

## AI-Enabled Enterprise Applications and Workforce Transformation in a Resource-Constrained University: The Case of Nalut University, Libya

Ibrahim Ali Kh. Shati<sup>1\*</sup>, Amhmed Ali Amhmed Abudiena<sup>2</sup>

<sup>1</sup> College of Information Technology, Nalut University, Nalut, Libya.

<sup>2</sup> College of Engineering, Nalut University, Jado, Libya,

\*Corresponding author: Ibrahim Shati | [i.shati@nu.edu.ly](mailto:i.shati@nu.edu.ly)

Received: 30-08-2026 | Accepted: 29-09-2026 | Available online: 12-10-2026 | [DOI:10.5281/zenodo.23389816](https://doi.org/10.5281/zenodo.23389816)

### ABSTRACT

This paper presents a documentary and comparative case analysis of the implications of AI-enabled enterprise applications for Nalut University, a small, geographically dispersed public university in the Nafusa Mountains region of western Libya. Drawing on Gartner's Predicts 2026: AI's Impact on Enterprise Applications and a rigorous analysis of five official Arabic institutional documents of Nalut University (the Second Strategic Plan 2025–2030, the Executive Plan 2025–2026, the 2020 Leadership Selection Guide, the 2019 Administrative Procedures Manual, and the current organisational structure chart), and the systematic assessment of nine formal cooperation agreements signed by the university between 2019 and 2023, the study investigates how intelligent applications, agentic AI, and composable architectures may extend institutional capacity while transforming the roles of academic, administrative, technical, and support staff. Deep comparative case studies are drawn from universities across the Arab world (University of Benghazi and Sebha University in Libya; Houari Boumediene University of Science and Technology in Algeria; selected Tunisian and Moroccan initiatives), the Gulf (leading universities in the United Arab Emirates and Saudi Arabia), Sub-Saharan Africa (University of Calabar in Nigeria; Bindura University of Science Education in Zimbabwe; selected South African institutions), Asia (Singapore's higher-education AI ecosystem), and broader global practice. Both successful implementations and analytically examined failure cases are included so that Nalut University can adopt proven practices and systematically avoid documented pitfalls. The historical partnership analysis reveals a consistent pattern of general, largely non-binding academic memoranda of understanding focused on staff exchange, joint research and traditional scholarly activities, with almost no provisions addressing digital transformation, artificial intelligence or enterprise-system modernization. Findings indicate that Nalut University possesses explicit strategic intent under Strategic Goal 7 but operates from a largely paper-based administrative baseline characterised by multi-step hierarchical procedures, limited inter-campus connectivity, shortages of specialised academic expertise, and dependence on state budgets. A five-layer AI Transformation Framework tailored to resource-constrained, multi-campus universities is proposed, together with three future scenarios (Limited Adoption, Augmented University, and Fully Enabled Digital University). Based on the documentary evidence and comparative cases examined, augmentation of existing staff roles rather than large-scale replacement appears to be the most plausible near- to medium-term trajectory under disciplined implementation, provided that data foundations, continuous staff capability-building, ethical governance, outcome-based implementation, and a deliberate redesign of future partnership instruments are prioritised. Detailed practical recommendations, limitations, and a forward research agenda are presented. The study contributes to the still underdeveloped literature on AI in small universities of the Global South and offers transferable lessons for similar institutions across the Arab region and beyond.

**Keywords:** Artificial intelligence; enterprise applications; workforce transformation; digital transformation; resource-constrained universities; failure analysis.

## تطبيقات المؤسسات المدعومة بالذكاء الاصطناعي وتحول القوى العاملة في جامعة ذات موارد محدودة: دراسة حالة جامعة نالوت، ليبيا

إبراهيم علي خليفة شتي<sup>1\*</sup>، إمامد علي إمامد أبودينة<sup>2</sup>

<sup>1</sup> كلية تقنية المعلومات، جامعة نالوت، نالوت، ليبيا.

<sup>2</sup> كلية الهندسة، جامعة نالوت، جادو، ليبيا.

