frameworks significantly obstructed the success of a newly introduced university information system (Sabiraguha et al., 2023). Many institutions continue to face challenges in aligning technological advancement with managerial capabilities, organizational culture, and formal change-management procedures (Musa, 2023; Hashim et al., 2022). These findings underscore the critical importance of leadership and governance capacity in steering institutions through the process of digital transformation.

Identified Gaps in Existing Research

Most existing research on digital student management systems (DSMS) in African universities predominantly concentrates on system functionality and user experience, with limited attention to managerial practices and governance frameworks. Additionally, regional disparities in institutional maturity and policy enforcement are often neglected in broader analyses across sub-Saharan Africa. There is a notable lack of systematic evidence

synthesising how East African institutions oversee DSMS from leadership and governance standpoints. This deficiency highlights the importance and timeliness of the current review, which seeks to identify best practices and inform policy and institutional reforms. By centering on East Africa, the study engages with a context characterized by common challenges such as resource limitations and capacity gaps, alongside existing collaborative frameworks, yet documented managerial experiences remain underexplored. Consequently, this review contributes to closing a significant knowledge gap by linking the technical aspects of DSMS implementation with the managerial and institutional factors that influence their success or failure.

METHODOLOGY

Research Design

The review employed the PRISMA 2020 systematic review framework (Page et al., 2021) to facilitate transparent and reproducible documentation of the processes involved in identification, screening, and eligibility assessment. PRISMA 2020 is extensively recognized as the prevailing standard for systematic reviews that synthesize both qualitative and quantitative evidence in social science research, thereby rendering it suitable for the examination of managerial practices within East African higher education institutions. Conforming to PRISMA principles involved a methodical approach to conducting literature searches, selecting relevant studies, extracting data, and synthesizing findings, as delineated below.

Research Question

The review was guided by the question: *What managerial practices do higher education managers in East African countries employ to improve digital student management systems?* This question focuses on the actions and strategies of university leadership and management in implementing, using, and maintaining DSMS to support student services.

Eligibility Criteria

The inclusion and exclusion criteria for selecting studies are detailed in Table 1A. These criteria were established to ensure the review stays focused on pertinent literature.

Table 1A:
Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Focus on digital student management systems (DSMS) or student information systems.	Focus only on technical or software development aspects.
Addresses managerial practices in higher education institutions.	Discusses ICT broadly without a specific focus on DSMS.
Study conducted in East African countries (e.g., Tanzania, Kenya, Uganda, Rwanda, Burundi, South Sudan, and Ethiopia).	Conducted outside East Africa.
Published between January 2010 and 15 August 2024.	Published before 2010.
Written in English.	Published in other languages.
Available in full text via the selected databases (Google Scholar, Scopus, Web of Science, African Journals Online).	Abstract-only or inaccessible full-text documents.
Includes empirical studies, case studies, or institutional reports.	Editorials, opinion pieces, or non-empirical sources.

Information Sources

This review systematically searched four databases: Google Scholar, Scopus, Web of Science, and African Journals Online to encompass both international and regional literature. We employed structured Boolean strings to combine keywords with platform names, thereby optimising the retrieval of relevant results. The searches were carried out between July 2024 and August 15, 2024.

We also reviewed the reference lists of all included articles (snowballing) and reached out to authors or consulted institutional repositories when full texts were unavailable. Only publications in English were included.

Search Strategy

Structured Boolean search terms were employed in Google Scholar to optimise relevant results. The search combined keywords related to student systems and management, as illustrated in Table 1B:

Table 1B:
Search Terms and Naming Conventions

Category	Terms / Phrases Used in Boolean Search	Notes on Inclusion
Functional synonyms	"Student management system", "student information system", "student record system", "academic record system", "student administration system", "student portal", "academic registry system"	Captures institutional differences in terminology; widely used across East African universities.
Brand/platform names	"ARIS", "SARIS", "AIMS", "AIMS-ERP", "Banner", "PeopleSoft", "Academia ERP", "HESA", "TUMIS", "UIMS", "eCampus"	Reflects specific products in East African institutions (e.g., ARIS at the University of Dar es Salaam, SARIS at OUT).
Functional modules / related systems	"Learning management system", "LMS integration", "student database", "academic management software"	Included to capture studies referring to DSMS via module integration.
Managerial / governance keywords	management, administration, leadership, governance, policy, registry, institutional planning	Ensures the search returned management-focused, not purely technical, studies.
Regional/geographic scope	"East Africa", "Tanzania", "Kenya", "Uganda", "Rwanda", "Burundi", "South Sudan", "Ethiopia"	Specifies inclusion criteria for regional focus.

