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Critical Success Factors for Learning Management System Implementation in South African Higher Education: An Evidence-Based Multi-Dimensional Analysis

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ABSTRACT

Learning Management Systems (LMS) have become essential infrastructure for higher education, yet their implementation in South African universities and colleges remains persistently challenging. This article presents a multi-dimensional analysis of critical success factors (CSFs) for LMS implementation, drawing on 127 peer-reviewed articles identified through a structured literature search and thematic synthesis. Eight interconnected dimensions were examined: technical infrastructure and reliability; pedagogical design and course quality; faculty capacity and development; student digital readiness; institutional governance and strategy; financial sustainability and resource allocation; stakeholder engagement and change management; and data governance, privacy and ethics. The analysis employed an integrated framework that revealed how these dimensions interact to determine implementation outcomes. Key findings confirm that success requires institutional transformation beyond technical deployment, demanding coordinated investment in human capacity, equitable infrastructure, pedagogical redesign, and policy development. The article concludes with practical recommendations (27 in total, organised under eight areas: strategic planning and governance; infrastructure and technology; faculty development and support; student support and accessibility; technical support and change management; pedagogy and quality assurance; financial sustainability; and evaluation and continuous improvement), a readiness assessment framework, a summary CSF table, and priority research gaps.

Keywords: Learning Management Systems, Critical Success Factors, Higher Education, South Africa, Digital Transformation, Technology Adoption, Faculty Development, Student Engagement, Equity, Institutional Change

INTRODUCTION AND BACKGROUND

Learning Management Systems have evolved from supplementary tools into essential platforms for teaching, learning, assessment, and institutional administration. In South Africa, the COVID-19 pandemic accelerated LMS adoption while exposing profound infrastructure and equity challenges (Yakobi, 2026; Masibigiri et al., 2026b; Mbaleki et al., 2023). Institutions now face the dual imperative of expanding LMS capabilities and addressing deep-seated inequalities in access, digital literacy, and infrastructure that characterise the national higher education landscape (Afolabi & Ajani, 2023; Lembani et al., 2020).

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The sector is markedly heterogeneous. Historically disadvantaged institutions (HDIs), rural universities, and universities of technology face distinct constraints compared to well-resourced urban research universities (Matarirano et al., 2021a; Matarirano et al., 2021b; Masibigiri et al., 2026b). This diversity demands context-sensitive strategies that acknowledge institutional capacity, student demographics, and the legacy of educational inequality.

LMS implementation success extends beyond technical deployment. Genuine success encompasses sustained adoption, pedagogical integration, user satisfaction, improved learning outcomes, and institutional transformation (Krems, 2026; Alagarsamy & Vijay, 2019). Empirical evidence from a hybrid statistics module in Gauteng likewise indicates a positive relationship between LMS use and students' academic performance (Masibigiri et al., 2026c). Drawing on information systems success models, success operates across multiple dimensions: system quality, information quality, service quality, user satisfaction, intention to use, and net benefits with equity as an additional critical dimension in the South African context (Otto et al., 2024; Simelane-Mnisi & Mthimunye, 2025; Czerniewicz et al., 2020).

This article synthesizes recent empirical evidence to identify and analyse CSFs across eight dimensions, mapping their interactions, distinguishing enablers from barriers, and providing actionable recommendations for leaders, implementation teams, and policymakers.

CONCEPTUAL FRAMEWORK

Theoretical Foundations

LMS implementation research draws on multiple theoretical traditions. The Technology Acceptance Model (TAM) and its extensions position perceived usefulness and ease of use as primary adoption determinants (Davis, 1989; Venkatesh et al., 2003; Matarirano et al., 2021a; Chipps et al., 2015; Kuppusamy et al., 2023). The DeLone and McLean IS Success Model adds system quality, information quality, service quality, use, user satisfaction, and net benefits as interdependent constructs (DeLone & McLean, 1992, 2003; Alagarsamy & Vijay, 2019; Elmunsyah et al., 2023). Innovation diffusion theory explains how LMS features and practices spread through faculty and student populations via social networks and early adopters (Rogers, 1995; Botha et al., 2018; Boland, 2020). Socio-technical systems theory frames implementation as a joint optimisation problem requiring simultaneous attention to technical and social/organisational dimensions (Ajayi et al., 2022).

No single theoretical framework captures the full complexity of LMS implementation. This analysis therefore adopts an integrative perspective that combines insights from all four traditions, enabling a holistic examination of the multi-dimensional factors that determine implementation success in the South African context.

Multi-Dimensional Framework for LMS Success

This analysis employs an integrated framework of eight interconnected dimensions, summarised in Table 1.

Table 1: Eight Dimensions of the Multi-Dimensional Framework for LMS Implementation Success

Dimension	Characteristics
Technical Infrastructure & Reliability	Connectivity, hardware, power supply, system reliability, data security, interoperability, and scalability (Maphalala & Adigun, 2020; Masibigiri et al., 2026b; Mbaleki et al., 2023).
Pedagogical Design & Course Quality	Curriculum integration, instructional design, online assessment, feedback, learning analytics, and data-driven decision-making (Krems, 2026; Alagarsamy & Vijay, 2019; Clark et al., 2020).
Faculty Capacity & Development	Instructor readiness, digital literacy, pedagogical skills, motivation, time constraints, workload management, professional development, and technical support (Matarirano et al., 2021b; Boland, 2020; Nazma et al., 2026; Modise & Zawacki-Richter, 2023).
Student Digital Readiness	Learner readiness, device and connectivity access, accessibility, interface design and user experience, and student satisfaction (Matarirano et al., 2021a; Chipps et al., 2015; Afolabi & Ajani, 2023).

