

A systematic review of factors influencing learning management system usage in higher learning institutions across the East African Community

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ABSTRACT

In this digital era, the use of learning management systems in education as an attempt to improve teaching and learning delivery has become a central concern. Despite significant investment in Information Communication and Technology (ICT) infrastructure, higher learning institutions across the East African Community continue to face diverse challenges that hinder full utilization. This study was guided by the Unified Theory of Acceptance and Use of Technology (UTAUT) and Technology-Organization-Environment (TOE) framework to present a systematic review of literature published between 2015 and 2025, focusing on the most critical factors influencing Learning Management System usage in the East African Community. The literature was identified through six electronic databases guided by the Reporting Items for Systematic Reviews and Meta-Analyses framework; 92 academic articles were identified and critically analyzed. The results revealed that 28 studies primarily focused on Kenya. The Technology Acceptance Model was the dominant model employed, and students were the main subject of studies. Moreover, the quantitative approach was the preferred design. Overall, thirty-nine factors were identified. The study concludes that the East African Community requires a multi-dimensional approach combining continuous training, supportive policies, and robust ICT infrastructure, including high-speed internet connectivity and strengthened mobile technology. This review will be useful for future research and higher education decision-makers who plan to use online learning to overcome the challenges they face in utilizing LMS effectively. The study was limited to link usage and learning outcomes; therefore, future work should employ stronger designs, incorporate lecturer and administrator perspectives, and integrate multi-level theories to link usage with learning outcomes.

Keywords: East Africa Community, Learning Management System, Higher Learning Institutions, Usage

I. INTRODUCTION

In East Africa Community (EAC), there is increased adoption of Learning Management System (LMS) that enhanced teaching and learning delivery to support face-to-face traditional environments in Higher Learning Institutions (HLIs) (Araka et al., 2021; Gamede et al., 2021; Mare et al., 2023). This adoption has been stimulated by the investment in various learning management systems, availability of internet and other digital technologies such as laptops, desktops, smart phones, tablets, and among others aiming at improving the quality of teaching and learning (Mtebe, 2020; Duruhan, 2020; Yunus, 2021). Despite the fast adoption, there is low usage of these systems amongst EAC users (Mtebe, 2020; Mtani & Mbelwa, 2022; Vincent et al., 2020). The successful use of LMS relies on understanding the usage factors as well as the main challenges that face the current online learning systems (Almaiah et al., 2020). This may result from several factors, such as those related to technological factors, individual factors, institutional factors, and socio-cultural factors, which may inhibit the usage of LMS among lecturers. In order to increase the level of LMS usage, countries in the EAC (Kenya, Tanzania, Uganda, Rwanda, Burundi, Congo, Somalia, and South Sudan) should understand the relevant adoption models, theories and challenges facing the utilization of LMS. Therefore, this study investigated the critical factors influencing the usage of LMS in HLIs across the EAC region.

It is argued that technology-based teaching and learning has established a new educational ground for lecturers and students by removing time and place constraints (Endres & Chowdhury, 2019; GÜRCAN & ÖZYURT, 2020). In this digital era, the use of Learning Management Systems in education as an attempt to improve teaching and learning delivery has become a central concern. United Nations Environmental, Scientific and Cultural Organization [UNESCO] reported that “ICT must be harnessed to strengthen education systems, disseminate knowledge, provide access to information, promote quality and effective learning and deliver services more efficiently” (UNESCO, 2023). The use of LMS will help achieve global goal number 4. This goal aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all (UNESCO, 2021b). Due to the increase in enrollment of higher learning students, face-to-face learning delivery is not adequate to bring about quality education; therefore, the use of modern approaches such as online and blended learning, which are supported by LMSs, is necessary. Alsswey et al., (2020) argues that increasing demand for higher education cannot be met solely through traditional face-to-face learning delivery; therefore, it is advantageous to use modern approaches such as eLearning, blended and online learning, which

are supported by LMSs. These methods stimulate the teaching and learning process and enhance communication between users at all times and locations, enabling students to engage with the material at their pace, helps better manage users and courses by providing reports and activity notifications (Khetsiwe Eunice & Cosmas, 2020; Sinclair & Aho, 2018)

Even though the increasing number of systematic reviews papers examining LMS adoption worldwide (van der Merwe et al., 2023; Ziraba et al., 2020; Gamage et al., 2022; Mousa et al., 2020; Maluleke & Maake, 2025), none of these have investigated the factors influencing the usage of LMS in EAC. The aim of conducting this study is to address this research gap. A main factor observed by past studies has to do with the challenges of preliminary adoption of LMS. Alsswey et al., (2020) state that failure rates of adopting LMSs are high regardless of their benefits. Despite key challenges pointed by various research findings including (Nkata, 2020; Ndibalema, 2025; UNESCO, 2021; UNICEF, 2021) that continue to exist and hinder the effective utilization of LMSs; no systematic review paper provided a comprehensive view of the LMS use in the EAC. This raises a need to collect these studies from the last ten years to establish the challenges and factors for LMS usage in EAC.