Scoping searches with various combinations of these clusters (functional terms + platform names + management keywords + country names) were conducted. This approach yielded an initial pool of 47 records, consistent with expectations for a niche topic focused on managerial practices in East African higher education.

Study Selection, Data Extraction, and Synthesis

The study selection process followed PRISMA guidelines and is summarised in the PRISMA flow diagram (Figure 1). After the initial identification of 47 records, screening was performed in two major stages, as shown below, divided into four phases: identification, screening, eligibility, and inclusion, as indicated in Figure 1. The stages are:

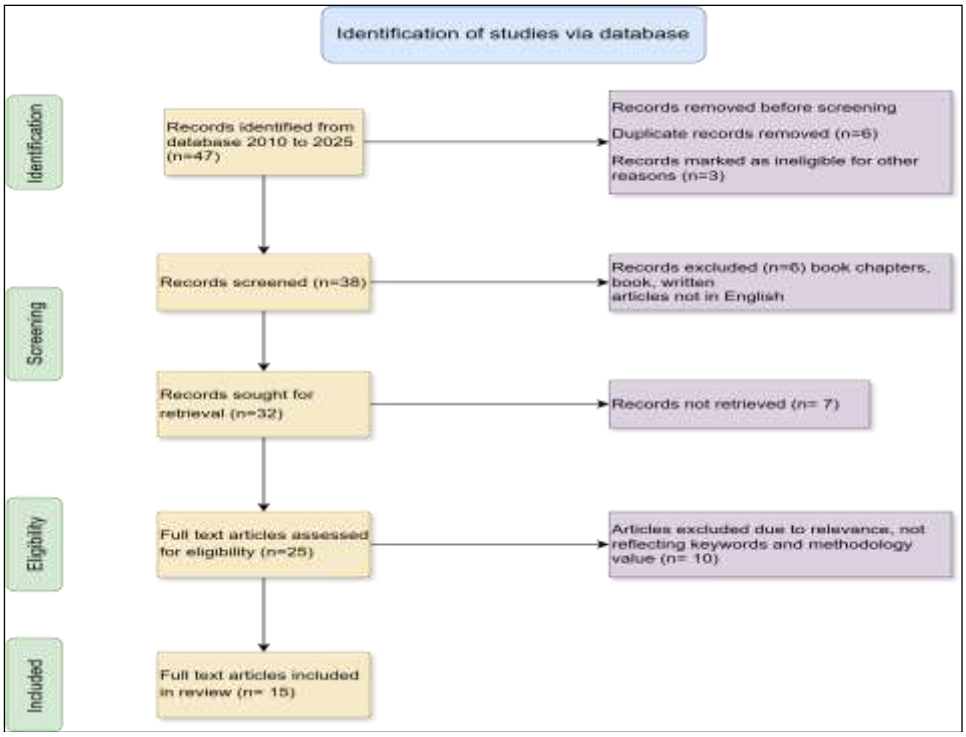
i) Title/Abstract screening involved removing duplicates and assessing titles and abstracts of 40 unique records against the inclusion criteria. At this stage, studies that clearly did not meet the criteria (e.g.,

focused solely on technical aspects or outside East Africa) were excluded. This resulted in a subset of studies for full-text review.

ii) Full-text review involved reading a total of 18 studies in their entirety. During the full-text analysis, 3 studies were excluded because they did not sufficiently focus on DSMS managerial practices (for example, one paper discussed general ICT policy without mentioning student systems, and two others were identified as commentary pieces without empirical data). This process resulted in 15 studies meeting all criteria and being included in the final synthesis.

Data from each included study were systematically extracted using a literature matrix that documented bibliographic information, contextual details such as country and institution, study design or type, key findings related to DSMS managerial practices, and identified themes. A qualitative thematic synthesis was subsequently performed. Recurring concepts within the findings were organized into thematic categories aligned with managerial practices. Each identified theme was supported by evidence from multiple studies, and in cases where a theme was supported by only a single study, this was explicitly noted to prevent overgeneralization. Through thematic analysis across diverse cases, the review elucidated broader patterns and best practices reflective of the varied contexts examined.