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Dimension	Characteristics
Institutional Governance & Strategy	Strategic vision, top management support, policy frameworks, resource allocation, and accountability structures (Alduraywish et al., 2021; Veseli et al., 2025).
Financial Sustainability & Resource Allocation	Funding models, total cost of ownership, and resource allocation (Radwan, 2014; Masibigiri et al., 2026b).
Stakeholder Engagement & Change Management	Cultural readiness, stakeholder communication, resistance management, deliberate change management, and iterative improvement (Veseli et al., 2025; Ajayi et al., 2022; Alduraywish et al., 2021; Mirata & Bergamin, 2023).
Data Governance, Privacy & Ethics	POPIA compliance, privacy-by-design, policy compliance, and ethical data governance (Masibigiri et al., 2024).

These dimensions are interdependent as illustrated by Figure 1. For instance, inadequate infrastructure undermines training, while poor communication exacerbates resistance, and insufficient funding curtails all other dimensions. Hence, a successful implementation of LMS would require coordinated and simultaneous attention to all eight dimensions (Masibigiri et al., 2026b; Alduraywish et al., 2021; Krems, 2026).

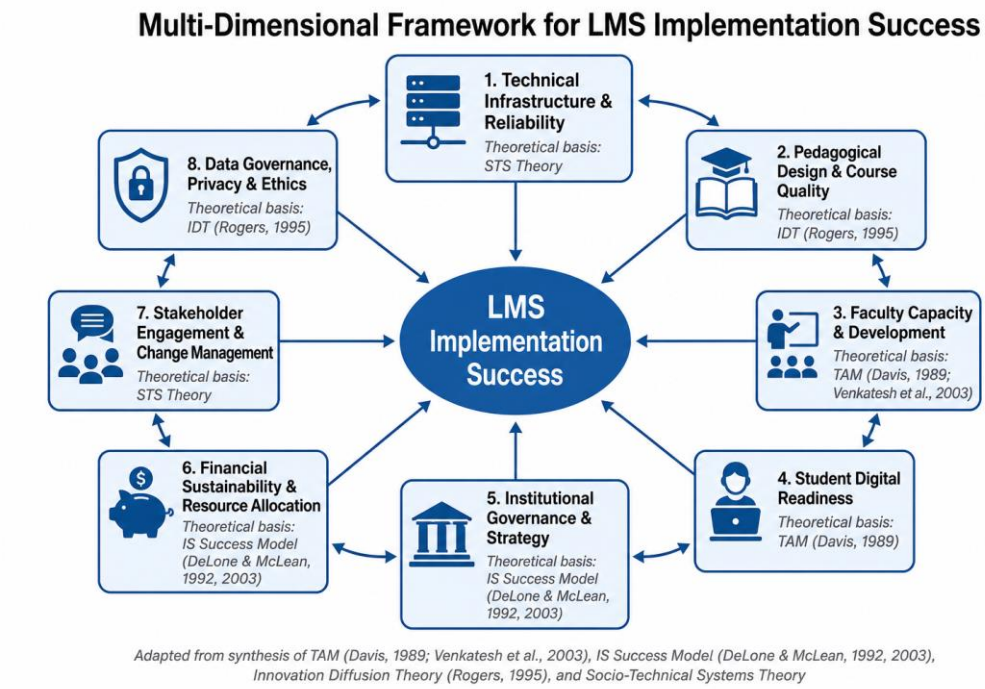

Figure 1. Multi-Dimensional Framework for LMS Implementation Success.

Related Work and Positioning

Several prior systematic and narrative reviews have examined LMS adoption and e-learning implementation in sub-Saharan African higher education, providing a foundation against which the present framework can be positioned. Bagarukayo and Kalema (2015) conducted a systematic review of e-learning implementation in sub-Saharan Africa, identifying infrastructural deficits, lack of institutional readiness, and limited faculty development as the dominant barriers. While their findings remain contextually relevant, the review predates the post-COVID-19 digital acceleration and does not address the multi-dimensional CSF architecture that characterises LMS planning in the 2015–2025 period.

Bervell and Umar (2017) examined LMS adoption at the University of Cape Coast in Ghana through the lens of the Technology Acceptance Model (TAM), providing evidence that perceived ease of use and perceived usefulness are the primary predictors of instructor adoption intention. Although the study is methodologically rigorous, its single-institution design and reliance on a single theoretical model limit the transferability of conclusions to the diversified South African higher education system, where institutional type (historically

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advantaged versus historically disadvantaged institutions), language policy, and digital infrastructure conditions vary substantially across the sector.

Alduraywish et al. (2021) conducted a structured review of critical success factors for LMS implementation across Saudi Arabian universities, identifying leadership commitment, IT infrastructure, technical support, and end-user training as the four primary CSFs. Their work is the closest antecedent to the present review in its CSF orientation; however, the Gulf Cooperation Council context differs materially from the South African higher education environment in terms of funding regimes, governance structures, and the role of LMS adoption in national digital transformation policy.

The present framework advances this body of literature in three substantive respects. First, it aggregates evidence specifically from the South African and cognate sub-Saharan African context (2015–2025), accounting for the post-apartheid transformation agenda, the dual mandate of access and quality under the South African Higher Education Act, and the infrastructural and socio-economic diversity of the sector. Second, it synthesises evidence across eight implementation dimensions, providing a more comprehensive and actionable CSF typology than the predominantly TAM-based, single-institution, or single-dimension designs prevalent in prior reviews. Third, by incorporating post-pandemic evidence and including recent empirical contributions from the South African context (Masibigiri et al., 2026a), the framework captures the most recent trajectory of LMS adoption in the region.

METHODOLOGICAL APPROACH

This article employs a structured narrative review methodology to synthesise existing evidence on critical success factors for LMS implementation in South African higher education. A structured narrative review was chosen because the heterogeneity of the available literature spanning empirical studies, contextual analyses, and practitioner evaluations across multiple methodological traditions permits rigorous thematic synthesis without requiring formal meta-analytic aggregation. A comprehensive literature search was conducted across five electronic databases: Scopus, Web of Science, EBSCOhost, Google Scholar, and ERIC. Boolean search strings combined the terms 'learning management system' OR 'LMS', 'higher education' OR 'university', 'critical success factors OR 'CSF', 'implementation' OR 'adoption', and 'South Africa' OR 'sub-Saharan Africa'. The search was restricted to peer-reviewed English-language publications issued between 2015 and 2025.

