

Digital Transformation and Business Sustainability: Exploring the Role of Artificial Intelligence in Strategic Management and Organizational Performance: A Case Study of Makerere University, Uganda

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Abstract

This study examines the strategic orchestration of digital transformation and artificial intelligence (AI) to advance business sustainability and organizational performance through an in-depth qualitative case study of Makerere University, Uganda. Utilizing an exploratory qualitative case study design grounded in interpretivism and phenomenology, this inquiry investigates how university administrators, ICT directors, and quality assurance officers navigate systemic technological change. The findings demonstrate that while digital initiatives, specifically Open, Distance, and e-Learning (ODEL) platforms, significantly enhance strategic agility and administrative speed, institutional sustainability is actively threatened by a persistent digital divide, high bandwidth costs, and misaligned faculty workload structures. Furthermore, the deployment of AI in back-office administration yields powerful predictive capabilities for enrollment forecasting and resource optimization, yet its execution is currently obstructed by fragmented data quality, cultural staff resistance, and a distinct regulatory policy vacuum. The study concludes that successful digital transformation requires a shift from uncoordinated technology procurement to a holistic, socio-technical alignment of dynamic organizational capabilities. Accordingly, we recommend that higher education institutions and regulatory bodies: 1) establish formalized AI governance and ethical audit frameworks; 2) build localized digital data competencies; and 3) formally recognize digital pedagogy within academic workload allocation models.

Keywords

Digital Transformation, Artificial Intelligence, Strategic Management,

1. Introduction and Background of the Study

The historical trajectory of educational technology in higher education is characterized by a shift from static, analog instruction to highly dynamic, distributed digital paradigms. Historically, universities relied almost exclusively on face-to-face lecture delivery, physical paper registries, and traditional library facilities as the sole repositories of academic knowledge. In the late twentieth century, the introduction of personal computing and early internet frameworks initiated the first wave of digitization, converting administrative records and syllabi into electronic formats. Over time, these basic formats evolved into complex Learning Management Systems, such as Moodle and Blackboard, which initially served as passive repositories for course materials with limited scope for interactive learning.

By the early 2000s, the concept of digital learning began to mature, transcending mere digitization through the establishment of e-learning environments engineered to facilitate synchronous and asynchronous remote interactions. Specifically, this transition encompassed the provision of educational materials via mobile devices, irrespective of temporal or spatial constraints; it further integrated distance learning modalities, social media platforms, and collaborative tools, thereby enhancing pedagogical reach. In developing regions, particularly in Sub-Saharan Africa, efforts to integrate technology into the mainstream curriculum were historically hampered by traditional teaching methods and a severe lack of digital facilities. However, the advent of the Fourth Industrial Revolution introduced more advanced digital tools, such as big data analytics, cloud computing, and artificial intelligence, potentially compelling global universities to perceive technological integration not merely as a peripheral support mechanism but as a fundamental strategic asset for cultivating institutional resilience and maintaining competitive advantage.

In Uganda, the evolution of higher education has been guided by complex socio-economic, political, and regulatory dynamics. Following independence in 1962, the government accorded higher education the recognition of an essential driver of national development; this recognition consequently precipitated policy initiatives aimed at the expansion of tertiary enrollment and the enhancement of educational quality. To regulate this expanding landscape, the government enacted the Universities and Other Tertiary Institutions Act in 2001, which established the National Council for Higher Education (NCHE) as the central regulatory authority mandated to set standards, accredit programs, and monitor compliance across public and private universities (Alemiga & Kibukamusoke, 2019; Unkule, 2020). The NCHE has prioritized promoting equitable access to education by mainstreaming Open, Distance, and e-Learning frameworks, a mandate that became critically apparent during the COVID-19 pandemic when the sudden

closure of institutions forced a rapid shift toward remote learning.

At the center of Uganda's higher education system is Makerere University, established in 1922 (Nabaho et al., 2017), which has grown to become one of the most prestigious technical and research institutions in Africa (Olivier, 2025). This ambitious digital transformation initiative appears to operate within a highly complex, resource-constrained environment where the institution must navigate structural deficits: inadequate campus local area networks; high bandwidth costs; a pronounced lacuna in digital and computational proficiencies; and deep-seated cultural resistance among faculty habituated to conventional pedagogical paradigms (Van der Merwe et al., 2023; Zeleza & Okanda, 2021).

The contemporary push for digital transformation within higher education is intimately linked to the broader concept of business sustainability (Leal Filho et al., 2021). Incorporating artificial intelligence into the strategic management of universities may serve as a pivotal enabler for the furtherance of this sustainability (George & Wooden, 2023). AI-enabled systems possess the capacity for the processing of large-scale datasets, the automation of routine administrative back-office operations (encompassing document processing, scheduling, and procurement support), and the provision of predictive decision-making support concerning student enrollment, academic scheduling, and financial resource allocation (Onesi-Ozigagun et al., 2024).

Despite these operational benefits, literature regarding the macro-level strategic management of artificial intelligence within public universities of the Global South remains fragmented (Dwivedi et al., 2019). While recent regional scholarship has begun to explore digitization, such as the 2025 study by Kayanja, Kyambade, & Kiggundu (2025) on the operational efficiencies of paperless systems at Makerere University Business School (MUBS), scholarly attention remains largely localized to basic administrative and workflow-level implementations. A distinct empirical gap persists regarding how higher education institutions scale these systems into cognitive algorithmic governance while simultaneously maintaining public accountability, ethical fairness, transparency, and social inclusion (Eynon, 2023; Popenici, 2023; Bond et al., 2024). This study addresses this gap by moving beyond classroom-level pedagogical tools and basic electronic record-keeping systems, focusing instead on the macro-level dynamic capabilities required to govern advanced digital technologies responsibly within public higher education ecosystems.

While the commercial sector typically evaluates AI adoption through the lenses of efficiency, profitability, and competitive advantage, public universities are instead expected to align technological deployment with the imperatives of public accountability, ethical governance, transparency, and social inclusion (Eynon, 2023; Popenici, 2023; Bond et al., 2024). However, the current academic literature remains fragmented, with a dominant emphasis on classroom-level pedagogical AI applications such as adaptive tutoring systems and automated grading, while often neglecting macro-level strategic management practices and the organizational capabilities required for responsible governance of artificial intelligence

systems (Bond et al., 2024; Khoza & van der Walt, 2025).