Figure 1:
PRISMA Flow Diagram depicting the number of records identified, screened, excluded, and included at each stage of the review.



Quality Appraisal

To give readers confidence in the findings, each included study was assessed using the Mixed Methods Appraisal Tool (MMAT, version 2018). This checklist evaluates whether a study asks clear questions, uses appropriate sampling and data collection methods, analyses data properly, and draws conclusions that fit the evidence. Of the 15 studies, eight met most of the MMAT criteria (scoring 75% or above), five were moderate (50–74%), and two scored below half. Common shortcomings included small sample sizes, limited details on data collection procedures, and minimal reflection on researcher bias in qualitative work.

RESULTS

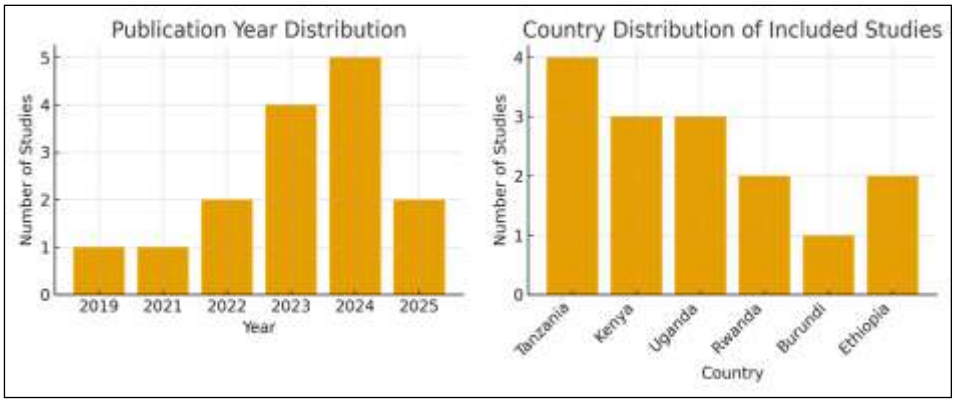
This section presents the findings of the systematic review, organised in two main parts. The first provides a descriptive overview of the included studies, offering context on publication trends and country representation. The second part is a thematic analysis aligned with the review question,

synthesising the best managerial practices identified in DSMS implementation across East African higher education institutions. Each thematic finding is derived from patterns recurring across multiple studies.

Descriptive Statistical Results

A total of 15 studies met the inclusion criteria and form the basis of this review. Research on DSMS in East African higher education has increased in recent years, with over two-thirds of the included studies published since 2019. There was a notable rise in publications after 2020, likely reflecting the growing importance of digital solutions in response to the COVID-19 pandemic and related educational reforms. Geographically, Uganda and Kenya accounted for the majority of studies, reflecting these countries' relatively developed ICT infrastructures and keen interest in higher education digital governance. Specifically, about five of the included studies were conducted in Ugandan universities and four in Kenyan universities. Tanzania was the focus of around three studies, while Rwanda, Burundi, and Ethiopia each had one to two studies within the corpus. This distribution highlights that most research has concentrated on the larger East African countries, with fewer studies in Rwanda and Burundi, indicating a need for further research in these regions. Figure 2 depicts the publication trends by year and country, with Kenya and Uganda together representing nearly half of the included cases. This descriptive overview provides context for understanding the subsequent synthesized findings.

Figure 2:
Publication year and country distribution of included DSMS studies in East Africa (n = 15). The figure displays a rising trend in publications over time, with peaks around 2022–2024, and emphasises that Kenya, Uganda, and Tanzania are the most frequently studied countries.



Overview of Included Studies

Table 2 summarises each included study, listing author(s), year, country, study design, system/platform, and key managerial practices. This overview provides context for the subsequent thematic analysis.

Thematic Findings

The review identified six key themes concerning managerial practices that affect DSMS success in East African higher education: (1) strategic leadership and policy direction, (2) capacity building and staff training, (3) infrastructure investment and resource allocation, (4) monitoring, evaluation, and data-driven decision-making, (5) security and risk management, and (6) stakeholder engagement and user support. Each theme is discussed below with illustrative examples from the literature.