Table 2: Inclusion and Exclusion Criteria for Study Selection

Inclusion Criteria	Exclusion Criteria
Peer-reviewed journal articles	Grey literature, theses, conference proceedings
Published 2015–2026	Published before 2015
Higher education context	K–12 or vocational settings
LMS implementation or adoption focus	Studies on non-LMS educational platforms exclusively
English language	Non-English publications
Empirical or systematic review methods	Opinion pieces, editorials

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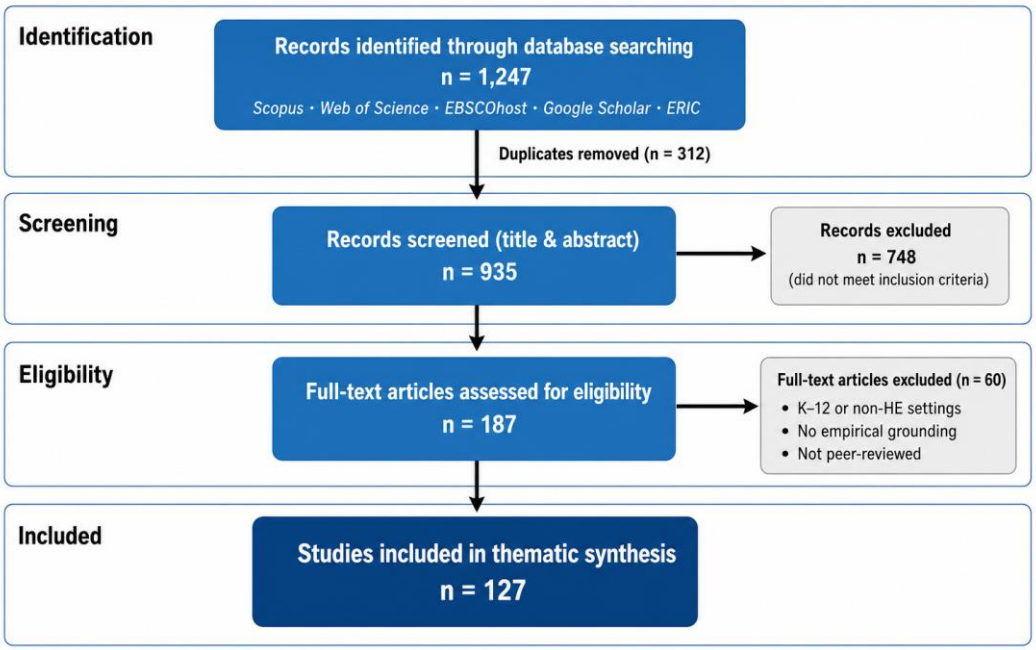

Figure 2. PRISMA 2020 Flow Diagram of Literature Search and Screening Process.

The initial database searches yielded 1,247 records. Following removal of duplicates (n = 312), the remaining 935 records were screened by title and abstract, resulting in 187 articles for full-text review. Of these, 127 articles satisfied all inclusion criteria and were retained for thematic synthesis (Figure 2). Studies were included if they: (i) addressed LMS implementation, adoption, or critical success factors; (ii) were set in higher education contexts; (iii) were published in English between 2015 and 2025; and (iv) employed empirical, qualitative, or review-based methodologies. Studies were excluded if they focused exclusively on K–12 settings, lacked empirical grounding, or were not peer-reviewed (Table 2). Limitations: Evidence specific to South African and sub-Saharan African contexts, while growing, remains limited relative to global literature (Bervell & Umar, 2017; Bagarukayo & Kalema, 2015). Most studies employ cross-sectional designs; longitudinal evidence is scarce. Publication bias may favour successful implementations. These gaps underscore the need for ongoing, context-specific South African research.

MULTI-DIMENSIONAL ANALYSIS OF CRITICAL SUCCESS FACTORS

Figure 1 forms the basis of the discussion by examining each dimension, its characteristics, and how each contributes to the success of LMS implementation in the South African context.

Technical Infrastructure & Reliability

Reliable internet connectivity is foundational yet remains a major challenge (Maphalala & Adigun, 2020; Masibigiri et al., 2026b). Bandwidth limitations constrain video streaming and real-time collaboration; load shedding severely disrupts online learning for extended periods (Mbaleki et al., 2023). Institutions require backup power, hybrid connectivity solutions, and offline-capable features. Students frequently depend on shared family devices or institutional computer labs, necessitating device-lending programmes and carefully planned BYOD policies (Matarirano et al., 2021a; Afolabi & Ajani, 2023).

LMS platforms must be reliable, scalable, and performant. System downtime and crashes undermine user confidence and disrupt pedagogy (Alduraywish et al., 2021; Ajani & Govender, 2026). Cloud-based solutions offer scalability but raise data sovereignty and vendor lock-in concerns (Radwan, 2014). Interoperability with student information systems, library platforms, and authentication services is essential; adoption of open standards (LTI, SCORM, xAPI) reduces integration friction (Akhsan et al., 2025). On cybersecurity, comprehensive measures strong authentication, encryption, security audits, and user education are mandatory, as is POPIA-compliant data governance incorporating privacy-by-design from the earliest design stage (Masibigiri et al., 2024; Alduraywish et al., 2021).

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Pedagogical Design & Course Quality

The most pervasive pedagogical failure in LMS implementation is using the platform as a content repository uploading lecture notes without exploiting interactive, collaborative, or formative features (Krems, 2026; Cant & Bothma, 2010; Alagarsamy & Vijay, 2019). Effective LMS use demands pedagogical redesign: interactive content, structured collaboration, timely feedback, diverse assessment modalities, and deliberate alignment of online activities with learning outcomes (Krems, 2026; Wenzel & Moreno, 2022). Evidence from a hybrid statistics module in Gauteng associates LMS use with higher academic performance, while underscoring the need for a carefully managed transition, institutional support, and training (Masibigiri et al., 2026c). Institutions should provide instructional design support, course design standards, and quality assurance processes to ensure consistency and effectiveness across programmes (Krems, 2026; Alagarsamy & Vijay, 2019).