To address these gaps, this study delineates and integrates several interrelated conceptual constructs. Digital Transformation is understood as the overarching process through which digital technologies drive structural and cultural change across organizations (Nadkarni & Prügl, 2020). Artificial Intelligence functions as the cognitive engine of this transformation, enabling automation of routine processes and supporting predictive decision-making (Forradellas & Gallastegui, 2021). Strategic Management provides the leadership and administrative framework through which these technologies are planned, coordinated, and governed to achieve institutional objectives (Sawhney et al., 2020). Finally, Organizational Performance and Business Sustainability represent the ultimate outcomes of effective technological integration, encompassing improved efficiency, reduced environmental impact, and strengthened long-term financial and social resilience (Kiyani, 2023). Collectively, these relationships underscore the importance of understanding how digital investments in Ugandan higher education can generate sustainable public value rather than inefficient or unsustainable resource allocation.

2. Statement of the Problem

The imperative for digital transformation within Ugandan higher education institutions has been widely recognized by regulatory bodies and university leadership alike, leading to the formulation of national e-learning policies and ambitious institutional strategic plans (Natukunda et al., 2026). Despite these structural steps, there appears to be a persistent and widening gap between strategic intent and the actual execution of these digital initiatives (Pimentel, 2024). The principal challenge appears to be that Ugandan higher education institutions, most notably Makerere University, struggle to translate digital transformation investments into sustainable organizational performance and long-term business sustainability, primarily due to an unstructured approach to integrating advanced technologies like artificial intelligence into their strategic management frameworks (Msoka et al., 2026).

Empirical evidence suggests that the mainstreaming of digital platforms may be considerably impeded by systemic resource constraints and infrastructural deficits (Eton & Chance, 2022; Tulinayo et al., 2018). A substantial digital divide persists in Uganda, characterized by uneven internet access, prohibitive data costs, and a paucity of requisite hardware among students and faculty members, which undermines the equitable delivery of online services (Kaahwa et al., 2022). At the same time, faculty members may frequently confront considerable pedagogical demands and a paucity of formal recognition or institutional incentives for the development of digital pedagogical competencies; this often may culminate in elevated rates of burnout and a pronounced cultural resistance to digital systems (Uzorka & Odebiyi, 2025; Watuleke et al., 2026). Consequently, many digital platforms, such as the Makerere University e-Learning Environment, tend to remain underutilized or operate in an ad hoc, fragmented manner, potentially failing to

enhance overall institutional efficiency (Mtebe & Raphael, 2018; Nabushawo & Aguti, 2023).

Although global research suggests the capacity of artificial intelligence integration into administrative workflows to alleviate operational bottlenecks, evidenced by the automation of routine tasks, the improvement of predictive resource allocation, and the sharpening of strategic decision-making capacities (Adepoju et al., 2025; Olutimehin et al., 2025), the extant higher education literature appears to have largely overlooked this dynamic, particularly within resource-constrained environments such as those prevalent in East Africa. Existing studies tend to exhibit a pronounced bias toward classroom-level tools, neglecting the macro-level governance, administrative structures, and “algorithmic governance” models required to manage AI systems effectively within public universities (Bond et al., 2024; Chan, 2023).

Without empirical investigation into these strategic management mechanisms, Ugandan universities could consequently engage in expensive, uncoordinated technological investments, which could fail to comply with ethical standards (Bond et al., 2024), exacerbate the digital divide (Okoye et al., 2022), and deplete finite financial resources (Bond et al., 2024; Okoye et al., 2022). This research, therefore, endeavors to address this lacuna. By analyzing the qualitative experiences of institutional leaders at Makerere University, this study aims to provide a concrete, empirically grounded socio-technical framework intended to guide universities in the reconfiguration of their internal resources and the strategic leveraging of AI for the enhancement of sustainable organizational performance.

3. Purpose of the Paper

The primary objective of this qualitative study is to elucidate the strategic role of artificial intelligence within the digital transformation paradigm, specifically its potential to enhance organizational performance, decision-making agility, and long-term business sustainability within the context of Makerere University as a representative public higher education institution.

4. Research Objectives

The study delineates three principal objectives:

- 1) To evaluate how digital transformation initiatives influence strategic decision-making and institutional agility within Ugandan higher education.
- 2) To examine the pivotal role of artificial intelligence integration in optimizing administrative workflows and macro-level strategic management practices.
- 3) To analyze the influence of technological capabilities on long-term business sustainability and organizational performance within resource-constrained educational environments.

5. Research Questions

This inquiry endeavors to address three principal research questions:

- 1) How do digital transformation initiatives shape strategic decision-making and institutional agility within Ugandan higher education?
- 2) In what ways does artificial intelligence integration optimize administrative workflows and macro-level strategic management?
- 3) How do technological capabilities influence long-term business sustainability and organizational performance in resource-constrained educational environments?

In order to address these research questions and facilitate the generation of in-depth qualitative findings during the field interviews, the primary investigator employed structured sub-questions, as delineated in the subsequent table.

6. Significance of the Study

This inquiry, it may be argued, holds significant implications for various stakeholders, primarily through its delineation of the nexus between technological innovation and sustainable institutional governance within higher education.

- **Academics:** The study contributes to scholarship in higher education management, digital transformation, and technology governance by integrating Dynamic Capabilities Theory with the Intelligent Socio-Technical Systems framework. Furthermore, this investigation facilitates an expansion of inquiry into artificial intelligence, shifting its purview from pedagogical application to institutional governance and administrative oversight.
- **Practitioners and Industry:** University administrators, ICT directors, and change management practitioners may benefit from practical insights on the effective implementation of artificial intelligence and digital systems. Specifically, the elucidation of these findings may contribute to the amelioration of staff resistance, the enhancement of workflow efficiency, the fortification of support systems, and the refinement of service delivery within institutional contexts.
- **Policymakers:** Regulatory bodies, including the National Council for Higher Education and the Ministry of Education and Sports, may potentially leverage these findings for the refinement of policies pertaining to digital transformation, accreditation, and quality assurance within higher education institutions.
- **Society:** The study promotes inclusive and equitable education by addressing challenges such as the rural-urban digital divide and unequal access to technology. In doing so, it supports the achievement of United Nations Sustainable Development Goals 4 (Quality Education) and 10 (Reduced Inequalities).