This systematic review study aim to collect and summarize the factors influencing LMS usage across the East African Community (EAC), and it will serve as a resource for Higher Learning Institutions on effective ways to utilize LMS. The findings are expected to pinpoint best practice and provide actionable insights that can improve the usage of LMS in Higher Learning Institutions across the region. Ultimately, top management, facilitators, students, policy makers, LMS administrators and other researchers will have the baseline to effectively utilize the Learning management systems. The next part will describe the methodology used for the review, including the scope of the study, the search strategy employed to identify relevant literature, and the methods used to analyze the data. The third part will present the results and discussion. Finally, the paper will conclude with a summary of the necessary findings as a response to research questions aimed to fill the study gap.

1.2 Research Questions

- i. Which countries have most contributed to LMS studies within EAC?
- ii. Which models have been most used to study LMS usage in EAC?
- iii. What methodologies have been employed in studying LMS usage in EAC?
- iv. What are the critical factors influencing the usage of LMS in EAC?

II. LITERATURE REVIEW

2.1 Theoretical Review

The adoption and usage of LMS in EAC Higher Learning Institutions (HLIs) can best be provided a comprehensive view through the integrated framework combining the Unified Theory of Acceptance and Use of Technology (UTAUT) developed by Venkatesh et al., (2003) and the Technology-Organization-Environment (TOE) developed by Tornatzky and Fleischer, (1990). This study therefore adopts a hybrid model that combines individual and organizational models to explain LMS adoption and usage within EAC HLIs. A similar approach was used by Bouteraa, (2024), Tan and Lee, (2024), and Ates & Polat, (2025). Tan and Lee, (2024) argue that the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Technology-Organization-Environment (TOE) model have become prominent tools to assess and understand adoption and use behaviors towards specific technologies.

According to Venkatesh et al., (2003), the UTAUT is a model that combines theories and frameworks of the Technology Acceptance Model, Innovation Diffusion Theory (IDT), Theory of Planned Behavior (TPB), PC Utilization Model, Motivational Model, Theory of Reasoned Action (TRA), and Social Cognitive Theory (SCT). The UTAUT model explains behavioral intention to use LMS by focusing on factors at the individual level, including performance expectancy (PE), social influence (SI), effort expectancy (EE), and facilitating conditions (FC) (Abbad, 2021). Performance expectancy refers to the degree to which an individual believes that using the LMS will improve teaching quality and student engagement. Social influence refers to the impact of colleagues on the intention to adopt and use LMS. Effort expectancy refers to the degree of ease of use and perceived simplicity of using LMS in facilitating the teaching and learning process. Facilitating conditions refers to the degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the LMS. In the study of Abbad (2021), it was found that performance expectancy, effort expectancy, and social influences are directly associated with behavioral intentions, while the final facilitating conditions are associated with actual usage. In addition, behavioral intentions are influenced by gender, age, experience, and voluntariness of use.

While UTAUT emphasizes the individual factors influencing adoption and usage of LMS, the TOE framework addresses organizational factors that have not been captured by the UTAUT model to fill the gap of using one model. According to Abdurrahman et al., (2024), the TOE model assesses how technological attributes, organizational readiness, and environmental conditions shape technology adoption. The technology factors include complexity, relative advantage, and compatibility. The organizational factors, which include the role of management support, user training,

and resource availability, can either foster or hinder the adoption and usage of LMS. Lastly, the environmental factors consider external influences, such as government policies, competitive pressure, and vendor support, which can impact users' decisions to adopt and use LMS.

In combining UTAUT and TOE Theory, this study provides a more comprehensive framework for understanding both individual behavioral intentions and organizational factors that influence the adoption and usage of LMS in higher learning institutions across the EAC region.

2.2 Conceptual Review

2.2.1 LMS in Higher Education

The LMS in education is a comprehensive digital platform designed to enable educational institutions to manage, deliver, and track educational content and activities in an organized and efficient manner using the Internet (Al-Nuaimi & Al-Emran, 2021). Globally, higher educational institutions have gradually transformed the teaching and learning process into a new learning environment. This shift is due to the impact of the availability of the internet and other digital technologies such as laptops, desktops, smartphones, tablets, and others (Duruhan, 2020; Yunus, 2021). Learning Management Systems (LMS) encourage personalized learning, promote educational equity, provide immediate feedback and assessments, and enable learning anytime and anywhere. As a result, many higher education institutions have integrated LMSs as a core component of their educational frameworks (Lytras et al., 2022).

In EAC, LMSs have played a significant role in improving access to higher education, particularly during and after the COVID-19 pandemic. These platforms enabled the delivery of education to learners remotely, ensuring the continuity of classes across the world without traditional face-to-face classes (Ngala, 2024). The traditional face-to-face approach is supplemented by LMS; the systems enhance the quality of face-to-face delivery by enabling learners to independently access course content (Innocent, 2020; Mtani & Mbelwa, 2022; Mtebe & Raphael, 2018; Nkata, 2020). Therefore, in this digitalization world, the higher learning institutions are required to adopt and use LMS to supplement the face-to-face learning mode (Higher Education for Economic Transformation [HEET], 2021; NACTVET, 2024; UNESCO, 2023).