Online assessment requires alignment with outcomes, clear rubrics, academic integrity measures, and timely feedback at scale (Alagarsamy & Vijay, 2019). Learning analytics the collection, analysis, and application of learner data represents a powerful but underutilised capability in South African institutions (Clark et al., 2020; Maluleke, 2024). Critical enablers include data quality, analytical capacity, integration with decision-making processes, and ethical data governance. Research capacity in this area remains limited and constitutes a priority development need (Clark et al., 2020; Maluleke, 2024).

Faculty Capacity & Development

Faculty adoption is the most direct human determinant of LMS success yet remains a persistent challenge in South African higher education (Matarirano et al., 2021b; Moonsamy & Govender, 2018). Adoption is shaped by perceived usefulness, ease of use, digital self-efficacy, and institutional support (Matarirano et al., 2021b; Bousbahi & Al-Razgan, 2015; Nazma et al., 2026). Many South African academics lack adequate digital competence particularly in the pedagogical integration of technology owing to limited pre-service training and insufficient professional development (Yakobi, 2026; Enakrire et al., 2024; Cant & Bothma, 2010).

Heavy workloads and time constraints constitute major adoption barriers (Dlalisa & Govender, 2020; Jackson, 2022; Carnicer, 2021; Boland, 2020). Developing online courses and adapting teaching practices require substantial time that competes with research and administrative duties. Incentives such as course release time, financial recognition, and promotion credit are associated with stronger faculty engagement with the LMS (Gautreau, 2011; Boland, 2020), yet South African institutions rarely provide them (Dlalisa & Govender, 2020). Resistance stems from comfort with traditional methods, skepticism about technology's value, intellectual property concerns, and anxiety about technical failures. Social capital and collegial networks are critical countervailing forces: early adopters serve as change agents whose demonstrations and mentoring accelerate diffusion across departments (Boland, 2020).

Comprehensive, ongoing faculty training is essential and must be multi-tiered, multi-modal, discipline-specific, and pedagogically rather than merely technically focused (Modise & Zawacki-Richter, 2023; Usman et al., 2025; Jarvie-Eggart et al., 2023; Swaminathan et al., 2021). Evidence from South African institutions reveal that training is frequently limited to one or two technical workshops without follow-up support necessary for developing lasting competence and confidence (Maphalala & Adigun, 2020; Matarirano et al., 2021b). Best practices include just-in-time training, peer mentoring, communities of practice, and dedicated instructional design services (Marongwe & Chisango, 2022; Sims, 2024; Boland, 2020). Student orientation at the start of each term, reinforced throughout courses, is equally important yet routinely neglected (Chipps et al., 2015; Afolabi & Ajani, 2023).

Responsive technical support multi-tiered help desks extended operating hours, self-service resources, and rapid response protocols are critical for sustaining adoption (Maphalala & Adigun, 2020; Masibigiri et al., 2026b). South African institutions often under-resource IT support, particularly at HDIs and rural universities (Matarirano et al., 2021b; Afolabi & Ajani, 2023).

Student Digital Readiness

Student readiness varies dramatically across South Africa's socioeconomic spectrum (Matarirano et al., 2021a; Rambe & Chikobvu, 2014). Students from disadvantaged communities frequently lack digital literacy, device access, and prior online learning experience (Chipps et al., 2015; Afolabi & Ajani, 2023). Computer anxiety and low self-efficacy reduce LMS adoption, while adequate orientation programs demonstrably improve engagement (Chipps et al., 2015; Afolabi & Ajani, 2023).

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The digital divide represents the most critical structural barrier to equitable implementation (Lembani et al., 2020; Afolabi & Ajani, 2023). Rural students face compounded disadvantages: limited connectivity, high data costs, unreliable electricity, and limited device access (Mbaleki et al., 2023; Afolabi & Ajani, 2023). Even on-campus computer labs are often overcrowded, under-resourced, and have operational limited hours (Maphalala & Adigun, 2020; Van der Merwe et al., 2023; Mtebe et al., 2021). Addressing this divide requires subsidised data, device-lending programmes, offline-capable LMS features, and low-bandwidth content design (Masibigiri et al., 2026b; Sigama & Kalema, 2022; Petersen, 2020). User experience (UX) further determines student satisfaction: intuitive navigation, mobile responsiveness, accessible design (WCAG compliance), and standardised course templates are essential for sustaining engagement (Al-Fraihat et al., 2025; Maslov et al., 2021; Gumiran, 2022; Nguyen et al., 2026).

Institutional Governance & Strategy

Top management support consistently emerges as a foundational CSF (Alduraywish et al., 2021; Veseli et al., 2025). Effective institutional leadership articulates strategic vision, allocates resources, develops policy frameworks, and visibly champions LMS initiatives. In South Africa, leadership must explicitly link LMS to equity and quality-enhancement goals (Yakobi, 2026; Masibigiri et al., 2026b). Yet evidence reveal that strategic planning is often inadequate: institutions frequently lack clear e-learning policies, implementation roadmaps, and cross-functional governance structures (Maphalala & Adigun, 2020; Bagarukayo & Kalema, 2015).

Effective governance requires cross-functional implementation teams and steering committees representing academic, IT, student affairs, and administrative units (Alduraywish et al., 2021; Ajayi et al., 2022). Comprehensive policy frameworks are equally necessary, addressing acceptable use, intellectual property, POPIA compliance, accessibility, and quality assurance (Masibigiri et al., 2024). The Protection of Personal Information Act mandates lawful data processing, security safeguards, transparency, and accountability requirements that LMS implementations must incorporate from the outset through privacy-by-design principles (Masibigiri et al., 2024).