Strategic Leadership and Policy Direction

Several studies emphasised the critical role of top-level leadership in setting digital priorities and establishing supportive policies for DSMS. For instance, in Uganda and Kenya, proactive university managers developed institutional ICT policies and formal digital strategies to guide the transition from manual to digital systems (Kayiwa et al., 2016; Ochwo et al., 2018). These strategies included formalising electronic student record-keeping and aligning DSMS implementation with the university's strategic plans. When leadership committed to a clear vision – such as a "digital university" initiative championed by vice-chancellors – it created an enabling environment for DSMS adoption. In some cases, as in parts of Sudan and Burundi, the lack of visionary leadership was identified as a barrier to effective digital transformation (Musa, 2023; Sabiraguha et al., 2023). University leaders who did not prioritize ICT innovation or failed to communicate its importance saw their DSMS projects flounder due to organizational inertia. This theme suggests that managerial leadership provides the foundation for successful DSMS projects: leaders must not only endorse the systems but also embed digital goals in institutional policies and assign oversight (e.g., through steering committees) to drive implementation.

Capacity Building and Staff Training

A recurring managerial practice was investing in human capacity, specifically training staff to operate and maintain DSMS effectively. Several universities in the region undertook capacity-building initiatives such as workshops and short ICT courses for administrative staff and academics, to improve digital literacy and system utilisation (Mayanja et al., 2019; Mugeni et al., 2020). For example, in Rwanda, the University of Rwanda organised training sessions on the new Education Business

Management Information System (EBMIS) to ensure that faculty and registry staff could use the software comfortably (Mugeni et al., 2020). Similarly, Ugandan universities have provided continuous professional development on ICT skills, which helped reduce user errors and resistance. However, challenges remain: some institutions reported that low baseline digital competency among staff hindered effective DSMS use even after initial training, underscoring the need for ongoing support. At the University of Rwanda, insufficient follow-up training led to some features of the system going underutilised (Mugeni et al., 2020). This theme highlights that managerial efforts must focus on the people behind the technology. Continuous capacity building, including formal training, mentorship, and knowledge sharing, is crucial to empowering employees to leverage DSMS fully. Without adequate training, even a well-designed system may fail to deliver intended benefits.

Infrastructure Investment and Resource Allocation

Managers in more advanced universities demonstrated proactive financial leadership by prioritising budget allocations for the development and maintenance of ICT infrastructure essential for DSMS operation. These investments typically included procuring servers and networking equipment, ensuring reliable campus internet connectivity, providing sufficient computers or devices for staff who use the system, and establishing data backup and recovery systems. For example, at Mount Kenya University's Kigali campus in Rwanda, targeted investments in a robust Management Information System infrastructure (including high-performance servers and backup power generators) were credited with improving both academic and administrative operations. This facilitated efficient data management and reduced processing delays for tasks such as registration and grade submissions (Mukuru, 2018). In contrast, universities in Tanzania and Burundi reported persistent infrastructural limitations – such as unstable electrical power, low bandwidth internet, and insufficient server capacity – which constrained DSMS performance and hindered effective data integration (Mbuya, 2023; Sabiraguha et al., 2023). In these cases, even when leadership and staff were supportive, the lack of reliable infrastructure meant frequent system downtime and slow access, eroding confidence in the digital system. These disparities underscore the important role of strategic resource mobilisation and infrastructural planning. University managers who secured funding (through government grants, donor projects, or reallocation of internal budgets) to build and sustain the necessary ICT infrastructure were far more successful in institutionalising DSMS. Thus, one of the core managerial responsibilities is to align financial and material resources with the goal of digital

transformation, ensuring that technology initiatives are not undermined by hardware and connectivity gaps.