Despite the advantages of having these LMS in higher learning institutions across the EAC region, usage is still a challenging problem (Mtani & Mbelwa, 2022). This review therefore explores the individual and organizational factors influencing the usage of LMS in HLIs across EAC.

III. METHODOLOGY

To answer the research questions, four phases of Preferred Reporting Items for Systematic Reviews and MetaAnalyses (PRISMA): identification, screening, eligibility, and inclusion criteria were adopted. A similar approach was used by (Maluleke & Maake, 2025; Mousa et al., 2020). During the identification phase, articles were identified through online database searches and duplicates were removed in screening phase to get the actual total number of articles. During the identification phase, all search results from databases (Google Scholar, IEEE, Springer, Science Direct, Scopus, and Emerald) were stored in the Mendeley citation manager. The software identified articles that appeared multiple times across different databases, then manually verified and removed them. Furthermore, the relevant articles were selected by screening the titles and abstracts against the inclusion criteria (study focus on LMS usage, higher learning institutions, EAC, range of publication years, and review study design). Articles that did not meet these criteria were excluded. Additionally, the full text of the remaining articles was assessed. The study failed to satisfy all criteria, including theoretical focus, methodology used, and study objective, which were removed. The papers were not under the scope of the study were excluded in eligibility phase to meet the number of eligible articles. Lastly, the inclusion phase was performed to obtain the articles to be involved in final analysis.

Six online databases were used in searching relevant information that is in the scope of the study: Google Scholar, IEEE, Springer, Science Direct, Scopus, and Emerald. A set of combination keywords including "Online Learning" OR "Learning Management System" OR "eLearning" OR "LMS" OR "Mobile Learning", "Moodle" OR "Google Class" OR "Blackboard" OR "Blended Learning" OR "Course Management System" AND "Usage" OR "Utilization" OR "Implementation" OR "acceptance" AND "East Africa Community (including Burundi, Congo, Kenya, Rwanda, Somalia, South Sudan, Tanzania, and Uganda,)" OR "higher education institutions" OR "universities" OR "higher learning institutions". Microsoft Excel was used to store and document the articles acquired after inclusion and exclusion processes have been completed.

The criteria for selecting an article was adopted from PRISMA guidelines as clarified by (Page et al., 2021). The following selection criteria of selecting articles were used; **language**: Publication in English, **topic**: Focus on the use of Learning Management Systems (LMSs) in higher education, **setting**: Emphasis on higher learning institutions, **relevance**: Directly address factors that influence the LMS usage, and **timeframe**: Published between 2015 and 2025 to ensure inclusion of recent literature. Therefore, Articles not published in English were excluded. Also, papers that did not specifically investigate usage of LMSs in the context of higher education were excluded to maintain focus and

relevance. Moreover, publications not centered on higher learning institutions were not included in the study. Furthermore, only studies published between 2015 to 2025 were included to align with the study scope. Also, only studies conducted across EAC were included in the study.

The total articles of 3215 were obtained in initial search without applying elimination criteria. After removing all the duplicates, the total number of remaining articles was 3007. After reviewing the titles and abstracts only 927 articles were qualified for next selection process. The 45 reports were not retrieved; therefore, only 882 articles were assessed for eligibility. Among these articles, 12 removed on language criteria, 182 articles were irrelevant, 64 articles were not set at higher learning institutions (HLIs), 207 articles were out of timeframe, and 306 articles were not centered at EAC, and 19 articles were not met acceptable quality. A quality appraisal was conducted to evaluate methodological accuracy. This study adapts the mixed methods appraisal tool (MMAT) to accept the articles that meet the quality appraisal. The mixed methods appraisal tool (MMAT) was developed for critically appraising different study designs based on criteria such as clarity of research design, sampling technique, data collection method, analytical correctness, and reporting transparency (Bartlett et al., 2019). This led to 92 articles that met the criteria for inclusion in this study. Appendix A summarizes the reviewed articles that were selected, and figure 1 below reviews the procedure of the literature search and screening used to obtain final articles.