Financial Sustainability & Resource Allocation

LMS implementation incurs substantial direct and indirect costs: software licensing (or open-source hosting), infrastructure, personnel, training, ongoing maintenance, and upgrades (Radwan, 2014). Institutions routinely underestimate total cost of ownership by focusing on initial licensing while neglecting recurrent operational costs, a pattern associated with service degradation within two to three years of deployment (Bervell & Umar, 2017; Bagarukayo & Kalema, 2015). Open-source platforms (e.g., Moodle) reduce licensing costs but require significant technical expertise and customisation investment (Bagarukayo & Kalema, 2015). Sustainable funding models must balance capital and recurrent costs, explore diverse revenue sources, and plan across full LMS lifecycles (Masibigiri et al., 2026b; Radwan, 2014).

Stakeholder Engagement & Change Management

LMS implementation constitutes organisational change requiring deliberate management: stakeholder analysis, transparent communication, phased rollout, resistance management, and continuous feedback (Ajayi et al., 2022; Mirata & Bergamin, 2023). Implementations that proceed as top-down mandates without consultation or an under investment in communication and change capacity, consistently experience higher resistance and lower adoption (Ajayi et al., 2022).

Organisational culture profoundly shapes implementation trajectories (Mpungose, 2020; Njenga, 2018; Boland, 2020). Cultures valuing innovation, collaboration, and evidence-based practice accelerate adoption while hierarchical, risk-averse cultures that resist change impede it (Mpungose, 2020; Bousbahi & Al-Razgan, 2015). Resistance operates at individual, departmental, and institutional levels and stems from fear of the unknown, loss of autonomy, increased workload, and distrust of institutional motives (Ajayi et al., 2022; Kim & Park, 2023; Ali et al., 2023). Addressing resistance requires understanding its roots, demonstrating benefits, providing genuine support, and creating space for dialogue rather than imposing mandates.

Effective stakeholder communication multi-channel, frequent, transparent, and tailored to diverse audiences is essential throughout implementation (Ajayi et al., 2022). Communication must extend beyond information dissemination to active engagement in decision-making: faculty, students, and staff should participate in LMS selection, pilot testing, and policy development (Ajayi et al., 2022). Post-implementation, continuous improvement

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processes evaluation cycles, usage analytics, user feedback, and action planning enable iterative refinement and demonstrate ongoing institutional commitment (Alduraywish et al., 2021; Alagarsamy & Vijay, 2019).

Data Governance, Privacy & Ethics

Policy compliance encompasses POPIA intellectual property rights, accessibility obligations, and institutional quality assurance (Masibigiri et al., 2024). Faculty concerns about intellectual property particularly ownership of digitised course materials constitute a non-trivial adoption barrier requiring clear, explicit policy resolution (Boland, 2020). POPIA compliance requires lawful processing bases, data subject rights, security safeguards, and appointed information officers while non-compliance risks legal liability and loss of institutional trust (Masibigiri et al., 2024).

INTERACTIONS AMONG DIMENSIONS

CSFs are systemically interdependent, and understanding these interdependencies is as important as addressing individual factors.

Infrastructure-Training-Adoption cycle: Inadequate infrastructure undermines training effectiveness; negative early experiences reduce self-efficacy and willingness to adopt; low adoption reduces perceived need for support investment; under-resourced support further depresses adoption, a documented vicious cycle across South African institutions (Maphalala & Adigun, 2020; Matarirano et al., 2021b). The inverse virtuous cycle is equally real: reliable infrastructure enables effective training, positive experiences build confidence, adoption increases, and growing use justifies further investment (Boland, 2020; Masibigiri et al., 2026b).

Leadership-Culture interaction: Top management commitment is necessary but insufficient for cultural change. Leaders must model desired behaviours, reward innovation, and address resistance actively, not just allocate budgets. In hierarchical cultures, top-down mandates without grassroots engagement predictably provoke resistance (Ajayi et al., 2022; Al-Hyari, 2023). Therefore, genuine cultural transformation requires sustained leadership engagement over multiple years.

Pedagogy-Technology interdependence: Pedagogical effectiveness depends on appropriate technology design, while technology adoption depends on perceived pedagogical value (Krems, 2026; Alagarsamy & Vijay, 2019). LMS platforms with poor usability constrain instructional possibilities; faculty lacking pedagogical knowledge underutilise available features regardless of platform quality.

Systemic perspective: These interactions confirm that LMS implementation is a socio-technical change process, not merely a technical project. Piecemeal interventions, infrastructure investment without training, training without support, or support without pedagogical guidance consistently fail (Masibigiri et al., 2026b; Krems, 2026; Alduraywish et al., 2021). Coordinated, simultaneous attention to all eight dimensions, with explicit management of their interdependencies, characterises successful implementations. Context matters critically: rural universities, HDIs, and universities of technology face different constraint profiles and require adapted strategies, not one-size-fits-all approaches (Yakobi, 2026; Masibigiri et al., 2026b; Afolabi & Ajani, 2023).

COMMON IMPLEMENTATION CHALLENGES AND FAILURE RISKS

Table 3 summarises the most common failure modes, their typical causes, and their consequences in the South African context.

Table 3: Common LMS Implementation Failure Modes, Causes, and Consequences

Failure Mode	Typical Causes	Consequences
Connectivity and power failures	Inadequate broadband; load shedding; rural location	Disrupted learning; user frustration; abandonment
System performance problems	Insufficient server capacity; poor optimisation	Loss of user confidence; adoption decline

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Failure Mode	Typical Causes	Consequences
Inadequate training	Single-session workshops; technical focus only	Low competence; superficial use; resistance
Faculty resistance	No incentives; high workload; poor communication	Minimal adoption; repository-only use
Student digital divide	Lack of devices; high data cost; limited literacy	Inequitable outcomes; dropout risk
Poor course design	Repository use; no pedagogical redesign	No learning gains; student disengagement
Governance failures	No policies; weak leadership; poor stakeholder engagement	Legal risk; confusion; fragmented efforts
Financial unsustainability	Cost underestimation; no recurrent budget	Service degradation; platform migration; abandonment
POPIA non-compliance	Inadequate data governance; no privacy-by-design	Legal liability; trust erosion
Accessibility neglect	No audits; no disability accommodations	Exclusion; legal exposure; equity failure

PRACTICAL RECOMMENDATIONS

Strategic Planning and Governance

Rec 1. Develop a comprehensive LMS strategy aligned with institutional mission, equity commitments, and specified success metrics (Alduraywish et al., 2021; Masibigiri et al., 2026b).
Rec 2. Establish cross-functional governance with representation from academic, IT, student affairs, and administrative units (Alduraywish et al., 2021; Ajayi et al., 2022).
Rec 3. Conduct thorough stakeholder analysis and maintain engagement from LMS selection through post-implementation evaluation (Ajayi et al., 2022).
Rec 4. Develop policy frameworks addressing acceptable use, IP, POPIA compliance, accessibility, and quality assurance (Alduraywish et al., 2021; Masibigiri et al., 2024).