7. Scope of the Study

- **Location:** This investigation is situated at Makerere University, Kampala, Uganda, a locale chosen due to its established position as the premier and most extensive public university in Uganda, and its concurrent role as a leading in-

stitution in information and communication technology (ICT) policy and digital transformation throughout Sub-Saharan Africa.

- **Population:** The target population comprises key institutional stakeholders engaged in digital transformation initiatives, including, but not limited to, senior academic administrators, directors of information and communication technology (ICT) within the Directorate of ICT Support, quality assurance officers, and senior faculty participating in blended learning and Open, Distance, and e-Learning (ODEL) implementation.
- **Variables:** Rather than relying on rigid quantitative variables, this interpretivist inquiry maps the systemic, non-linear relationships among distinct qualitative constructs. The primary phenomena under strategic investigation encompass Digital Transformation Initiatives and Artificial Intelligence Integration. The contextual and mediating dynamics that shape these transformations are identified as Strategic Management and Institutional Trust/Readiness. Ultimate institutional outcomes are evaluated through the lenses of Organizational Performance and Long-term Business Sustainability. This conceptual framing allows the study to capture the emergent, socially constructed experiences of academic actors without imposing artificial quantitative constraints on phenomenological data.
- **Timeframe:** This investigation encompasses the period from 2019 to 2026, thereby capturing the pre-pandemic baseline, the COVID-19-driven expansion of Open, Distance, and e-Learning (ODEL), and the post-pandemic phase characterized by digital consolidation and nascent Artificial Intelligence (AI) adoption.
- **Constraints and Limitations:** This investigation is inherently delimited by its single-site case study design at Makerere University, which may limit the statistical generalizability of its findings to other institutional contexts. However, Makerere University constitutes a critical and information-rich case whose experiences illuminate broader infrastructural, governance, and technological dynamics that characterize higher education institutions across East Africa. Consequently, the study offers analytical rather than statistical generalizations, enabling the findings to contribute to theory development and contextual understanding beyond the immediate case. Therefore, the insights gained regarding structural deficits, faculty workload mismatches, and data governance gaps are contextually transferable and plausible for similar public universities in Sub-Saharan Africa, such as Kyambogo University or Gulu University, which share comparable state-funding models and regulatory oversight by the National Council for Higher Education (NCHE).

Furthermore, the study captures AI adoption during a relatively early stage of implementation within public universities, suggesting that many of the long-term organizational, pedagogical, and governance implications of these technologies remain emergent and subject to future evolution. As such, the findings should be interpreted as reflecting a developmental phase of institutional AI integration ra-

ther than a fully matured state of technological transformation. Additionally, the research relies substantially on self-reported data obtained from institutional stakeholders, which may introduce social desirability bias, selective recall, or subjective interpretation of AI-related experiences and organizational practices. Despite these limitations, the triangulation of perspectives across multiple stakeholder groups enhances the credibility and contextual richness of the findings while providing valuable insights into the opportunities and challenges associated with AI adoption in higher education settings.

8. Theoretical Framework of the Study

This investigation is theoretically predicated upon the integration of two robust conceptual frameworks: Dynamic Capabilities Theory and the Intelligent Socio-Technical Systems framework. Institutions of higher education in emerging economies do not invariably operate within stable environments; rather, they frequently confront highly turbulent contexts characterized by rapid technological disruption, fluctuating regulatory standards, and pronounced resource limitations (Hashim et al., 2022; Waller et al., 2019). Consequently, traditional resource-based perspectives, which typically emphasize static asset ownership, appear insufficient to elucidate the mechanisms by which universities can successfully navigate the complexities of digital transformation (Peñate et al., 2023; Abel et al., 2025).

Dynamic Capabilities Theory, originally formulated by (Teece et al., 1997), conceptualizes an organization's ability to "integrate, build, and reconfigure internal and external competences to address rapidly changing environments". Consequently, the delineation of organizational capabilities within this framework often converges upon three core clusters:

1) Sensing: The capability to identify and assess technological opportunities, environmental threats, and shifting stakeholder needs (Dubey et al., 2020). Within the scope of this inquiry, sensing may manifest as a university's capacity for the detection of digital trends, the identification of access disparities among students, and the recognition of prospective applications of emerging artificial intelligence (AI) technologies.

2) Seizing: The capability to mobilize resources, establish governance frameworks, and design innovative business models to capture sensed opportunities (Dubey et al., 2020). Within the academic milieu, seizing frequently entails the formulation of digital roadmaps, the establishment of public-private partnerships, and the judicious investment in learning management system (LMS) and artificial intelligence (AI) infrastructure.

3) Reconfiguring: The capability to continuously align, renew, and transform organizational structures, personnel competencies, and business practices (Dubey et al., 2020). In the sphere of higher education, reconfiguring often necessitates the updating of academic workloads, the reformation of curricula, the restructuring of administrative workflows, and the mitigation of cultural resistance to

change.

While Dynamic Capabilities Theory delineates the strategic mechanism of resource orchestration (Zahra et al, 2022), the Intelligent Socio-Technical Systems framework, which extends traditional Socio-Technical Systems Theory (Xu & Gao, 2024), underscores human-centered joint optimization across individual, organizational, ecosystem, and societal levels, which offers a holistic lens to analyze complex interactions and achieve long-term sustainability.

The formalization of the integration of dynamic capabilities and artificial intelligence within institutional operations necessitates the postulation of the subsequent conceptual relationship:

$$OP = f(DC(Sn, Sz, Rc), iSTS(T, P, I), \epsilon)$$

Herein, the constituent elements are delineated:

- OP represents Organizational Performance and long-term Business Sustainability (Maletič et al., 2014).
- DC (Sn, Sz, Rc) represents Dynamic Capabilities, composed of three principal processes (Pitelis et al., 2023):
 - Sensing (Sn)—the identification of opportunities and threats (Pitelis et al., 2023);
 - Seizing (Sz)—the mobilization of resources for value capture (Pitelis et al., 2023); and
 - Reconfiguring (Rc)—the transformation of assets and operations for sustained competitiveness (Pitelis et al., 2023).
- iSTS represents Intelligent Socio-Technical Systems, characterized by an emphasis on human-centered joint optimization across individual, organizational, ecosystem, and societal levels (Xu & Gao, 2024).
- ϵ represents environmental disturbances, including resource constraints, digital divides, and external regulatory or market shocks (Hadida et al., 2014).