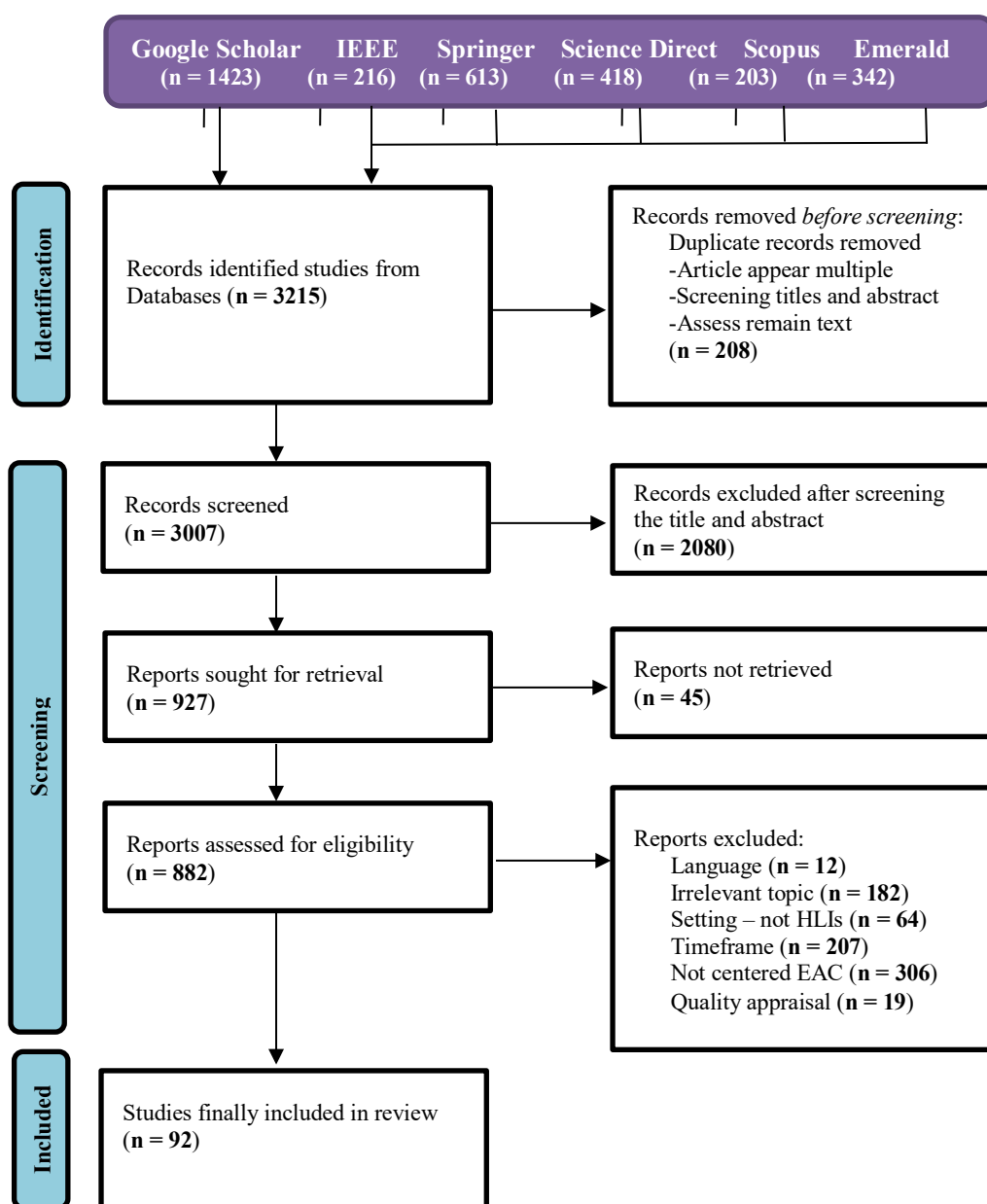


Figure 1
Flow diagram of the selection process for including articles
Source: Author’s Construct; Page et al., (2021)

IV. FINDINGS & DISCUSSION

4.1 Findings

4.1.1 Countries have contributed to LMS studies within EAC

The 92 articles were selected across all countries within EAC region as shown in figure 1. Kenya had 28 studies, being the highest number of articles, representing 30.4% out of the total number of 92 articles. This was followed by Uganda with 20 studies and Tanzania with 19 studies. 11 studies were conducted in Rwanda, followed by Somalia and South Sudan with 6 studies each. While Burundi and Congo had 1 studies each.

Table 1

Countries have contributed to LMS studies within EAC

Country	Number of studies	Percentage (%)
Burundi	01	01.1
Congo	01	01.1
Kenya	28	30.4
Rwanda	11	12.0
Somalia	06	06.5
South Sudan	06	06.5
Tanzania	19	20.7
Uganda	20	21.7
Total	92	100.0

Source: Author's Construct

4.1.2 Models have been used to study LMS adoption and use in EAC

In respect to research question number two, this part examine various model used in acceptance and usage of LMS in EAC as shown in figure number 2. The findings indicate that 14 (15.2%) articles were adopted TAM as the model that fit for their studies. The second model of preference was the UTAUT, being used in 11 (12.0%) studies. Then followed by Delone and Mclean's with 4 studies and TOE had 3 studies. While TPB model was used with 2 studies. SLT, GT, OOFAT, TOC, TRA, PBL, and TPACK models had only one studies adopt in each. 51 out of the 92 studies representing 55.4% did not use any model for their studies.