Infrastructure and Technology

Rec 5. Invest in robust, scalable infrastructure: network connectivity, server capacity, backup power, and device access programmes (Maphalala & Adigun, 2020; Masibigiri et al., 2026b; Alduraywish et al., 2021).
Rec 6. Prioritise rural and under-resourced areas through hybrid connectivity solutions and offline-capable LMS features (Masibigiri et al., 2026b; Afolabi & Ajani, 2023).
Rec 7. Implement privacy-by-design cybersecurity measures and POPIA compliance from the outset (Masibigiri et al., 2024; Alduraywish et al., 2021).
Rec 8. Ensure interoperability with existing systems through open standards adoption (Akhsan et al., 2025; Alduraywish et al., 2021).

Faculty Development and Support

Rec 9. Provide multi-tiered, multi-modal, pedagogically focused faculty training with structured follow-ups (Modise & Zawacki-Richter, 2023; Usman et al., 2025).
Rec 10. Establish instructional design support services for course design, content development, and LMS integration (Sims, 2024; Krems, 2026).
Rec 11. Create communities of practice and peer mentoring to facilitate organic adoption diffusion (Boland, 2020; Usman et al., 2025).
Rec 12. Provide workload relief, financial incentives, and promotion recognition for LMS investment (Boland, 2020; Gautreau, 2011).

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Student Support and Accessibility

Rec 13. Provide comprehensive student LMS orientation at the start of each academic term (Chipps et al., 2015; Afolabi & Ajani, 2023).
Rec 14. Address the digital divide through device-lending, subsidised data, computer lab expansion, and low-bandwidth content development (Masibigiri et al., 2026b; Afolabi & Ajani, 2023).
Rec 15. Ensure WCAG accessibility compliance with accommodations for students with disabilities (Gumiran, 2022).
Rec 16. Establish responsive multi-tier student support including help desk, online tutorials, and peer support (Chipps et al., 2015; Masibigiri et al., 2026b).

Technical Support and Change Management

Rec 17. Establish multi-tiered technical support with extended hours, rapid response, and adequate staffing (Maphalala & Adigun, 2020; Masibigiri et al., 2026b).
Rec 18. Implement deliberate change management: communication planning, resistance management, pilot testing, phased rollout, and feedback loops (Ajayi et al., 2022; Mirata & Bergamin, 2023; Kim & Park, 2023).
Rec 19. Communicate transparently and frequently with all stakeholders about rationale, timelines, expectations, and support resources (Ajayi et al., 2022).

Pedagogy and Quality Assurance

Rec 20. Emphasise pedagogical outcomes over technical features, supporting faculty in designing interactive and effective online learning (Krems, 2026; Alagarsamy & Vijay, 2019).
Rec 21. Develop course design standards, templates, and quality assurance processes for consistency across programmes (Krems, 2026; Alagarsamy & Vijay, 2019).
Rec 22. Expand learning analytics capacity with ethical governance frameworks for data-driven course improvement (Clark et al., 2020; Maluleke, 2024).

Financial Sustainability

Rec 23. Conduct full total cost of ownership analyses covering licensing, infrastructure, personnel, training, and maintenance (Radwan, 2014).
Rec 24. Develop multi-year sustainable funding models across diverse revenue sources (Masibigiri et al., 2026b; Radwan, 2014).

Evaluation and Continuous Improvement

Rec 25. Establish evaluation frameworks covering system performance, user satisfaction, pedagogical effectiveness, accessibility, and institutional impact (Alduraywish et al., 2021; Alagarsamy & Vijay, 2019).
Rec 26. Collect and analyse usage data, user feedback, and learning outcomes to inform iterative improvements (Alagarsamy & Vijay, 2019; Clark et al., 2020; Masibigiri et al., 2026c).
Rec 27. Share successes and failures openly to build momentum, sustain improvement, and inform the broader sector (Boland, 2020).

LMS READINESS ASSESSMENT AND SUCCESS EVALUATION FRAMEWORK

Readiness Assessment Checklist

Institutions should assess readiness across all eight dimensions before deployment.

Dimension 1: Institutional Strategy & Governance

- Clear strategic LMS vision aligned with institutional mission
- Top management commitment and visible leadership support
- Cross-functional governance structures established
- Policy frameworks developed (acceptable use, IP, data privacy, accessibility)
- Budget allocated; stakeholder engagement plan in place

Dimension 2: Technology Infrastructure

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- Reliable internet connectivity with adequate bandwidth
- Robust server infrastructure with scalability capacity
- Backup power systems installed.
- Device access programmes operational
- Cybersecurity measures and POPIA compliance confirmed

Dimension 3: Human Capacity

- Faculty and student digital literacy assessments completed.
- Comprehensive training programmes designed for both groups.
- Instructional design support services in place
- Adequate IT and change management expertise available

Dimension 4: Support Services

- Multi-tiered help desk with extended operating hours
- Online support resources (tutorials, FAQs, videos) developed
- Peer support and escalation procedures defined

Dimension 5: Pedagogical Readiness

- Course design standards and templates developed
- Assessment strategies adapted for online environments
- Academic integrity policies and tools in place
- Learning analytics governance frameworks established