\*المؤلف المراسل: إبراهيم شتي | [i.shati@nu.edu.ly](mailto:i.shati@nu.edu.ly)

استقبلت: 2026-08-30 | قبلت: 2026-09-29 | متوفرة على الانترنت: 2026-10-12 | DOI:10.5281/zenodo.23389816

### ملخص البحث

تقدّم هذه الورقة البحثية تحليلاً وثائقياً ومقارناً لحالات دراسية بشأن انعكاسات تطبيقات المؤسسات المدعومة بالذكاء الاصطناعي على جامعة نالوت، وهي جامعة حكومية صغيرة ومتباعدة جغرافياً تقع في منطقة جبل نفوسة بغرب ليبيا. واستناداً إلى تقرير Gartner's Predicts 2026: AI's Impact on Enterprise Applications، وإلى تحليل دقيق لخمس وثائق مؤسسية رسمية باللغة العربية صادرة عن جامعة نالوت (الخطة الاستراتيجية الثانية 2025-2030، الخطة التنفيذية 2025-2026، دليل اختيار القيادات لعام 2020، دليل الإجراءات الإدارية لعام 2019، والهيكل التنظيمي الحالي)، إضافةً إلى تقييم منهجي لتسع اتفاقيات تعاون رسمية وقعتها الجامعة خلال الفترة الممتدة بين عامي 2019 و2023، تبحث الدراسة في الكيفية التي يمكن بها للتطبيقات الذكية، والذكاء الاصطناعي العامل (Agentic AI)، والبنى المعمارية القابلة للتركيب (Composable Architectures) أن توسّع القدرة المؤسسية، مع إحداث تحول في أدوار الكوادر الأكاديمية والإدارية والفنية وكوادر الدعم. وتستند الدراسة إلى دراسات حالة مقارنة معمّقة مستقاة من جامعات في أنحاء العالم العربي (جامعة بنغازي وجامعة سبها في ليبيا، وجامعة هوارى بومدين للعلوم والتكنولوجيا في الجزائر، وعدد من المبادرات التونسية والمغربية المختارة)، ومنطقة الخليج (جامعات رائدة في دولة الإمارات العربية المتحدة والمملكة العربية السعودية)، وأفريقيا جنوب الصحراء (جامعة كالابار في نيجيريا، وجامعة بيندورا لتعليم العلوم في زيمبابوي، وعدد من المؤسسات الجنوب أفريقية المختارة)، وآسيا (منظومة الذكاء الاصطناعي في التعليم العالي بسنغافورة)، فضلاً عن التجارب العالمية الأوسع نطاقاً. وقد تم تضمين حالات نجاح فعلية، إلى جانب حالات إخفاق تم تحليلها تحليلاً نقدياً، بما يتيح لجامعة نالوت الاستفادة من التجارب المثبتة نجاحها، وتجنّب الأخطاء الموثقة بشكل منهجي. ويكشف التحليل التاريخي لاتفاقيات الشراكة عن نمط ثابت من مذكرات التفاهم الأكاديمية العامة وغير الملزمة إلى حد كبير، والتي تركز على تبادل الكوادر البشرية، والبحث المشترك، والأنشطة الأكاديمية التقليدية، مع شبه غياب تام لأي بنود تتعلق بالتحول الرقمي أو الذكاء الاصطناعي أو تحديث الأنظمة المؤسسية. وتشير النتائج إلى أن جامعة نالوت تمتلك توجّهاً استراتيجياً صريحاً في إطار الهدف الاستراتيجي السابع، غير أنها تعمل انطلاقاً من واقع إداري ورقي إلى حد كبير، يتسم بإجراءات هرمية متعددة الخطوات، ومحدودية الربط بين مقرات متعددة ومتناثرة للحرم الجامعية المتعددة (أماكن الإدارات والكليات التي تتبع الجامعة)، ونقص في الكفاءات الأكاديمية المتخصصة، واعتماد كبير على الموازنات الحكومية. وتقترح الدراسة إطاراً للتحول بالذكاء الاصطناعي مكوناً من خمس طبقات، مصمماً خصيصاً للجامعات متعددة أماكن الإدارات والكليات وذات الموارد المحدودة، إلى جانب ثلاثة سيناريوهات مستقبلية (التبني المحدود، والجامعة المعززة، والجامعة الرقمية المكتملة التمكين). واستناداً إلى الأدلة الوثائقية والحالات المقارنة التي تم فحصها، يبدو أن تعزيز أدوار الكوادر الحالية (Augmentation)، لا استبدالها على نطاق واسع، هو المسار الأرجح على المدى القريب والمتوسط في ظل تنفيذ منضبط، شريطة إعطاء الأولوية لبناء القواعد البيانية المتينة والموثوقة،

والتطوير المستمر لقدرات الكوادر البشرية، والحوكمة الأخلاقية، والتنفيذ القائم على النتائج، إلى جانب إعادة تصميم متعمدة لأدوات الشراكة المستقبلية. وتُعرض في الورقة توصيات عملية تفصيلية، وحدود للدراسة، وأجندة بحثية مستقبلية. بما قد يسهم في إثراء الأدبيات التي لا تزال محدودة حول الذكاء الاصطناعي في الجامعات الصغيرة بدول الجنوب العالمي، وتقدم دروساً قابلة للتعميم على مؤسسات مماثلة في المنطقة العربية وخارجها.