Table 2

Models adopted to study the use of LMS in EAC

Models	Number of studies	Percentage (%)
TAM	14	15.2
UTAUT	11	12.0
SLT	01	01.1
GT	01	01.1
Delone and Mclean's	04	04.3
NONE	51	55.4
OOFAT	01	01.1
TPB	02	02.2
TOC	01	01.1
TOE	03	03.3
TRA	01	01.1
PBL	01	01.1
TPACK	01	01.1
Total	92	100.0

Source: Author's Construct

4.1.3 Research methodologies have been employed to study LMS usage in EAC

The research methodology used in various EAC studies to investigate LMS usage is demonstrated in table 3. The findings indicate that 46 (50%) of the total studies used a quantitative approach, while 30 (32.6%) studies used a mixed methodology. The qualitative approach has fewer studies, which is 16 (17.4%) out of 92 studies reviewed. These findings highlight a significant favorite for quantitative methods in evaluating LMS usage, suggesting that researchers may favor measurable data to draw conclusions.

Table 3*Research methodology employed to study LMS usage in EAC.*

Methodology	Number of studies	Percentage (%)
qualitative	16	17.4
quantitative	46	50.0
Mixed	30	32.6
Total	92	100.0

Source: Author's Construct

The students appear most in the various studies as main subjects, as indicated in table 4. The findings indicate that 41 (44.5%) of the total studies used students as the main subject, while 26 (28.3%) studies used a mix of students, lecturers, and administrators. The lecturer has a total of 23 (26%), while 2 (2.2%) out of 92 studies have used administrative subjects. These results highlight the predominant focus on students in educational research, suggesting that their perspectives and experiences are deemed crucial for understanding the factors influencing learning environments.

Table 4*Subjects employed to study LMS usage in EAC.*

Methodology	Number of studies	Percentage (%)
Students	41	44.5
Lectures	23	25.0
Administration	02	02.2
Mixed	26	28.3
Total	92	100.0

Source: Author's Construct

On the other hand, questionnaires were the most adopted instruments, as shown in table 5. The findings indicate that 53 (57.6%) of the total studies used questionnaires as the main instruments, while 29 (31.6%) studies used a mix of instruments. Four studies (4.3%) used interviews, four studies (4.3%) used desktop reviews, one study (1.1%) used observation, and one study (1.1%) used focus discussion groups. Moreover, the dependence on questionnaires may reflect a preference for quantitative data collection methods in the field.

Table 5*Instruments adapted to study LMS usage in EAC.*

Instruments	Number of studies	Percentage (%)
questionnaires	53	57.6
Mixed	29	31.6
interviewees	04	04.3
desktop review	04	04.3
Observation	01	01.1
focus discussion groups	01	01.1
Total	92	100.0

Source: Author's Construct

The most preferred analysis tool used was descriptive analysis, as shown in table 6. The findings indicate that 62 (67.4%) of the total studies used a descriptive statistics approach, while 22 (23.9%) studies used a mixed approach. The thematic analysis has fewer studies, which are 8 (8.7%) out of 92 reviewed. These findings highlight a significant preference for descriptive analysis in evaluating LMS usage across EAC higher learning institutions, suggesting that researchers may favor measurable data to draw conclusions.

Table 6*Analysis tools used in the study of LMS usage in EAC*

Years	Number of studies	Percentage (%)
Thematic analysis	08	08.7
Descriptive statistics	62	67.4
Mixed	22	23.9
Total	92	100.0

Source: Author's Construct

Furthermore, table 7 shows that more articles focused on the year 2020 compared to other years. The findings show that 19 (20.7%) studies were conducted in 2020, followed by 15 (16.3%) studies in 2022 and 12 (13.0%) studies in 2024. In 2016, 9 (9.8%) studies were conducted, and 2023 has 9 (9.8%) studies. Eight (8.7%) studies were conducted in 2021, while 2025 has six (6.5) studies. In 2017 conducted 5 (5.4) studies, in 2019 conducted 3 (3.3) studies, while in 2018 have two (2.2%) studies.

Table 7*Years of LMS usage publications in EAC*

Years	Number of studies	Percentage (%)
2015	04	04.3
2016	09	09.8
2017	05	05.4
2018	02	02.2
2019	03	03.3
2020	19	20.7
2021	08	08.7
2022	15	16.3
2023	09	09.8
2024	12	13.0
2025	06	06.5
Total	92	100.0

Source: Author's Construct

4.1.4 Critical Factors Influencing the Use of LMS in EAC

In the respect of research question number four of this study, the researchers collected a list of the various critical factors across the reviewed studies as LMS usage catalyst. The findings of these studies show that, 39 factors were identified. Among these, 10 factors appear most frequently: Training, Internet connectivity and bandwidth cost, ICT infrastructure, Institutional policies, Technical skills support, Perceived Ease of Use, Perceived Usefulness, Facilitating Conditions, Institutional support, and Attitude. With the reference to the statistics in Figure 2, there is an indication that regular training, internet related issues and bandwidth cost, ICT infrastructure are the lead factors for the success of LMS usage across EAC region.