This integrated framework deliberately appears to avoid the pitfalls of technological determinism; specifically, it posits that the inherent value of artificial intelligence may not be automatically realized solely through the acquisition of AI software. Rather, the ascertainment of its strategic benefits arguably emerges contingent upon the cognitive assessment of its potential by academic leaders, the institutional development of sufficient readiness, and the active application of dynamic capabilities by leaders for operational reconfiguration, thereby potentially enhancing both administrative efficiency and social equity.

9. Literature Review

Variable 1: Digital Transformation and Institutional Agility

Digital transformation in higher education institutions involves leveraging new technologies a transformation of practices, business models, and processes (Alezzi, 2021). Globally, digital transformation is driven by the imperative of navigating volatile and ambiguous socio-economic environments, thereby necessitating the adoption of agile strategies by academic leadership for the maintenance of

institutional relevance (Xin et al., 2025). The referenced investigation into Polish HEIs examines technological maturity and the capacity for virtualized service provision during a pandemic, which, while affirming the notion of robust infrastructure and adaptation, notably refrains from explicit mention of tailored learning pathways (Kucharska & Rostek, 2021). These systems rely on advanced Learning Management Systems (LMS) integrated with video conferencing and real-time collaboration tools (Camilleri, 2021), which enhance institutional agility by enabling rapid, data-informed responses to changing academic and student enrollment demands.

Nonetheless, scholarly discourse elucidates the persistence of a digital divide and formidable structural constraints, which impede the digital transformation of higher education across the African continent (Genga & Babalola, 2025; Mateko et al., 2025). In Sub-Saharan Africa, efforts to integrate Information and Communication Technologies (ICTs) into curricula are frequently impeded by the sustained prevalence of traditional, face-to-face pedagogical approaches, alongside pronounced limitations in technological access (Ofosu-Asare, 2024; Samarakoon et al., 2017). Statistical analyses tend to demonstrate that learners in Sub-Saharan Africa often exhibit significantly lower rates of household computer ownership and home internet access when juxtaposed with global averages (Cariolle, 2020; Chinn & Fairlie, 2006). Consequently, the adoption of remote digital learning models by institutions may precipitate significant challenges, particularly pertaining to issues of equity and student exclusion (Belluigi et al., 2022; Laufer et al., 2021). Furthermore, research on faculty experiences indicates that top-down digital initiatives frequently contribute to heightened workloads and increased burn-out rates among teaching staff, a phenomenon potentially attributable to a conspicuous deficit of institutional support, the inadequacy of training provisions, and a discernible disregard for academic agency (Azam & Zipf, 2024; Doğan & Arslan, 2025). Consequently, investigations consistently underscore the criticality of specific determinants for enduring digital sustainability: namely, robust peer mentorship, substantive interdisciplinary collaboration, and explicit workload recognition; these elements are, however, frequently overlooked (Nirmala et al., 2025; Moore et al., 2021).

Despite extensive research on remote learning during crises, the extant literature appears to lack a comprehensive, qualitative understanding of how universities in resource-constrained settings can cultivate dynamic capabilities to sustain digital transformation beyond emergencies. Most existing studies appear to adopt a narrow, technology-centric perspective which may fail to capture the complex, relational aspects of digital pedagogy and administrative restructuring. Consequently, a critical necessity emerges for the exploration of how institutional agility may be sustained through ground-up innovation, policy adaptations, and a balanced alignment of human and technical resources.

Variable 2: Artificial Intelligence in Strategic Management

The integration of artificial intelligence into strategic management may deline-

ate a transition from predominantly manual, spreadsheet-based administration to highly data-driven “algorithmic governance”. Within contemporary higher education, AI is defined as an organizational capability that reconfigures strategic planning, resource allocation, and administrative decision-making (Nara et al., 2026). Prior research elucidates three primary areas of AI deployment within university governance: predictive analytics for student enrollment and retention, automated back-office process management, and intelligent decision-support systems (Rathod, 2025).

Globally, universities increasingly leverage AI systems, which can analyze vast arrays of student data, including GPA, attendance records, and socio-economic backgrounds, to construct predictive models that can identify students at risk of dropout, thereby enabling timely and targeted administrative interventions (Bates et al., 2020; Bond et al., 2024). In administrative processes, AI-driven automation streamlines standardized administrative processes, such as student registration, document handling, scheduling, procurement, and management reporting, such as student registration, document handling, scheduling, procurement, and management reporting (Zawacki-Richter et al., 2019; Popenici & Kerr, 2017; Selwyn, 2019). Studies suggest that these automated systems may significantly reduce variable administrative costs and the mitigation of staff workloads, consequently permitting university leadership a more strategic allocation of institutional resources toward core academic missions (Suazo-Galdamés & Chaple-Gil, 2025). Such a transition, consequently, may foster the emergence of a “smart university” model, a framework posited to dynamically calibrate its curricula and resource deployment in alignment with the rapidly evolving demands of the labor market.

However, the literature underscores the existence of distinct challenges confronted by public sector organizations, encompassing public universities, when juxtaposed with the private sector (Nazarko & Šaparauskas, 2014). While private firms tend to prioritize the attainment of efficiency and competitive advantage, public institutions are often compelled to navigate stringent demands concerning public accountability, data privacy, and ethical considerations (Bracci, 2023). A significant concern is the potential for algorithmic bias, wherein automated models may perpetuate historical gender, socio-economic, or regional inequalities within processes pertaining to admissions and assessments. Furthermore, empirical studies often suggest a profound “governance void” in higher education, as many institutions lack clearly delineated policies, formalized risk assessment procedures, and adequately trained leadership demonstrating the requisite capacity for the responsible governance of AI integration (Zawacki-Richter et al., 2019). While many studies primarily direct their focus toward micro-level pedagogical tools, macro-level strategic AI management and its concomitant impact on institutional performance are concurrently subjects of exploration (Bates et al., 2020; Bond et al., 2024).

Variable 3: Business Sustainability and Organizational Performance

Business sustainability in higher education refers to an institution’s capacity to fulfill its academic, research, and civic missions; concurrently ensuring long-term

financial viability, environmental responsibility, and social equity (Corcoran & Wals, 2004; Williams, 2024). The integration of digital capabilities, driven by technological advancement, is demonstrably a pivotal determinant of this sustainability, consequently giving rise to the concepts of “digitainability” and “digital sustainability” (Nthutang et al., 2024). These paradigms often suggest that digital tools, when judiciously integrated with sustainable business strategies, may facilitate the mitigation of resource depletion, the optimization of energy consumption, and the augmentation of administrative accountability (Hasan et al., 2026).