Monitoring, Evaluation, and Data-Driven Decision Making

Another managerial strategy discussed in the literature involves leveraging data generated by Decision Support Management Systems (DSMS) to enhance institutional decision-making processes. Several studies have observed that when administrators actively utilize comprehensive data from student information systems, it results in more responsive and evidence-based governance (Mbuya, 2023; Sabiraguha et al.; Mutungi et al., 2024). These studies also demonstrated that well-established digital recordkeeping practices at Kenyan Adventist universities are strongly associated with effective managerial decisions, highlighting the critical role of robust DSMS in institutional governance. Through systematic application of data analytics and integrated reporting functionalities, managers can monitor system performance, analyze student enrollment and retention trends, and assess staff workload distribution. For instance, reports on registration statistics enable departments to allocate teaching resources efficiently and identify operational bottlenecks proactively. Although the evidence supporting this theme is limited, it underscores the potential of DSMS as a managerial instrument beyond mere transactional functions. Adoption of data-driven management aligns with global best practices in higher education, where analytics are employed for quality assurance and strategic planning (Hashim et al., 2022). East African university administrators who perceive DSMS not solely as operational tools but also as sources of strategic intelligence foster cultures rooted in evidence-based decision-making, ultimately enhancing institutional performance.

Security and Risk Management

Effective digital system management necessitates the implementation of comprehensive cybersecurity protocols and data-protection strategies. Multiple studies have highlighted that as universities digitize sensitive student records, management must proactively address associated risks, including data privacy concerns, security breaches, and system failures. For instance, in Tanzanian institutions, administrators have demonstrated increasing apprehension regarding the security of student information, leading to efforts aimed at training users in digital-security best practices and deploying technical safeguards such as firewalls and secure authentication mechanisms (Mbuya, 2023). One case illustrated that following incidents involving unauthorized grade modifications, the university responded by strengthening user-access controls and appointing

an IT security officer (Mbuya, 2023). Nonetheless, a persistent challenge remains in the limited availability of technical expertise necessary for the full implementation of cybersecurity measures. Often, universities depend on external consultants to manage DSMS security, raising concerns about the long-term sustainability and development of in-house technical capacity (Mbuya, 2023). These issues underscore the critical need for capacity-building initiatives in IT risk management at the managerial level. Effective oversight of DSMS extends beyond technological safeguards to include ongoing training and vigilance to maintain data integrity. Furthermore, in some East African universities, the absence of clearly articulated data-protection policies compels managers to develop institution-specific guidelines for privacy and security. Overall, this analysis emphasizes that university management must prioritize DSMS security as a fundamental responsibility, integrating risk assessments, user education, and alignment with national data-protection regulations to ensure compliance and maintain stakeholder trust.

Stakeholder Engagement and User Support

Numerous studies have emphasized the pivotal role of university management in facilitating user adoption of Decision Support Management Systems (DSMS) through the provision of continuous support and stakeholder engagement during the implementation phase. This encompasses both student and staff users of the system. Support initiatives documented in the literature include establishing dedicated helpdesks and IT support teams, organizing orientation sessions, developing user manuals, and creating feedback mechanisms (Githinji et al., 2023; Mugeni et al., 2020). For instance, in Ugandan and Rwandan universities, administrators acknowledged that the introduction of a new student portal necessitated change management at the user level. Consequently, they implemented measures such as step-by-step guides for routine tasks, including course registration and online fee payments, and solicited user feedback via surveys to identify potential challenges (Githinji et al., 2023). These institutions exemplified that consistent communication, prompt technical assistance, and visible responsiveness to user feedback can substantially enhance user confidence and promote system uptake. As a result, satisfaction among students and staff regarding administrative services improved when they perceived adequate support during the transition to digital systems (Hashim et al., 2022). Conversely, some universities continued to exhibit deficiencies in user engagement, largely attributable to insufficient technical support personnel and a lack of ongoing professional development programs for end-users. In such cases, initial enthusiasm for the DSMS often diminished as users encountered

unresolved difficulties. This underscores the necessity for institutional investment in user support infrastructure, such as hiring additional IT support staff or establishing "DSMS champions" within departments, and fostering a user-centric approach. Ultimately, management practices that treat students and staff as partners in digital transformation through consultative processes, training, and ongoing support tend to lead to higher system utilisation and more sustainable success.