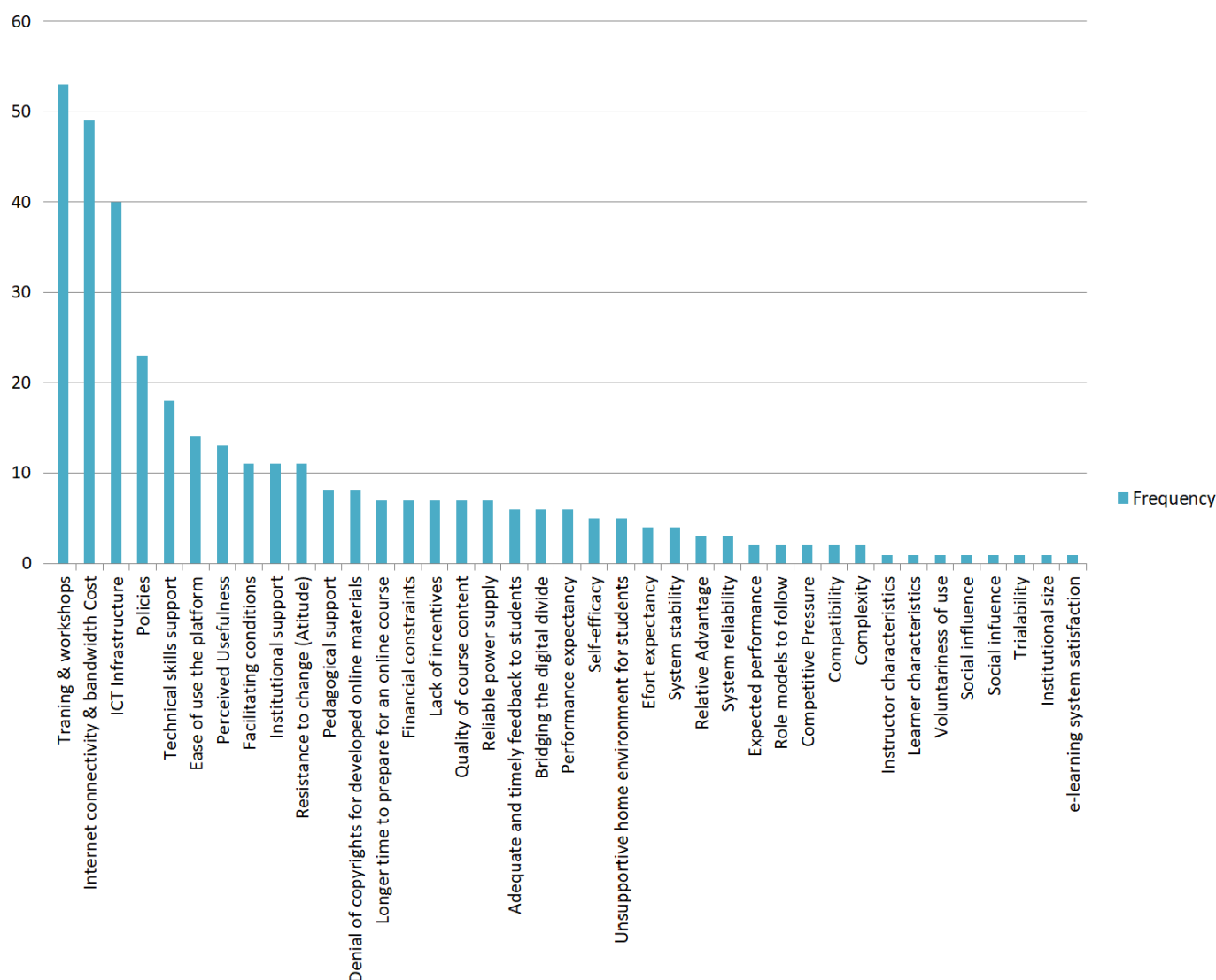


Figure 2
Critical factors influencing the use of LMS in EAC

Source: Author’s Construct

4.2 Discussion

This review synthesized 92 studies on LMS usage across the EAC and shows research output is unevenly distributed, theoretically concentrated around a small set of acceptance models, and empirically dominated by student-focused, questionnaire-based quantitative designs. Table 1 indicates that Kenya (30.4%), Uganda (21.7%), and Tanzania (20.7%) account for most studies, with scant evidence from Burundi and Congo (1.1% each). This distribution is consistent with continent-wide implementation imbalances reported elsewhere and with differential research capacity across Sub-Saharan systems (van der Merwe et al., 2023; Mare et al., 2023). The publication peak in 2020 (Table 7) plausibly reflects pandemic-driven shifts to emergency remote teaching, a pattern also noted in period syntheses (Almaiah et al., 2020), although our corpus shows that usage constraints persisted beyond that period.