Evidence suggests that the transition toward automated, paperless administrative systems may facilitate a direct reduction in paper waste, toner costs, and physical storage needs; this transition thereby promotes environmental sustainability while simultaneously enhancing administrative speed and processing accuracy (Trindade & Marques, 2024). Furthermore, integrating sustainability principles into academic curricula and fostering green campus practices appears essential for the preparation of future managers and specialists the navigation of global socio-environmental challenges (Leal Filho et al., 2021). The literature suggests that universities possessing robust dynamic capabilities may be better positioned to coordinate resources and execute green digital innovations that deliver both economic and environmental returns (Almutairi & Talib, 2025).

However, the relationship between digital capabilities and sustainable organizational performance is not necessarily automatic; it is highly mediated by internal structures, digital orientation, and institutional readiness (Ajani & Govender, 2026). In resource-constrained environments, universities frequently encounter difficulties in maintaining digital platforms, which may stem from inconsistent funding models, a lack of industry demand, and considerable faculty’s cultural resistance, which often manifests as a perception of digital transformation as an externally imposed administrative burden (Pimentel, 2024). Existing research predominantly employs quantitative, cross-sectional designs, which often prove insufficient for the comprehensive capture of the nuanced, qualitative experiences of academic actors as they navigate these socio-technical tensions. Consequently, a notable lacuna remains within qualitative, process-oriented investigations, which could delineate the microfoundations instrumental to digital sustainability within public universities situated in emerging economies, such as those in East Africa (Guandalini, 2022; Omar & Abdullahi, 2024).

10. Methodology

This study employed an exploratory qualitative case study design to investigate the relationships among digital transformation, artificial intelligence adoption, strategic management, organizational performance, and business sustainability within the bounded institutional context of Makerere University. Grounded in an interpretivist paradigm, the study adopted a phenomenological orientation to capture the lived experiences of academic and administrative stakeholders involved in technological and organizational change. The study was guided by Dy-

dynamic Capabilities Theory and the Intelligent Socio-Technical Systems framework, which informed both data collection and analysis. Thematic analysis was employed to identify recurring patterns across participant accounts, using a hybrid inductive-deductive coding strategy. Deductive codes were derived from the theoretical frameworks, while inductive coding enabled the emergence of context-specific themes. Final themes were iteratively linked to the theoretical frameworks to explain how digital transformation and AI adoption shape institutional agility, organizational performance, and sustainability within a public higher education context.

10.1. Participant Selection and Recruitment

The target population comprised key institutional stakeholders directly involved in digital transformation, technology governance, quality assurance, and academic delivery at Makerere University. Participants were selected through purposive criterion sampling to ensure inclusion of individuals possessing substantial experience and direct involvement in institutional digital transformation initiatives.

Academic administrators, ICT support directors, and quality assurance managers were required to possess a minimum of three years of experience in institutional leadership, governance, quality assurance, or digital transformation activities. Senior faculty members were required to demonstrate active involvement in blended learning, Open, Distance and e-Learning (ODEL) implementation, digital course development, or technology-enhanced teaching practices.

Recruitment was conducted through formal institutional authorization followed by targeted email invitations to eligible participants. Eighteen participants were ultimately recruited because they occupied strategic positions within the university's digital transformation ecosystem and possessed the specialized knowledge required to address the study objectives.

The final sample consisted of five academic administrators, four ICT support directors, three quality assurance managers, and six senior faculty members. Importantly, the six senior faculty members participated exclusively in a single focus group discussion and were not included among the individual interview respondents. This ensured a distinct allocation of participants across data collection methods and maintained the integrity of the overall sample size ($N = 18$).

10.2. Data Collection Procedures

Data collection was conducted between October 2025 and February 2026, using four complementary sources of evidence: semi-structured interviews, a focus group discussion, direct observations, and documentary review.

Twelve semi-structured interviews were conducted face-to-face in participants' offices and lasted between 45 and 60 minutes. The interviews explored participants' experiences with digital transformation initiatives, AI adoption, strategic management practices, institutional challenges, organizational performance out-

comes, and sustainability considerations.

One focus group discussion involving six senior faculty members was conducted in a private boardroom at Makerere University and lasted approximately 90 minutes. The discussion focused on faculty experiences related to blended learning implementation, digital pedagogy, workload implications, peer support mechanisms, and technology-enabled teaching practices.

To complement self-reported data, naturalistic direct observation was undertaken during site visits to the Directorate of ICT Support (DICTS), the Makerere Artificial Intelligence Laboratory, and selected smart classroom environments. Observations were documented using structured field notes and conducted across four separate sessions.

Observation sessions focused on digital infrastructure environments, including ICT server facilities, AI laboratory operations, smart classroom technologies, platform interoperability processes, and user interactions with institutional digital systems. Observation notes were used primarily to corroborate interview findings and strengthen triangulation.

The primary investigator observed system downtime records, data integration structures, platform interoperability challenges, operational workflows, and active user-system interactions during peak operational periods. These observations served as an additional source of evidence and were used to verify participant accounts concerning infrastructure limitations, digital system bottlenecks, and institutional operational challenges.

Documentary evidence included Makerere University strategic plans, digital transformation roadmaps, ICT policy documents, quality assurance reports, Open, Distance and e-Learning (ODEL) implementation guidelines, internal digital governance reports, and institutional audit documentation relating to digital transformation initiatives.

All interviews and the focus group discussion were audio-recorded with participant consent. Recordings were transcribed verbatim using AI-assisted transcription software and subsequently reviewed manually against the original recordings to ensure accuracy and completeness.

The final qualitative dataset comprised twelve (12) individual semi-structured interviews, one (1) focus group discussion involving six faculty participants, four (4) structured observation sessions, and three (3) institutional policy and audit documents. The utilization of multiple evidence sources enhanced methodological triangulation and strengthened the credibility, dependability, and confirmability of the findings.

10.3. Data Saturation

Data saturation was assessed continuously throughout the fieldwork process using a thematic saturation log. Preliminary coding occurred concurrently with data collection to monitor the emergence of new concepts and thematic categories. By the twelfth individual interview, no substantively new codes were emerging from

the dataset. The subsequent focus group discussion served as a confirmatory source and did not generate additional conceptual categories or modify the emerging thematic structure. Saturation was therefore determined through both code redundancy and conceptual completeness, at which point participant recruitment ceased.