**الكلمات المفتاحية:** الذكاء الاصطناعي؛ تطبيقات المؤسسات؛ تحوّل القوى العاملة؛ التحوّل الرقمي؛ الجامعات ذات الموارد المحدودة؛ تحليل حالات الإخفاق.

## 1. Introduction

The rapid maturation of artificial intelligence is reshaping enterprise applications across every sector, including higher education. Gartner's Predicts 2026 report forecasts that intelligent applications embedding connected data, autonomous orchestration, embedded insights, fluid knowledge, adaptive experiences, and composable architectures will fundamentally alter how organisations select, deploy, and govern software [1]. Key strategic planning assumptions to 2030 include limited replacement of commercial-off-the-shelf functionality by custom AI agents (no more than 30 percent), modest value realisation rates (approximately 35 percent of organisations leveraging agentic AI), the critical importance of AI-ready data quality, the rise of worker-created tools to manage noise from fluid knowledge, and the shift toward outcome-based application selection [1]. Workforce implications are framed primarily as augmentation rather than wholesale replacement: automation of high-volume, low-judgement tasks; enhancement of professional decision-making; role transformation; and the emergence of new roles in AI governance, data stewardship, and human-AI team supervision. In this paper, AI-enabled enterprise applications refer to institutional software systems (including ERP, student information systems, human-resource and financial platforms, workflow automation tools, and intelligent service interfaces) that embed artificial intelligence capabilities such as process automation, predictive analytics, natural-language interaction, and agentic orchestration. This focus is distinct from the general use of generative AI tools (for example ChatGPT) by individual staff or students for teaching or research support, although the two domains interact.

Yet the dominant discourse on AI in higher education remains heavily skewed toward large, well-resourced research universities in high-income countries. Small public universities operating in geographically isolated, resource-constrained settings of the Global South confront a markedly different reality. They typically face chronic shortages of specialised academic expertise, fragmented or unreliable digital infrastructure, multi-campus dispersion across difficult terrain, largely paper-based administrative processes, limited inter-campus connectivity, and tight fiscal dependence on central government budgets.

These structural constraints shape both the opportunities and the risks associated with AI adoption in ways that generic global narratives rarely capture. Nalut University in western Libya constitutes a particularly illuminating case. Serving approximately 2,300 students with 283 full-time faculty and 425 administrative staff distributed across faculties located in Nalut, Jadu, Kabaw, and Ghadames, the institution operates under classical hierarchical governance while explicitly prioritising digital transformation and artificial intelligence in its Second Strategic

Plan 2025–2030, where Strategic Goal 7 is devoted to these themes [2]. The companion Executive Plan 2025–2026 translates this ambition into concrete activities covering ERP-style systems, digital repositories, chatbots, AI training programmes, and the proposed establishment of AI-related centres [3]. At the same time, the university's internal administrative manuals from 2019 and leadership selection criteria from 2020 document a still largely paper-based, multi-step hierarchical operating model [18,19]. Between 2019 and 2023 the university also signed nine formal cooperation agreements with international and national partners; these instruments provide an important historical window onto Nalut's partnership practices and their current readiness to support digital and AI transformation [31–39].

This paper therefore addresses the fundamental research question: What will AI-enabled enterprise applications mean for the future of Nalut University, what will they mean for its academic and administrative staff, and how should Nalut University prepare for this transformation? To answer this question rigorously, the study integrates four strands of evidence: (a) Gartner's 2026 technological forecasts; (b) a complete translation and thematic analysis of five official Arabic institutional documents of Nalut University; (c) comparative case studies drawn from universities across the Arab world, the Gulf, Sub-Saharan Africa, Asia, and broader global practice, encompassing both successful implementations and analytically examined failure cases; and (d) a systematic assessment of nine formal cooperation agreements signed by the university between 2019 and 2023. The resulting analysis yields a context-sensitive AI Transformation Framework, three plausible future scenarios, and a set of practical recommendations tailored to Nalut's specific conditions and informed by both international experience and the university's own partnership history.