Theoretically, TAM and UTAUT dominate the EAC literature. Their parsimony and proven ability to explain intention and usage via perceived usefulness/ease of use and facilitating conditions makes them natural choices and is consistent with acceptance-model reviews (Mousa et al., 2020; Gamage et al., 2022). However, 55.4% of studies here were theoretical, which diverges from Mousa et al. (2020) who report wider use of formal models, limiting construct comparability and cumulative knowledge building in this region. Smaller clusters used DeLone & McLean and TOE, foregrounding system quality, service quality, and organizational readiness dimensions that TAM/UTAUT capture only

indirectly suggesting a need to integrate micro-level acceptance with meso-level institutional enablers to better explain actual LMS use in EAC HLIs.

Methodologically, half of the studies used quantitative designs, a third used mixed methods, and fewer than one in five were qualitative. Students were the predominant participants, and questionnaires the most common instrument; descriptive statistics were used more often than inferential or mixed analyses. This profile suggests that much of the regional evidence characterizes perceptions and intentions rather than evaluating real-world usage behaviors and learning outcomes through experimental or longitudinal designs. The reliance on student samples also risks under-representing lecturer and administrator perspectives that are crucial to course design, policy enforcement, and support provisioning (Sinclair & Aho, 2018). In line with continental reviews (e.g., van der Merwe et al., 2023), the field would benefit from more robust designs (e.g., longitudinal cohorts, quasi-experiments, and implementation evaluations) that connect platform analytics with pedagogy and performance.

Across 39 determinants, ten factors recur with greatest frequency: training; internet connectivity, bandwidth cost; ICT infrastructure; institutional policies; technical skills support; perceived ease of use; perceived usefulness; facilitating conditions; institutional support; and attitude, refer to figure 3. The prominence of training, connectivity/cost, and infrastructure indicates that usage constraints in EAC are structurally mediated, not merely attitudinal, consistent with reports that adoption falters where reliability and service quality are weak (UNICEF, 2021; van der Merwe et al., 2023). At the same time, frequent reporting of TAM/UTAUT constructs (Table 2) confirms that well-designed professional development and supportive environments shape beliefs and capabilities that translate into active use (Araka et al., 2021; Gamede et al., 2021). Notably, privacy/security, foregrounded during COVID-19 (Almaiah et al., 2020), do not appear among the most frequent determinants here, suggesting a different prioritization in EAC higher education.

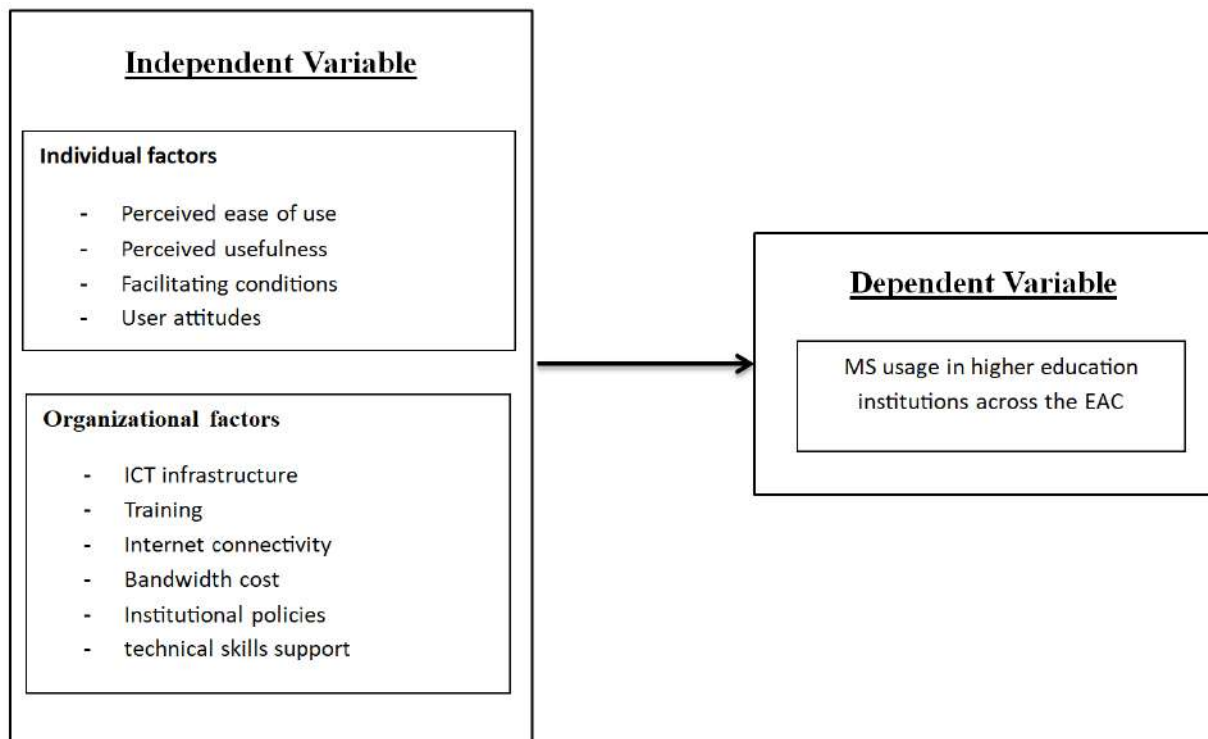


Figure 2
Ten critical factors influencing the use of LMS across EAC that recur with the greatest frequency