10.4. Ethical Considerations

Prior to data collection, ethical clearance was obtained from the relevant university research review structures. Participants received detailed information regarding the purpose of the study, voluntary participation, confidentiality procedures, and their right to withdraw at any stage without penalty. Written informed consent was obtained from all participants before interviews, focus group discussions, and observation activities commenced. To preserve confidentiality, participant identities were anonymized using coding references throughout the analysis and reporting process.

10.5. Participant Profile and Coding Framework

The qualitative respondents and coding framework are presented in **Table 1**.

Table 1. Qualitative respondents and coding framework.

Participant Category	Primary Institutional Unit	Sample Size (N)	Primary Instrument
Academic Administrators	College Deans and Department Heads	5	Semi-Structured Interviews
ICT Support Directors	Directorate of ICT Support (DICTS)	4	Semi-Structured Interviews and Observation
Quality Assurance Managers	Quality Assurance and Compliance Directorate	3	Semi-Structured Interviews and Document Review
Senior Faculty Members	ODEL and Blended Learning Specialists	6	Focus Group Discussion
Total	Makerere University	18	Triangulated Qualitative Methods

The inclusion of multiple stakeholder groups enabled institutional representation across administrative, technical, regulatory, and academic domains. Academic administrators provided insights into strategic leadership and institutional planning; ICT support directors contributed perspectives regarding technological infrastructure and digital systems; quality assurance managers offered insights into governance, compliance, and accreditation processes; while senior faculty members provided experiential accounts of digital pedagogy, faculty adaptation, and workload implications. This diversity of perspectives enhanced analytical depth, reduced individual bias, and strengthened methodological triangulation.

10.6. Qualitative Coding Indicators for Core Constructs

To improve analytical transparency and facilitate traceability between data and findings, the study operationalized its principal constructs using predefined qualitative coding indicators. These indicators informed the deductive phase of coding while allowing additional themes to emerge inductively from participant narratives.

Core Construct	Qualitative Coding Indicators
Institutional Agility	Cross-departmental data accessibility, rapid transcript processing, senate meeting digitization, administrative responsiveness, adaptive decision-making, and technological responsiveness during peak enrolment or crisis periods.
Organizational Performance	Reductions in administrative errors, reporting accuracy, automation efficiency, faster processing times, service delivery improvements, workflow optimization, and mitigation of operational bottlenecks.
Business Sustainability	Long-term cost savings, paper and toner reduction, resource optimization, environmental sustainability initiatives, campus greening efforts, digital inclusion, social equity, mitigation of the rural-urban digital divide, and accessible digital pedagogy.

10.7. Data Analysis

Thematic analysis was employed to analyse interview transcripts, focus group discussions, observation notes, and documentary evidence. A hybrid coding strategy combining deductive and inductive approaches was adopted. Initial deductive codes were derived from Dynamic Capabilities Theory and the Intelligent Socio-Technical Systems framework, while inductive coding allowed context-specific insights to emerge directly from the data.

The analytical process involved data familiarization, open coding, category development, theme generation, constant comparison, and iterative refinement of thematic structures. During interpretation, emergent themes were systematically mapped to the Dynamic Capabilities dimensions of sensing, seizing, and reconfiguring, as well as to the technological, organizational, and human dimensions of the iSTS framework. Themes relating to environmental scanning, digital opportunities, and strategic foresight informed sensing capabilities; themes concerning technology investments, policy responses, and resource mobilization informed seizing capabilities; while themes associated with organizational restructuring, faculty adaptation, and resistance to change informed reconfiguring capabilities.

The integration of interviews, focus groups, observations, and documentary evidence enabled methodological triangulation, thereby enhancing the credibility, dependability, confirmability, and transferability of the study findings.

11. Findings per Variable

Objective 1: Digital Transformation and Institutional Agility

The qualitative evidence gathered from Makerere University administrators largely suggests that digital transformation initiatives may contribute to improved strategic agility, communication speed, and academic coordination. The transition to paperless administrative registries and the integration of the Makerere University e-Learning Environment have facilitated departmental access to student data and the rapid processing of transcripts, potentially enhancing institutional responsiveness. However, this perceived agility appears to be highly uneven, given that the institution continues to confront severe structural challenges, including unreliable network connections and a persistent digital divide, all of which may disrupt daily academic operations.

An academic administrator from the College of Education and External Studies explained:

“Mainstreaming MUELE across our undergraduate and postgraduate programs has certainly opened up new pathways for us to monitor academic progress and coordinate our semesters. We no longer have to wait weeks for paper transcripts or department registries to sync. But this agility is immediately lost when our systems crash during peak registration periods, or when our students in rural districts are cut off due to poor network connectivity. It’s a fast system that runs on a very fragile track.”

Focus group discussions with senior faculty members indicated that, despite the expansion of enrollment capacities afforded by digital transformation, a substantial instructional burden was concomitantly generated. A senior faculty member remarked:

“The university wants us to adopt blended learning and co-design online courses, but there is a complete mismatch between strategic ambition and the physical workload. Designing interactive digital packages requires significant time, yet this effort is completely invisible in our official workload allocations. We are essentially running a double shift, teaching face-to-face and managing online forums, without any recognition or compensation. It is causing severe burnout across the departments.”

This finding suggests that while digital transformation functions as a potent catalyst for institutional agility, its strategic value may be substantially compromised by a socio-technical mismatch within the university’s human resources and operational frameworks. In terms of Dynamic Capabilities Theory (Teece et al., 1997), Makerere University appears to have successfully demonstrated robust “sensing” capabilities by the identification of the necessity for digital Online Distance and E-Learning (ODEL) platforms, alongside the formulation of its 2025-2030 roadmaps. However, the institution’s “reconfiguring” routines remain incomplete, as it concomitantly appears not to have fully aligned its internal reward structures and workload policies with the emergent digital reality. Without formally integrating digital pedagogy into academic workloads, digital transformation may remain unsustainable, becoming reliant on individual faculty resilience rather than robust institutional structures.

Objective 2: Artificial Intelligence and Administrative Workflow Optimization

The second theme examines the integration of artificial intelligence into strategic management and administrative back-office operations. The findings indicate that while these early-stage AI tools demonstrate considerable promise for forecasting and process automation, their successful integration appears to be impeded by cultural resistance, a deficiency in AI literacy, and the absence of explicit governance frameworks.