This study makes four main contributions. First, it provides one of the few detailed analyses of AI-enabled enterprise applications in a small, multi-campus, resource-constrained public university in the Arab region, grounded in the institution's own strategic, administrative and partnership documents. Second, it systematically assesses nine formal cooperation agreements signed by Nalut University between 2019 and 2023 and shows that these instruments currently offer almost no scaffolding for digital or AI transformation. Third, it proposes a five-layer AI Transformation Framework specifically designed for geographically dispersed universities operating under severe resource and connectivity constraints. Fourth, it develops three plausible future scenarios (2026–2035) and translates the analysis into concrete, sequenced recommendations for institutional leaders.

## 2. Materials and Methods

An exploratory qualitative single-case design was adopted, supplemented by structured multi-case comparative analysis and documentary analysis of institutional partnerships. The primary case is Nalut University. Primary data sources consist of the full text of Gartner's Predicts 2026: AI's Impact on Enterprise Applications [1]; five official Arabic institutional documents of Nalut University: the Second Strategic Plan 2025–2030 [2], the Executive Plan 2025–2026 [3], the Guide for the Selection and Assignment of Administrative and Academic Leaders (2020) [18], the Administrative Procedures Manual (2019) [19], and the current organisational structure chart [20]; and nine formal Memoranda of Understanding or cooperation agreements signed by Nalut University between 2019 and 2023 [31–39]. All Arabic documents were professionally translated into English and subjected to iterative close reading and thematic coding.

Coding categories were derived deductively from Gartner constructs (intelligent applications, agentic AI, AI-ready data, workforce transformation, governance, outcome-based selection) and inductively from the institutional texts (strategic goals, SWOT elements, procedural descriptions, staffing data, organisational structure, digital initiatives) and from the partnership agreements (scope of cooperation, binding character, presence or absence of digital/AI provisions, implementation mechanisms, and monitoring arrangements). Comparative cases were selected according to explicit criteria: public or semi-public status, documented resource or infrastructural constraints or rapid digital ambition, and availability of credible secondary evidence. The selected cases comprise Sebha University and the University of Benghazi (Libya), Houari Boumediene University of Science and Technology – USTHB (Algeria), selected Tunisian and Moroccan initiatives, leading universities in the United Arab Emirates and Saudi Arabia, selected South African institutions, Singapore’s higher-education AI ecosystem, the University of Calabar (Nigeria), Bindura University of Science Education (Zimbabwe), and documented global under-performance cases. Secondary sources include peer-reviewed articles, institutional and national strategy reports, UNESCO analyses, and official announcements [8–17,21–30].

No primary interviews or live system audits were conducted; the study therefore represents an institutional-document-based and secondary-comparative analysis. Trustworthiness was enhanced through triangulation across multiple institutional documents and partnership instruments, transparent translation protocols, explicit linkage of every major claim to source evidence, and systematic comparison with peer institutions facing similar structural conditions. Limitations arising from the absence of primary interview data and from the incomplete text of some partnership agreements are acknowledged in the final section.

### **3. Results**

#### **3.1 Institutional Profile of Nalut University**

Nalut University operates under a classical hierarchical structure. At the apex stands the University Council, followed by the President, the Vice-President for Academic Affairs, and the Vice-President for Administrative and Financial Affairs. Specialised centres include the Research and Consultancy Centre, the Innovation and Entrepreneurship Centre, the Information and Documentation Centre, the Languages Centre, and the Training Centre. Nine faculties are distributed across four geographic locations; Nalut, Jadu, Kabaw, and Ghadames; reflecting the university’s regional service mission in the Nafusa Mountains [20]. Quantitative indicators synthesised from the Strategic Plan indicate approximately 2,299 students, 283 full-time faculty (the majority holding Master’s degrees), and 425 administrative staff [2]. The 2025–2030 Strategic Plan articulates nine strategic goals. Goal 7 is explicitly devoted to digital transformation and artificial intelligence. It encompasses the establishment of AI-related departments or centres, the updating of curricula to incorporate AI competencies, the expansion of electronic administration, the adoption of integrated enterprise systems (including ERP-style platforms), the creation of digital repositories and open-access portals, the deployment of chatbots for student and staff services, and the strengthening of international cooperation in digital and AI domains [2].