Source: Author’s Construct

Taken together, these findings suggest three mechanisms for improving LMS usage in EAC HLIs. First, capability building: recurring, role-specific training that goes beyond platform navigation to pedagogy-in-practice (assessment design, feedback workflows, analytics-informed adjustments) strengthens self-efficacy and perceived usefulness, consistent with instructor-focused evidence on practice change (Mtebe, 2020; Sinclair & Aho, 2018). Second, structural enablement: financing for campus networks, Wi-Fi density, and off-campus bandwidth subsidies lowers participation costs and boosts reliability, conditions repeatedly tied to sustained use during and beyond COVID-19 (Almaiah et al., 2020; UNICEF, 2021). Third, institutionalizations: clear policies (e.g., course-level minimum LMS standards), helpdesk service levels, and recognition of digital course design embed LMS use into routine academic

practice, rather than leaving it optional; this is consistent with settings that documented durable LMS uptake beyond emergency use (Gamede et al., 2021).

This review also surfaces important gaps. Nearly 55% of studies did not state a guiding model, weakening construct comparability and impeding meta-analytic synthesis (Mousa et al., 2020). Lecturer-centric barriers, such as time, incentives, and instructional design support, appear less frequently than student-side factors, even though lecturers' course-level decisions ultimately drive LMS-based learning opportunities (Sinclair & Aho, 2018). Moreover, mobile-first realities were often acknowledged but less frequently operationalized, despite strong indications that smartphone-based access is pivotal to equitable participation (UNESCO, 2023). Finally, there was limited reporting on equity dimensions (e.g., rural/urban, gender, disability), which are central to SDG 4 and to system-level improvement (UNESCO, 2021b).

These patterns have practical implications for EAC higher education systems. Institutions should prioritize structured, continuous professional development that links LMS features to pedagogy and assessment; mobile-optimized course design to reflect dominant student access modes; and formal policy levers (course minimums, syllabus checklists, and programme-level monitoring) that normalize LMS integration. Sector-level actions include pooled procurement to reduce bandwidth costs, national Ed-tech standards, and incentive frameworks that recognize digital teaching effort in promotion criteria. Importantly, support units (e-learning centers) should be resourced to provide just-in-time technical and pedagogical support, as technical scaffolding repeatedly appears as a precondition for usage. These recommendations are consistent with regional and global guidance on building resilient digital learning ecosystems (UNESCO, 2021a; UNICEF, 2021).

Strengths of this review include the application of PRISMA methods, coverage of eight EAC countries, and a decade-long window that captures both pre- and post-pandemic dynamics. Nonetheless, limitations must be acknowledged. We restricted inclusion to English-language publications and higher learning institutions, which may omit relevant francophone or non-tertiary evidence. Database selection and retrieval constraints can introduce publication bias, and 45 records could not be retrieved. The heterogeneity of measures and outcomes precluded meta-analysis; most included studies used descriptive methods and self-report instruments, limiting causal inference. Finally, the uneven country representation means that regional generalizations should be interpreted cautiously, especially for under-represented contexts such as Burundi and Congo.

Looking ahead, research should extend beyond intention and satisfaction toward actual usage and learning outcomes, leveraging LMS analytics and triangulating with classroom observations and assessment data. There is also a need for lecturer- and administrator-focused studies, equity-aware analyses (rurality, gender, disability), and design experiments that test how training, policy nudges, and connectivity improvements jointly affect usage. Multi-theoretical models that integrate acceptance, institutional readiness, and system quality can offer a more complete explanation of LMS use in EAC HLIs (e.g., TAM/UTAUT + TOE + DeLone & McLean) (Mousa et al., 2020; Gamage et al., 2022).

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

This systematic review of 92 studies across the EAC finds that LMS usage is driven by a combination of capabilities (training and skills), structures (affordable, reliable connectivity and ICT infrastructure), and institutionalization (policies, facilitating conditions, and support), alongside classic acceptance constructs (perceived usefulness, ease of use, attitude). Evidence production remains student-centered and largely descriptive, with TAM dominant. Furthermore the review shows that LMS adoption in EAC higher learning institutions is evidently but the usage is still a challenging problem.

5.2 Recommendations

To move from ad-hoc adoption to sustained, effective use, EAC higher learning institutions should (i) implement continuous, pedagogy-focused professional development; (ii) invest in mobile-first course design and robust, affordable connectivity; and (iii) formalize LMS expectations and support through policy and resourcing. Future work should employ stronger designs, incorporate lecturer and administrator perspectives, and integrate multi-level theories to link usage with learning outcomes. Together, these steps can help EAC higher learning institutions translate LMS investments into equitable, high-quality learning that advances sustainable development goal number 4 (SDG 4).

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