Dimension 6: Equity and Accessibility

- Digital divide assessment completed
- Strategies for connectivity and device gaps developed
- WCAG accessibility audit processes established
- Disability accommodations planned; multilingual strategies considered

Dimension 7: Policy and Compliance

- POPIA compliance measures implemented.
- IP and data governance frameworks established
- Quality assurance processes and legal review of LMS contracts completed

Dimension 8: Culture and Change Management

- Institutional culture assessment and change strategy completed
- Communication plan and resistance management strategies active
- Pilot testing, phased rollout, and evaluation processes planned

Success Evaluation Framework

Post-implementation success should be evaluated across eight metric dimensions (Table 4):

Table 4: Post-Implementation Success Evaluation Metrics

Metric Domain	Key Indicators
System Quality	Uptime >99%; response time; usability scores; mobile compatibility; accessibility compliance
Information Quality	Content currency; relevance to outcomes; clarity of instructions
Service Quality	Support responsiveness; training effectiveness; help desk satisfaction

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Metric Domain	Key Indicators
Use and Adoption	Faculty adoption rates; student engagement; feature utilisation patterns
User Satisfaction	Faculty and student satisfaction surveys; qualitative feedback
Learning Outcomes	Student performance; completion and retention rates; learning gains
Institutional Impact	Cost-effectiveness; capacity expansion; equity improvements; institutional reputation
Equity	Access by demographic; performance gaps; digital divide indicators; accessibility compliance

SUMMARY TABLE OF CRITICAL SUCCESS FACTORS

Table 5 synthesises all 24 critical success factors across the eight implementation dimensions, providing a consolidated reference for planning, implementation, and evaluation.

Table 5: Summary of Critical Success Factors for LMS Implementation

Dimension	Critical Success Factor	Rationale	Key Evidence	Implementation Indicators	Potential Risks if Neglected
Institutional Strategy & Governance	Top management support and strategic vision	Provides legitimacy, resources, and direction	Alduraywish et al. (2021); Masibigiri et al. (2026b); Veseli et al. (2025)	Strategic plan approved; budget allocated; leadership communication	Lack of resources; fragmented efforts; low institutional priority
	Comprehensive policy frameworks	Clarifies expectations, rights, and responsibilities	Alduraywish et al. (2021); Masibigiri et al. (2024)	Policies published; POPIA compliance; IP clarity	Legal risks; user confusion; conflicts
	Cross-functional governance	Ensures coordination and representation	Alduraywish et al. (2021); Ajayi et al. (2022)	Steering committee active; regular meetings	Siloed decisions; poor coordination
Technology Infrastructure	Reliable connectivity and power supply	Enables consistent LMS access	Maphalala & Adigun (2020); Masibigiri et al. (2026b); Mbaleki et al. (2023)	Uptime >99%; backup power; bandwidth adequate	Outages; user frustration; abandonment
	Robust, scalable infrastructure	Supports growing user base	Alduraywish et al. (2021); Akhsan et al. (2025)	Server capacity adequate; performance benchmarks met	System crashes; slow response; poor UX

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Dimension	Critical Success Factor	Rationale	Key Evidence	Implementation Indicators	Potential Risks if Neglected
	Cybersecurity and data privacy	Protects user data and ensures compliance	Alduraywish et al. (2021); Masibigiri et al. (2024)	Security audits passed; POPIA compliance	Data breaches; legal liability; trust loss
	Device access programmes	Ensures equitable student access	Masibigiri et al. (2026b); Afolabi & Ajani (2023)	Device-lending; BYOD policy; lab access	Digital divide; inequitable access
Faculty Adoption & Competence	Comprehensive, ongoing faculty training	Builds confidence and pedagogical competence	Modise & Zawacki-Richter (2023); Nazma et al. (2026); Usman et al. (2025)	Training participation >80%; follow-up sessions	Low adoption; superficial use; frustration
	Instructional design support	Assists with pedagogical LMS integration	Sims (2024); Krems (2026)	ID staff available; design templates provided	Poor course design; feature underutilisation
	Workload relief and incentives	Compensates faculty for time investment	Boland (2020); Gautreau (2011)	Course release; financial incentives; promotion recognition	Resistance; burnout; minimal adoption
	Collegial support networks	Facilitates peer learning and diffusion	Boland (2020)	Communities of practice; peer mentoring active	Isolation; slow diffusion
Student Engagement & Accessibility	Student orientation and LMS training	Prepares students for effective engagement	Chipps et al. (2015); Afolabi & Ajani (2023)	Orientation each term; online tutorials available	Low engagement; confusion; poor performance
	Digital divide mitigation	Ensures equitable access	Lembani et al. (2020); Masibigiri et al. (2026b); Sigama & Kalema (2022)	Subsidised data; device programmes; offline content	Inequitable outcomes; increased dropout
	Accessible and inclusive design	Accommodates diverse learners	Gumiran (2022)	Accessibility audits; WCAG compliance	Student exclusion; legal exposure
	User-centred interface design	Enhances usability and engagement	Al-Fraihat et al. (2025); Maslov et al. (2021)	Usability testing; responsive design; mobile-friendly	Poor UX; low engagement