The companion Executive Plan 2025–2026 translates these ambitions into time-bound activities, responsible units, and implementation matrices covering the period from late 2025

through 2026 [3]. The SWOT analysis embedded in the Strategic Plan identifies, among other factors, shortages of specialised academic staff, inadequate laboratory and building infrastructure, the absence of a reliable inter-faculty internet network, weak research support mechanisms, and relatively rigid administrative procedures as internal weaknesses. External threats include dependence on state budgets, geographic isolation, and competition for scarce talent [2]. These structural features define the opportunity space within which AI-enabled enterprise applications must be assessed.

### 3.2 Administrative and Leadership Baseline

The 2019 Administrative Procedures Manual provides granular evidence of the university's pre-digital operating model. Processes for incoming and outgoing mail rely on physical serial numbering, coded file systems assigned to each administrative unit, and paper archiving. Attendance control depends on physical signature registers that are opened at the start of the working day and closed with a red pen after a fixed interval; late arrivals and absences trigger formal written warnings and, in repeated cases, salary deductions. Leave requests (annual, sick, marriage, Hajj, iddah, unpaid), recruitment, promotion, internal and external transfer, secondment, resignation, retirement, and disciplinary procedures all follow multi-step paper-based routing through successive hierarchical levels [19]. This documentation constitutes strong evidence of the baseline administrative environment that any AI-enabled enterprise application, especially ERP and workflow-automation systems, would need to replace or overlay. The 2020 Leadership Selection Guide formalises criteria for academic and administrative leadership posts. Academic leaders must be permanent faculty members with documented teaching experience, thesis supervision, research output, conference participation, and quality-committee service. Leadership competencies include influence, innovativeness, crisis management, communication, teamwork, time management under pressure, problem-solving, independent decision-making, strategic planning, and change management. Practical administrative experience, training in management and leadership, knowledge of university regulations, computer and internet literacy, integrity, and community contribution are also required [18]. The explicit inclusion of computer and internet literacy among selection criteria indicates early institutional recognition of digital competence as a leadership requirement.

### 3.3 Systematic Assessment of Nalut University's Nine Partnership Agreements (2019–2023)

Nine formal cooperation instruments signed by Nalut University were systematically examined (Table 1). They comprise partnerships with Ainul Hayat International University (Somalia, 2021), the International Union of Universities (2019), Guru Nanak Dev Engineering College (India), International Astrolabe University (Turkey, 2021), University of Ghardaïa (Algeria), the Libyan Center for Future Studies (2023), University of Gabès (Tunisia), Jadara University (Jordan), and the Nalut Health Services Administration [31–39].

Common strengths include presidential-level signature giving institutional weight; coverage of core academic activities (joint research, staff and student mobility, postgraduate supervision, publishing and, in some cases, curriculum development); presence of both international and domestic partners; and, in the more detailed instruments (India, Tunisia, Jordan), relatively clearer operational language.

Common and consequential weaknesses are structural. The great majority of agreements are

general, non-binding and lack numerical targets, timelines, funding commitments or monitoring mechanisms. Almost none contain any provision relating to digital transformation, e-learning platforms, artificial intelligence, enterprise systems, data governance or staff digital upskilling. Financial responsibility is frequently left undefined or placed on the sending institution. Several instruments therefore risk remaining symbolic if not activated by annual action plans and dedicated resources. The partnership portfolio demonstrates Nalut's willingness to engage internationally and nationally, yet simultaneously reveals a clear structural mismatch with the digital and AI ambitions articulated in Strategic Goal 7 of the 2025–2030 Strategic Plan.

**Table 1:** Nine Cooperation Agreements Signed by Nalut University (2019–2023)

| # | Partner                              | Country/Type     | Year | Key Character & Principal Limitation                                  |
|---|--------------------------------------|------------------|------|-----------------------------------------------------------------------|
| 1 | Ainul Hayat Int. University          | Somalia          | 2021 | Staff exchange & knowledge sharing; general, no digital clauses       |
| 2 | International Union of Universities  | Turkey (network) | 2019 | Historical/civilisational research focus; open-ended, non-operational |
| 3 | Guru Nanak Dev Eng. College          | India            | —    | Joint research + student exchange; explicitly non-binding             |
| 4 | International Astrolabe University   | Turkey           | 2021 | Academic, scientific & business-technical; general                    |
| 5 | University of Ghardaïa               | Algeria          | —    | Scientific cooperation + mobility; Maghreb partner                    |
| 6 | Libyan Center for Future Studies     | Libya (national) | 2023 | Academic & applied cooperation; domestic partner                      |
| 7 | University of Gabès                  | Tunisia          | —    | Postgraduate focus + labour-market curriculum alignment               |
| 8 | Jadara University                    | Jordan           | —    | Broad mobility + joint-venture framework; non-binding                 |
| 9 | Nalut Health Services Administration | Libya (local)    | —    | Training, field practice, public-health research; non-binding         |

### 3.4 Comparative Cases from Libya and the Maghreb

Sebha University, located in the remote southern desert region of Libya, shares with Nalut the challenges of geographic isolation, multi-campus dispersion, and constrained infrastructure. In recent years Sebha has launched a digital transformation programme that includes specialised AI-related training for engineers of its Information Development Centre and progressive implementation of an electronic personnel-affairs system [15,16]. These steps illustrate both the feasibility of incremental digital progress under difficult conditions and the continued centrality of human-capacity development.