Author(s) & Year	Country	Study Design & Sample	DSMS/Platform	Key Managerial Practices / Findings
Anyeko (2016)	Uganda	Doctoral dissertation (case study)	ICT for student administration	ICT improved student administration but hindered by limited infrastructure and staff training.
Kayiwa, Juma & Clement (2016)	Uganda	Mixed-method study of higher education administration	Student records management	ICT adoption improved administrative processes but managerial capacity constraints persisted.
Henry & Njenga (2021)	Kenya	Case study in public universities	Electronic records management	Electronic records systems enhanced service delivery; success depended on training and resource allocation.
Hashim, Mugo & Kiptoo (2022)	Kenya	Survey of stakeholders	Student information system	Stakeholder engagement and communication were critical for successful SIS implementation.
Mohammadi, Alemu & Bekele (2021)	Ethiopia	Mixed-method study	Institutional ICT adoption	Managerial capacity building and staff training were essential for DSMS adoption.
Mbuya (2023)	Tanzania	Case study (SARIS)	SARIS	Capacity building and digital literacy increased utilisation of SARIS.
Mugeni, NagoorMeera & Banamwana (2020)	Rwanda	Survey at University of Rwanda	EBMIS	User satisfaction was influenced by training, support and stakeholder engagement.
Mukuru (2018)	Rwanda	Descriptive study at Mount Kenya University	Management information system	MIS improved academic processes but limited by technical skills and infrastructure.
Ndulu, Kimani & Nsubuga (2023)	East Africa (multi-country)	Policy analysis	Digital transformation initiatives	Highlighted gaps between policy and practice; emphasised leadership and investment.
Ntorukiri, Omondi & Karanja (2022)	Kenya	Survey of universities	Student information system	Identified barriers such as inadequate infrastructure, funding, training and leadership support.
Musa (2023)	Sudan	Case study	E-governance in higher education	DSMS adoption hindered by lack of infrastructure, legal frameworks and managerial commitment.
Mutungi, Nakato & Byaruhanga (2024)	Uganda	Survey / case study	Student information system	Emphasised need for cybersecurity policies, staff training and risk management.

Mutungi, Kibirango & Maiyo (2024)	Kenya	Survey of Adventist universities	Digital records practices	Positive association between digital records management and decision-making; underscored leadership role.
Wahyuni (2024)	Tanzania	Mixed-method study	Digital transformation monitoring	Highlighted monitoring and evaluation of DSMS to inform data-driven decision-making.
Nwachukwu & Ohalete (2024)	Pan-African	Comparative analysis	Strategic leadership & SIS	Strong leadership and governance frameworks were necessary for SIS success across African universities.

Table 2:
Summary of Included Studies

DISCUSSION

This systematic review aimed to synthesise the managerial practices employed by higher education institutions in East African countries to improve Digital Student Management Systems (DSMS). The findings show that, although the adoption of DSMS is gradually increasing across the region, its effectiveness depends heavily on the quality of leadership, institutional capacity, and strategic management decisions. In essence, technology adoption alone is not a cure-all; the managerial environment surrounding it largely determines whether a DSMS achieves its goal of better educational administration.

A key managerial practice identified is the provision of strategic leadership and policy direction, which forms the foundation for successful digital transformation. As echoed by Unwin et al. (2010), visionary leadership in African universities is essential for initiating and sustaining technological change. The reviewed studies affirmed that when university managers clearly defined digital priorities and embedded them into institutional policies, the adoption and performance of DSMS improved significantly (Kayiwa et al., 2016; Musa, 2023; Sabiraguha et al., 2023). For instance, having a formal ICT or digital education strategy gives implementation teams a clear mandate and framework to operate within. In contrast, a lack of direction or poor leadership, as observed in Sudan and Burundi, resulted in minimal uptake of digital solutions despite the availability of systems (Musa, 2023; Sabiraguha et al., 2023). This suggests that leadership commitment and vision are prerequisites for any substantial digital initiative to take root in higher education institutions.

Another essential factor is capacity building through staff training and development. Studies emphasise that digital competence among personnel is crucial for the sustainability of ICT systems (Mayanja et al., 2019; Mugeni et al., 2020). The review found that universities in Uganda and Rwanda that invested in structured ICT training programmes experienced improved DSMS functionality and reduced staff resistance (Mayanja et al., 2019; Mugeni et al., 2020). Employees confident in using new systems become advocates, creating a positive feedback loop of adoption. However, institutions that overlooked training or only offered one-off workshops often faced under-utilisation of the systems and ongoing technical issues because users did not fully understand how to utilise the tools or troubleshoot basic problems. Therefore, management practices must include continuous learning opportunities to keep skills up to date, especially as systems are upgraded or new features are introduced.