An Information and Communication Technology (ICT) support director delineated the current AI deployment initiatives:

“However, the challenge is data quality and system integration. Our current databases are siloed across different colleges, and many administrative officers lack the basic AI literacy to understand or trust automated reports. They prefer manual spreadsheets because they fear losing control to an algorithm.”

A quality assurance compliance manager underscored the regulatory and ethical governance challenges:

“At the National Council for Higher Education (NCHE) and the university level, we are operating in a policy vacuum regarding artificial intelligence. We have guidelines for distance education, but no guidelines on algorithmic bias, data protection, or automated decision support. If an AI system flags a student as high-risk, how do we guarantee that the algorithm is not biased against students from underprivileged schools? We must establish strict governance frameworks and audit trails before we scale these technologies. Efficiency must not override equity.”

The transition toward algorithmic governance in higher education is mediated by institutional trust, data quality, and regulatory readiness (Britchenko & Lysiak, 2025; Quevedo et al., 2026). Although AI systems possess the technical capability to optimize workflows and provide predictive support, they cannot generate institutional value unless they achieve socio-technical fit (Erdmann & Toro-Dupouy, 2025; Silalahi et al., 2026). The introduction of sophisticated AI technology disrupts established human (administrative staff) and institutional (policies and culture) subsystems (Yadav, 2025; Picciano, 2019). The widespread cultural resistance observed appears to stem from a lack of transparency and low AI literacy, which fosters a fear of algorithmic displacement and bias (Britchenko & Lysiak, 2025; Quevedo et al., 2026; Yadav, 2025). To facilitate the establishment of trust and the realization of AI’s potential, institutions may consider complementing technological investments with clear governance frameworks, staff training, and robust ethical oversight mechanisms (Bhaskar et al., 2025; Kaşarcı et al., 2025; Mabirizi et al., 2025).

Objective 3: Technological Capabilities, Business Sustainability, and Performance

The third theme explores the relationship between technological capabilities, organizational performance, and long-term business sustainability. A significant

tension is consistently observed between international ranking ambitions (such as the QS and Times Higher Education World University Rankings) and local equity mandates in a resource-constrained environment (Darwin & Barahona, 2023). While higher education institutions increasingly pursue technologically advanced campuses and smart classroom ecosystems, faculty and students often experience persistent barriers to basic digital access, thereby threatening the social sustainability of these innovations (Laufer et al., 2021).

A senior faculty participant (SFM1) emphasized this contradiction:

“The university recently launched a high-tech smart classroom with international partners, which is wonderful for public relations. However, when you step out of that smart room, you find lecture halls where the projectors do not work, and students who cannot afford a basic internet bundle to access MUELE. If our digital transformation only benefits a few privileged students while leaving the rest behind, it is not sustainable. It is a surface-level change that does not address our core educational mission.”

Conversely, an academic administrator highlighted the positive financial and environmental sustainability outcomes associated with digitized systems:

“We cannot ignore the massive cost savings and environmental benefits of going digital. Transitioning our senate meetings, exam processing, and administrative registries to paperless systems has saved us millions in shillings in paper, toner, and physical storage. It has also reduced our carbon footprint on campus. These savings can be directly reinvested into upgrading our broadband capacity and subsidizing data bundles for our students. This is how digital transformation feeds back into our long-term financial survival.”

This empirical pattern may suggest that business sustainability in higher education is inherently multidimensional, requiring a carefully managed equilibrium among financial efficiency, environmental stewardship, and social equity (Almutaiti & Talib, 2025; Imbriscg & Toma, 2020).

However, if digital transformation neglects the persistent digital divide, it risks producing a stratified learning environment that undermines inclusive development objectives (Matsieli & Mutula, 2024; Soomro et al., 2020).

The implication is that while technological capability development enhances operational efficiency and global competitiveness, its contribution to organizational performance is contingent upon inclusive implementation strategies. Digital transformation initiatives such as paperless administrative systems demonstrate strong “reconfiguring” capabilities that improve efficiency and reduce environmental impact (Al Jaber et al., 2022; Mubalama et al., 2025). Frugal innovation strategies that redirect savings from administrative digitization toward broadband expansion, digital literacy programs, and data subsidies emerge as a critical mechanism for aligning technological capability development with inclusive institutional performance outcomes (Korua et al., 2025; Sharma et al., 2025).

Overall, the implication is that technological capability development enhances organizational performance only when embedded within inclusive implementa-

tion architectures. Without such alignment, digital transformation risks reinforcing structural inequalities rather than resolving them.

12. Discussion of Findings

Objective 1: Digital Transformation and Institutional Agility

The findings for the first research objective demonstrate that while digital transformation initiatives act as key drivers of institutional agility and decision-making speed, their execution in Ugandan higher education is hampered by deep-seated socio-technical misalignments. This empirical reality aligns with (Warner & Wäger, 2019) and (Vial, 2019), who argue that digital transformation is not a simple linear process of technology adoption but a continuous, systemic reconfiguration of organizational capabilities and routines. At Makerere University, the “sensing” of digital opportunities has been highly successful, as evidenced by the integration of the ODeL Strategic Plan and the five-year digital pedagogy roadmap (2025-2030). However, when it comes to “seizing” and “reconfiguring”, the institution encounters severe operational friction. This friction is clearly illustrated by the experiences of faculty members who are tasked with co-designing blended courses. As found by (Watuleke et al., 2026), while faculty members possess high intrinsic motivation to engage with digital tools, a lack of institutional recognition, heavy workloads, and a failure to integrate digital pedagogy into formal academic workloads severely undermine their commitment.

Furthermore, the transition to paperless, automated systems at Makerere University Business School and Makerere University has introduced a new level of administrative responsiveness, allowing for faster processing of student registries and senate coordination. Yet, as highlighted by (Isabirye & Isabirye, 2020), this agility remains extremely fragile in the face of the national digital divide. When network infrastructures fail or when students in remote districts are excluded due to prohibitive data costs, the university’s operational agility is compromised. Agility is not merely about technological speed; it is about the sustained capacity of the entire socio-technical system to adapt to external shocks and coordinate resources equitably (Choi et al., 2019; Hayes, 2022).