The University of Benghazi, one of Libya's largest institutions, has been the site of several empirical studies on AI awareness and use. Research conducted in 2024–2025 found that while

many students are familiar with generative AI tools such as ChatGPT, consistent educational use remains limited. Participants recognised both benefits (engagement, assessment efficiency, potential grade improvement of approximately 15 percent in AI-supported courses) and risks. Critically, 90 percent of respondents identified internet instability as a primary barrier, and 60 percent reported insufficient AI-related training for faculty and students [12,13]. These findings underscore that technological availability alone does not guarantee effective adoption; infrastructure reliability and structured capacity-building are decisive.

Beyond Libya, Algerian higher education provides additional insight. Houari Boumediene University of Science and Technology (USTHB) has pursued digital skills enhancement for faculty through dedicated teaching-support units and has participated in regional discussions on responsible AI. Algerian policy discourse emphasises that AI should empower rather than replace teaching and research activities, and that clear guidance and continuous training are essential [9,17]. Tunisian institutions have demonstrated high student engagement with AI tools, including high-profile events in which large student cohorts rapidly prototype AI-powered solutions, signalling strong latent capacity when organisational and infrastructural conditions permit. Moroccan initiatives under national digital strategies have focused on expanding ICT integration and AI literacy, particularly in efforts reaching beyond major urban centres [17].

Across the broader MENA region, a multi-country analysis covering 259 institutions in 19 countries found that AI adoption remains in early stages for a substantial share of universities (approximately 44 percent). Adaptive learning platforms and AI-enhanced research tools are among the more frequently reported applications, yet financial constraints, infrastructure deficits, and unclear policies constitute persistent barriers, especially in lower-income settings. Significant positive correlations were observed between AI integration in administrative functions and improvements in student support and institutional planning [8].

### **3.5 High-Performing Cases from the United Arab Emirates and Saudi Arabia**

Universities in the United Arab Emirates have moved rapidly from national AI strategy to large-scale institutional implementation. Several federal and emirate-level institutions have embedded AI across student services, adaptive learning platforms, research analytics, and administrative automation, supported by national AI strategies, substantial infrastructure investment, and dedicated AI institutes or centres. Key success factors include strong top-level political and institutional sponsorship, systematic faculty development programmes, clear data-governance frameworks, and the coupling of AI initiatives with measurable service-quality and learning-outcome indicators. These universities illustrate that when connectivity, funding, and leadership alignment are present, AI can move beyond pilots to become part of routine academic and administrative operations within a relatively short period [21,22].

In Saudi Arabia, Vision 2030 has driven significant investment in digital transformation and AI across the higher-education sector. Leading universities have established AI research centres, integrated intelligent systems into campus management, and launched large-scale upskilling programmes for faculty and staff. Success has been associated with multi-year funding commitments, partnerships with international technology providers under clear knowledge-transfer arrangements, and the embedding of AI literacy into both curriculum and professional development. Challenges remain in ensuring equitable access across all institutions and in

maintaining focus on pedagogical value rather than technology acquisition alone [23,24]. For Nalut, the Gulf cases demonstrate the catalytic effect of sustained leadership commitment and the importance of treating AI as a multi-year institutional capability rather than a series of isolated projects.

### **3.6 Cases from South Africa and Singapore**

South African universities operate under resource pressure yet have produced notable AI and digital-transformation initiatives. Several institutions have deployed AI-supported tutoring systems, automated administrative workflows in student admissions and finance, and research-analytics platforms. Success factors include the creation of dedicated educational-technology or AI centres, strong collaboration between information-technology and academic units, and careful attention to ethical guidelines in a context of high social inequality. Persistent constraints include uneven connectivity, load-shedding (power interruptions), and the need for continuous staff development [25,26]. These conditions share partial similarity with infrastructure unreliability faced by Libyan universities.