Infrastructure investment and resource allocation have become vital managerial practices. The successful implementation of DSMS relies heavily on a robust digital infrastructure, including computers, servers, software, and reliable internet connectivity (Mohamed Hashim et al., 2022). Institutions like Mount Kenya University have significantly improved academic processes through focused investment in management information systems (Mukuru, 2018). Conversely, financial and logistical limitations at some Tanzanian and Burundian universities have restricted system scalability and dependability (Mbuya, 2023; Sabiraguha et al., 2023). This contrast indicates that even with effective management, a lack of fundamental infrastructure cannot be ignored; university leaders must advocate for, or strategically allocate, funds to lay the essential groundwork for technology. Furthermore, policy-level backing is crucial; governments and education regulators in East Africa may need to increase funding or introduce infrastructure programmes for universities, especially those in resource-limited settings, to foster equitable progress in digital transformation.

Additionally, the use of data for managerial decision-making emerged as a transformative approach, though evidence was somewhat limited. Institutions that adopted digital data analytics for monitoring academic processes and student progress reported more responsive and efficient administration (Mbuya, 2023; Sabiraguha et al., 2023). This aligns with the broader trend in higher education management towards data-informed decision-making cultures, where leadership, guided by real-time data, improves quality assurance and institutional responsiveness (Hashim et al., 2022). In our context, this indicates that East African universities could benefit greatly by utilising DSMS data for planning—such as analysing enrolment patterns to shape admission policies or using performance dashboards to identify at-risk students and intervene early. However, developing these data capabilities may require additional training and tools, highlighting a future managerial focus. Mutungi et al. (2024) also provide empirical evidence that strong digital records practices are linked to higher decision quality in universities.

Moreover, cybersecurity and data protection practices are becoming increasingly important in the management of DSMS. As these systems store confidential student and staff information, university managers have begun prioritising digital safety, although challenges persist due to inadequate technical expertise and inconsistent enforcement (Mbuya, 2023). This resonates with Gkrimpizi et al. (2023), who identified weak

cybersecurity frameworks as a common barrier in digital ecosystems within higher education in developing contexts. It is encouraging that some East African universities are taking steps such as formulating ICT security policies and sensitising users about data privacy. Yet, more needs to be done: institutional managers should incorporate regular security audits of DSMS, ensure compliance with emerging data protection laws, and develop contingency plans for data recovery. Neglecting this area could not only jeopardise system integrity but also erode stakeholder trust in digital services.

Lastly, stakeholder engagement and user support, including orientation, helpdesks, and feedback mechanisms, have been crucial in fostering DSMS adoption. The review indicates that institutions that support users through inclusive and participatory approaches achieve greater system acceptance (Githinji et al., 2023). This highlights an important principle: technological change in universities is fundamentally human-centric. By listening to user feedback and making iterative improvements, such as simplifying workflows or providing additional training on frequently misunderstood features, managers can significantly improve user satisfaction. However, gaps remain in providing ongoing support for students and staff, especially in institutions with limited IT support resources. Many universities lack enough personnel to provide timely assistance, leading to frustration when issues occur. This suggests that, as part of DSMS initiatives, university management should plan for adequate support staffing or adopt innovative solutions like peer support programmes. Engaging students, for instance, as tech ambassadors to assist their peers in navigating systems, could be a creative strategy in resource-limited contexts.

In summary, the discussion highlights that the success of DSMS in East Africa is not purely a factor of technology availability but is deeply intertwined with managerial actions and context. The six themes identified work in concert: visionary leadership enables allocation of resources and sets the tone for capacity building; trained staff make better use of infrastructure and adhere to security protocols; engaged stakeholders provide feedback that can guide further leadership decisions, and data from the system informs strategic planning. This interdependency means university managers must adopt a holistic approach, addressing technical, human, and organisational dimensions simultaneously, to realise the full benefits of digital student management systems. Notably, these insights are consistent with global experiences in digital governance of education, but they take on added significance in developing countries' contexts where

resource constraints are real, and the margin for error is small. For East African universities aiming to transform digitally, strengthening managerial practices appears to be just as important as acquiring new technologies.