Objective 2: Artificial Intelligence and Administrative Workflow Optimization

The findings from the second objective show that integrating artificial intelligence into strategic management and back-office governance can optimize administrative workflows, but this transition is highly mediated by low AI literacy, cultural resistance, and a major policy void. This matches the findings of (George & Wooden, 2023) and (Zawacki-Richter et al., 2019), who note that while AI holds significant potential to automate routine tasks, predict enrollment trends, and support strategic planning, its adoption within public universities faces unique legitimacy and accountability hurdles. Unlike the private sector, where AI is primarily evaluated through the lenses of efficiency and profitability, higher education institutions must operate under strong compliance constraints, prioritizing

public accountability, ethical fairness, transparency, and data privacy (Attanayake & Goonaratne, 2025). The empirical evidence from the Makerere AI Lab and the Infectious Diseases Institute shows that while local, AI-driven diagnostic and predictive systems can improve administrative planning and forecasting, their integration is slow. As discussed by Ghaffar (2025) and Wu et al. (2024), the transition toward “algorithmic governance” requires not only high-quality, interoperable databases but also a profound shift in the administrative culture.

The reluctance of administrative staff to trust predictive analytics models stems from a lack of transparency and a fear of algorithmic displacement, reflecting a classic socio-technical misalignment. Institutional readiness and digital culture are critical success factors that determine whether AI investments translate into sustainable administrative performance (Msoka et al., 2026). Furthermore, the compliance concerns raised by quality assurance managers regarding algorithmic bias and the lack of regulatory frameworks are highly consistent with existing literature (Enholm et al., 2021; Kordzadeh & Ghasemaghaei, 2021). In the absence of clear guidelines from the National Council for Higher Education or institutional AI governance frameworks, deploying predictive tools for student monitoring runs the risk of reproducing historical inequalities. As (Cao et al., 2025) observe, for AI to generate real public value, universities must cultivate a “strategic foresight” capability that integrates technological development with ethical governance, robust risk assessment procedures, and documented decision-making rights. Technology alone cannot optimize governance; it requires a highly literate, ethical leadership that can manage the complex mediation between humans, data, and machines.

Objective 3: Technological Capabilities, Business Sustainability, and Performance

The discussion regarding the third research objective highlights that business sustainability and organizational performance are multidimensional concepts that require a strategic balance between financial efficiency, environmental stewardship, and social equity. This empirical finding aligns with the paradigms of “digital sustainability” proposed by (Lichtenthaler, 2021) and “digital sustainability” discussed by (Guandalini, 2022), which assert that digital technologies should be used to support long-term sustainability goals rather than serving as static, resource-intensive investments. At Makerere University, the transition to paperless administrative and evaluation systems has generated notable cost savings and reduced environmental waste, demonstrating a highly effective reconfiguration of resources. However, the qualitative data also reveals a profound tension between global prestige-seeking and local equity mandates. While senior leadership strives to align the university with the global ranking standards of the QS and Times Higher Education indices through the launch of high-tech “smart classrooms” with international partners, the underlying digital divide at the local level threatens the social sustainability of these innovations.

This finding is highly consistent with global literature by global literature,

which argues that many African higher education institutions are falling behind because their digital initiatives do not adequately address the shared barriers faced by underprivileged, marginalized, and rural student groups (Laufer et al., 2021; Mpungose, 2020). If postgraduate research and digital transformation do not directly connect to broader societal needs and local realities, they remain superficial and unsustainable (Mussanadah & Saputra, 2025). This perspective is supported by literature, which emphasizes that digital sustainability requires a human-centered AI approach grounded in socio-technical thinking (Mhlanga, 2022). For a university to achieve institutional sustainability, it must leverage its digital dynamic capabilities to construct inclusive systems. The cost savings realized from paperless administration should be strategically reinvested in expanding regional internet connectivity, developing accessible ODeL materials, and providing digital literacy training for faculty and students alike. Only through this holistic alignment can technological capabilities translate into long-term organizational performance and equitable public value.

13. Conclusions and Recommendations

13.1. Conclusions

This study suggests that digital transformation and artificial intelligence integration are not merely technological transitions but highly complex, socio-technical reconfigurations of institutional capabilities, cultures, and governance structures. While the adoption of digital platforms and early-stage predictive AI tools appears to have improved administrative speed, workflow transparency, and environmental efficiency, these operational gains are heavily constrained by persistent digital divides, infrastructural gaps, and a major policy void. The core structural challenge lies in the socio-technical misalignment: universities are expediting the acquisition of sophisticated digital systems and algorithmic tools without updating their internal workload policies, change management strategies, or ethical governance frameworks.

Ultimately, achieving business sustainability and superior organizational performance within Ugandan higher education requires shifting from ad-hoc, prestigious technological installations to a coordinated, inclusive approach to resource orchestration. This involves recognizing that technological capabilities can only generate sustainable public value when they are aligned with academic agency, supported by comprehensive data protection mechanisms, and structured to promote equitable access for all student groups. In the absence of a proactive, ethical strategic management framework, expensive digital investments risk turning into unsustainable administrative burdens that worsen regional inequalities and exhaust limited institutional resources.

Although the findings are derived from a single-case study of Makerere University, analytical transferability is plausible to comparable public universities operating under similar regulatory, funding, and infrastructural conditions. Institutions such as Kyambogo University, Gulu University, and other public universities

within Sub-Saharan Africa that face comparable digital transformation challenges may find the identified socio-technical dynamics particularly relevant.

13.2. Strategic Recommendations

To strengthen a sustainable, resilient, and inclusive digital ecosystem in Ugandan higher education, several strategic interventions are recommended.

- First, universities should revise human resource policies to formally recognize digital pedagogy and blended course development within workload allocation and promotion systems. Institutions should also establish peer mentorship programs to support faculty capacity building and reduce burnout.
- Second, higher education institutions should develop internal AI governance frameworks, including AI ethics committees, to ensure accountability, data integrity, transparency, and fairness in the use of predictive analytics and automated systems.
- Third, the National Council for Higher Education should establish a National Quality Assurance Framework for intelligent digital education to guide institutions on AI governance, data protection, algorithmic transparency, and equitable student support. This should be supported through national AI literacy and risk management training initiatives.
- Finally, the Government of Uganda should invest in digital infrastructure, particularly in underserved regions, through expanded internet connectivity, reliable electricity, and subsidized broadband access for students. Universities should further utilize savings from paperless systems to support device loan programs, affordable data access, and smart learning centers.

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The author declares no conflicts of interest regarding the publication of this paper.

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