Singapore represents a high-capacity Asian benchmark. National strategies have positioned AI as a core economic and educational priority. Universities have integrated AI into curriculum design, personalised learning pathways, intelligent campus operations, and research management. Distinctive strengths include world-class digital infrastructure, a culture of lifelong learning and rapid skills updating, close government–university–industry coordination, and rigorous attention to AI ethics and governance frameworks. While Singapore’s resource base far exceeds that of Nalut, its emphasis on human-capital development, outcome measurement, and ethical guardrails offers transferable design principles [27,28].

### **3.7 Comparative Cases from Sub-Saharan Africa**

The University of Calabar in Nigeria has pursued a dual-track digitisation strategy: streamlining postgraduate administrative processes while simultaneously expanding access through an Open and Distance Learning Centre. Interest in AI chatbots for student services has emerged as a natural extension of these efforts [10,11]. Bindura University of Science Education in Zimbabwe established a Centre for Educational Technologies, Innovation and Design, adopted digital learning platforms, and began integrating AI tools. Progress has been real, yet the institution continues to confront infrastructure gaps, uneven digital literacy, limited AI governance frameworks, and constrained financial resources [10,11]. Broader literature on AI adoption in higher education institutions of low-income countries reinforces that relative advantage is most readily perceived when AI applications address immediate, observable problems, while diffusion remains fragile because of infrastructural deficits, limited faculty capacity, and weak governance frameworks [10].

### **3.8 Documented Failure Modes and Under-Performance Cases**

Alongside success stories, the literature records recurrent patterns of under-performance and failure that supply equally important lessons. Common faults include: launching ambitious AI or ERP projects without adequate data-quality foundations, resulting in low user trust and limited value realisation; treating AI as a purely technical procurement exercise while neglecting change management and staff consultation, producing resistance or superficial adoption; over-reliance on vendor promises without internal capability to configure, maintain, and critically evaluate systems; fragmentation of initiatives across faculties with no institutional

coordination, creating digital silos; and neglect of connectivity and power reliability in multi-campus or resource-constrained settings, rendering sophisticated applications unusable for large parts of the user population [8,10,12,29,30]. Gartner's own forecast that only approximately 35 percent of organisations will realise measurable value from agentic AI underscores how common these failure modes remain [1]. Nalut University must treat these patterns as explicit risks to be designed against from the outset.

### 3.9 Mapping Gartner Predictions, Comparative Lessons and Partnership History onto Nalut University

Table 2 synthesises the mapping of Gartner's 2026 predictions and comparative evidence onto Nalut University. The paper-based administrative environment documented at Nalut [19] represents precisely the high-volume, rule-based process landscape that agentic AI and intelligent process orchestration are designed to transform. Multi-campus dispersion further amplifies the potential value of cloud-based, composable architectures capable of extending scarce specialised expertise across sites. Nalut's explicit Goal 7 places it ahead of many peers that still lack a formal AI strategy. At the same time, the university must consciously avoid the failure modes identified internationally (see Table 2). Table 1 further shows that the nine existing partnership agreements, while valuable for traditional academic cooperation, currently provide almost no operational scaffolding for digital transformation or AI. This gap constitutes both a documented weakness and a high-leverage opportunity for redesign.

**Table 2:** Comparative Overview of AI-Related Maturity and Lessons for Nalut University

| Dimension                      | Nalut (current)                                    | UAE / KSA                                        | South Africa                                     | Singapore                             | Key Lesson for Nalut                                                |
|--------------------------------|----------------------------------------------------|--------------------------------------------------|--------------------------------------------------|---------------------------------------|---------------------------------------------------------------------|
| <b>Strategic intent</b>        | Explicit Goal 7                                    | Strong national & institutional strategies       | Institutional strategies under resource pressure | National AI priority                  | Leverage Goal 7; convert intent into funded multi-year roadmap      |
| <b>Infrastructure</b>          | Weak inter-campus network                          | High-capacity digital infrastructure             | Uneven; power challenges                         | World-class                           | Prioritise connectivity before advanced applications                |
| <b>Admin processes</b>         | Largely paper-based (2019 Manual)                  | Highly automated in leading institutions         | Partial automation                               | Advanced intelligent operations       | Target high-volume paper processes first for early wins             |
| <b>Staff capability</b>        | Digital literacy recognised in leadership criteria | Systematic large-scale upskilling                | Ongoing development needs                        | Strong lifelong-learning culture      | Launch multi-year role-differentiated capability programme          |
| <b>Governance &amp; ethics</b> | Not yet formalised for AI                          | Developing national and institutional frameworks | Active ethical guideline development             | Mature ethical and governance regimes | Establish AI governance before large-scale deployment               |
| <b>Failure-mode risk</b>       | High if data & change management neglected         | Lower due to resources & coordination            | Moderate; infrastructure & equity risks          | Low                                   | Consciously avoid data-last, tech-first, and no-training approaches |