Literature Verification and Quality Control

During the review process, all cited references were systematically verified through Google Scholar and institutional repositories to confirm their accessibility and authenticity. Sources that could not be reliably located or obtained in full text were excluded and, where feasible, replaced with peer-reviewed studies of equivalent relevance, specifically addressing themes within the African or East African higher education contexts. This rigorous quality assurance procedure ensured that the final collection of studies comprised traceable, verifiable, and publicly accessible sources, thereby enhancing the transparency and reliability of the systematic review. Only those studies satisfying both thematic relevance and verifiability criteria were included in the synthesis. Moreover, in cases of multiple sources covering the same managerial themes, preference was given to the most recent studies to ensure that the review reflects current practices.

Limitations

This review primarily employed literature obtained through Google Scholar. Although this method effectively encompassed a broad spectrum of sources, it may have overlooked studies exclusively indexed in subscription-based databases. Certain pertinent research, particularly from prominent international journals, might have been omitted if not indexed or easily accessible via Google Scholar. Nonetheless, considering the regional emphasis on East African higher education and the significance of grey literature and locally published works, this search strategy was both appropriate and essential for gaining contextual insights.

Another limitation is the relatively small number of eligible studies and the uneven country-level representation among them. With only fifteen studies constituting the core of the synthesis, some countries, such as Rwanda and Burundi, are represented by very few studies. The findings should be regarded as indicative of prevailing managerial practices rather than comprehensive or universally applicable across all higher education institutions in East Africa. Certain successful practices or challenges encountered by specific universities may not have been captured due to a lack of documented experiences in accessible literature. Future research

could broaden the scope by including francophone African contexts or by conducting primary investigations to supplement the existing literature. Despite these limitations, the review offers a systematic summary of existing knowledge and provides a valuable starting point for university leaders and policymakers to understand the key success factors in managing digital student systems.

CONCLUSIONS

This systematic review examined the managerial practices employed by higher education institutions in East African countries to enhance Digital Student Management Systems (DSMS). The findings suggest that DSMS adoption is increasing across the region; however, its effectiveness appears closely associated with the quality and consistency of managerial practices within individual institutions. In essence, how university leaders plan, execute, and support digital initiatives determines whether those initiatives flourish or flounder.

Strategic leadership emerged as an especially influential factor. Institutions that articulated clear digital visions and implemented supportive policies generally achieved stronger DSMS outcomes. Leadership commitment translated into concrete actions like establishing governance committees, integrating DSMS goals into strategic plans, and championing the project to stakeholders, all of which drove success.

Similarly, capacity building through staff training was identified as a key facilitator of digital transformation. The success of DSMS heavily relies on the digital skills and mindset of both academic and administrative staff. Universities that offered ongoing training and support for change management experienced higher utilisation and fewer issues, whereas those with untrained staff faced underuse and recurring technical problems that could have been prevented.

Furthermore, investing in infrastructure and providing adequate resources helped make DSMS operations more dependable and sustainable. Without a solid technological base (power, network, hardware, and maintenance funding), even the best management efforts cannot achieve results. On the other hand, focused investments in technology resulted in smoother operations and increased user satisfaction.

The review also shows that adopting data-driven decision-making, strong cybersecurity, and user support systems helps improve institutional

efficiency and system reliability. These practices ensure that the DSMS not only automates processes but also enhances institutional management and gains the trust of its users. Universities that used DSMS data for planning could respond more quickly to trends, and those that actively involved users fostered a culture of acceptance for new digital tools.

Nonetheless, disparities across institutions reveal that progress in DSMS implementation and use remains inconsistent. Often, this is limited by differences in funding, technical capacity, and organisational readiness. Some universities in the region are pioneers with strong leadership and abundant resources, while others lag behind due to factors beyond the control of individual managers (such as limited government funding or a shortage of qualified IT personnel in the area). Since only fifteen studies met the inclusion criteria and coverage of some countries was limited, these conclusions should be viewed as indicative rather than definitive. There is potential for further research and cross-institutional learning to help refine best practices.

In conclusion, managerial capacity and practices are crucial in the digital transformation of student administration in East Africa. University leaders and decision-makers can utilise the insights from this review to compare their own practices: emphasising leadership and vision, investing in people and infrastructure, leveraging data, protecting systems, and engaging stakeholders. By doing so, higher education institutions in East Africa will be better equipped to harness DSMS to enhance governance, efficiency, and student service delivery, ultimately supporting educational transformation in the region.

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