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Dimension	Critical Success Factor	Rationale	Key Evidence	Implementation Indicators	Potential Risks if Neglected
Training & Technical Support	Multi-tiered technical support	Resolves problems quickly	Maphalala & Adigun (2020); Masibigiri et al. (2026b)	Help desk staffed; <24hr response time	Unresolved issues; frustration; abandonment
	Self-service support resources	Enables independent problem-solving	Masibigiri et al. (2026b); Marongwe & Chisango (2022)	FAQs; video tutorials; knowledge base	Help desk overload; user frustration
Pedagogy & Learning Analytics	Pedagogical design emphasis	Ensures learning effectiveness	Krems (2026); Alagarsamy & Vijay (2019)	Course design standards; pedagogical training	Superficial adoption; no learning gains
	Learning analytics capacity	Enables data-driven improvements	Clark et al. (2020); Maluleke (2024)	Analytics tools; ethical governance; staff capacity	Missed improvement opportunities
Financial Sustainability	Adequate, sustainable funding	Ensures ongoing operations	Masibigiri et al. (2026b); Radwan (2014)	Multi-year budget; diverse revenue sources	Budget shortfalls; service cuts; abandonment
	Total cost of ownership analysis	Informs realistic budgeting	Radwan (2014)	TCO analysis completed; lifecycle costs projected	Cost overruns; unexpected expenses
Culture & Change Management	Deliberate change management	Manages resistance and supports adaptation	Ajayi et al. (2022); Mirata & Bergamin (2023); Kim & Park (2023)	Change plan; communication strategy; pilot tested	High resistance; implementation failure
	Transparent stakeholder communication	Builds trust and institutional buy-in	Ajayi et al. (2022)	Regular updates; multiple channels; feedback loops	Confusion; resistance; trust erosion
	Continuous improvement processes	Enables iterative evidence-based refinement	Alduraywish et al. (2021); Alagarsamy & Vijay (2019)	Evaluation cycles; action plans implemented	Stagnation; declining use

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CONCLUSION

Synthesis of Key Findings

Successful LMS implementation in South African higher education requires coordinated, simultaneous investment across eight interconnected dimensions. The central finding of this analysis is unambiguous: technical implementation is necessary but not sufficient. Genuine institutional integration demands parallel development of human capacity, equitable infrastructure, pedagogical transformation, sound governance, sustainable funding, and cultural readiness. Institutions that treat LMS as purely technical projects neglecting human, pedagogical, and organisational dimensions consistently experience low adoption, superficial use, and failure to realise anticipated benefits (Krems, 2026; Alagarsamy & Vijay, 2019; Masibigiri et al., 2026b).

South Africa's distinctive challenges load shedding, the digital divide, HDI resource constraints, heavy faculty workloads, and POPIA obligations require context-sensitive strategies that explicitly address equity. The imperative is clear: LMS implementation must reduce, not exacerbate, educational inequalities. This demand calls for prioritising rural and under-resourced institutions, providing device and data access, designing for low-bandwidth environments, and monitoring equity metrics continuously (Yakobi, 2026; Afolabi & Ajani, 2023; Czerniewicz et al., 2020).

Practical Implications for Leaders

Seven implications follow for institutional leaders and implementation teams: (i) adopt a systemic, multi-dimensional approach rather than isolated technical fixes (Masibigiri et al., 2026b; Alduraywish et al., 2021); (ii) invest equally in human and pedagogical dimensions as in infrastructure (Krems, 2026; Modise & Zawacki-Richter, 2023); (iii) engage stakeholders actively throughout the full implementation lifecycle (Ajayi et al., 2022); (iv) treat implementation as organisational change requiring deliberate management (Ajayi et al., 2022; Mirata & Bergamin, 2023); (v) make equity an explicit, monitored institutional goal (Yakobi, 2026; Czerniewicz et al., 2020); (vi) commit to sustainable multi-year funding (Masibigiri et al., 2026b; Radwan, 2014); and (vii) establish continuous evaluation and improvement systems (Alduraywish et al., 2021; Alagarsamy & Vijay, 2019).

Research Gaps and Final Reflection

Significant evidence gaps remain. Priority future research should address: longitudinal implementation studies tracking outcomes over multiple years (Bervell & Umar, 2017); comparative institutional research across universities of technology, HDIs, and research universities (Yakobi, 2026); equity and digital divide interventions and their learning outcome impacts (Lembani et al., 2020; Petersen, 2020); learning analytics governance and pedagogy in South African contexts (Clark et al., 2020; Maluleke, 2024); cost-effectiveness and return on investment across LMS models (Radwan, 2014); faculty development models for pedagogical LMS integration (Yakobi et al., 2026; Usman et al., 2025); change management strategies specific to South African higher education cultures (Ajayi et al., 2022); rural and HDI contexts facing the most severe implementation constraints (Afolabi & Ajani, 2023; Matarirano et al., 2021a); and POPIA compliance practices and their operational implications (Masibigiri et al., 2024).

The goal of LMS implementation is not technology adoption for its own sake, but enhanced teaching, learning, and student success for all, a goal that is achievable in South Africa's diverse higher education landscape. However, must be done through the holistic, equity-centred, evidence-based approach described by in this analysis.

Methodological Limitations

This review is subject to several methodological limitations that should be considered when interpreting the findings and applying the resulting framework. First, as a structured narrative review, the synthesis is inherently interpretive rather than statistical. No formal quality appraisal instrument such as the Critical Appraisal Skills Programme (CASP) checklist, the Mixed Methods Appraisal Tool (MMAT), or the GRADE framework was applied to weigh studies by methodological rigour. Consequently, studies of varying design quality contribute equally to the thematic synthesis, which may overstate the evidential strength of conclusions drawn from weaker empirical designs.

Second, the literature search was restricted to English-language publications, which may have excluded relevant practitioner reports, policy evaluations, and institutional studies published in Afrikaans or other South

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African official languages. This restriction is compounded by the deliberate exclusion of grey literature. In developing-country higher education contexts, where peer-reviewed publication rates in educational technology remain lower than in high-income settings, grey literature represents a substantial portion of the available LMS evidence; its exclusion may therefore under-represent practitioner knowledge and institutional learning.

Third, several included studies are authored or co-authored by the lead author of this review (Masibigiri et al., 2026a, 2026b, 2026c). While these contributions meet all stated inclusion criteria and contribute substantively to the evidence base, readers should be aware of this potential self-citation bias when assessing the independence of the evidence base and the objectivity of the thematic synthesis.

Fourth, the concentration of evidence in the South African higher education context, while methodologically appropriate for the stated purpose of constructing a context-specific implementation framework, limits the direct transferability of the eight CSF dimensions to other developing-country systems. Institutions in sub-Saharan Africa, South and Southeast Asia, or Latin America may face different infrastructural, governance, and socio-cultural conditions that are not fully captured by the present framework. Future comparative cross-national studies should test the portability of the CSF typology across varied institutional and national contexts.

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