## 4. Discussion

### 4.1 Synthesis of Cross-Case Findings and Application to Nalut University

The comparative evidence yields several convergent findings that can be applied directly to Nalut University. First, strategic intent is a necessary but insufficient condition for successful AI-enabled transformation. Nalut's explicit articulation of Goal 7 places it ahead of many peer institutions that lack a formal digital or AI strategy; however, the experience of Benghazi, Sebha, Calabar, Bindura, and under-performing global cases demonstrates that strategy documents do not automatically translate into operational change without parallel investment in infrastructure, data foundations, and human capacity [12–16,29,30]. The same pattern is visible in Nalut's own partnership history: nine formal cooperation agreements signed between 2019 and 2023 demonstrate outreach capacity, yet almost none contain operational provisions for digital transformation or AI [31–39]. Second, infrastructure reliability; particularly internet connectivity and inter-campus networking; functions as a binding constraint. At Benghazi, 90 percent of study participants identified internet instability as the primary barrier to AI use [12,13]. Nalut's own SWOT analysis highlights the absence of a reliable inter-faculty network [2]. Any AI or ERP initiative that assumes continuous high-bandwidth connectivity will underperform unless foundational connectivity investments are prioritised. Third, administrative process automation offers the most immediate and visible returns in paper-based environments. Nalut's 2019 Administrative Procedures Manual documents precisely the class of high-volume, rule-based, multi-step processes; mail registration, attendance, leave, basic HR transactions; that agentic AI and intelligent process automation are designed to streamline [19]. Peer institutions that have begun digitising postgraduate administration or personnel systems report efficiency gains and reduced clerical burden [10,15,16]. Fourth, human capacity development must run in parallel with technology deployment. Across Libyan, Algerian, Nigerian, Zimbabwean, South African, and global cases, insufficient training emerges as a recurrent bottleneck [9,12,13,11,25,26]. Nalut's Leadership Selection Guide already recognises computer and internet literacy as a criterion [18]; this recognition should be expanded into a multi-year, role-differentiated capability programme. Fifth, governance and ethics cannot be deferred. Regional and global analyses emphasise the absence of clear AI policies as a barrier [8,9,27,28]. Nalut has an opportunity to embed data privacy, algorithmic transparency, academic integrity, and staff consultation mechanisms from the outset of any AI or enterprise-system initiative. Sixth, the internationally documented failure modes—technology-first procurement, neglect of data quality, weak change management, fragmented initiatives, and under-investment in people; must be treated as explicit design constraints. Gartner's forecast that only about 35 percent of organisations realise measurable value from agentic AI is a quantitative reminder of how frequently these faults occur [1]. Seventh, partnership instruments themselves require redesign. The systematic review of the nine agreements shows that traditional academic MoUs, while valuable for staff exchange and joint research, currently provide almost no scaffolding for Goal 7. Future agreements must explicitly incorporate digital transformation, AI capacity building, joint virtual laboratories, data-sharing protocols, measurable targets, and joint staff upskilling if they are to support rather than lag behind the university's strategic ambitions [31–45].

#### 4.2 Proposed AI Transformation Framework for Nalut University

Building on the cross-case synthesis and the partnership assessment, a five-layer AI Transformation Framework tailored to small, multi-campus, resource-constrained universities is proposed and applied to Nalut (see Figure 1). Layer 1 (Foundational) addresses connectivity (including inter-campus networking), basic digital literacy for all staff categories, and the establishment of AI-ready data governance practices. Layer 2 (Application) prioritises phased deployment of core enterprise modules (HR, finance, student information), intelligent document processing, academic decision-support tools, and student- and staff-facing chatbots, sequencing toward the highest-volume paper-based processes documented in the 2019 Manual. Layer 3 (Workforce) encompasses continuous upskilling, deliberate role redesign around human–AI collaboration, and the creation of new specialised positions (AI governance officer, data stewards, digital-worker supervisors). Layer 4 (Governance and Ethics) establishes formal policies on data privacy, algorithmic transparency, academic integrity, staff consultation, and alignment with emerging national digital and AI frameworks. Layer 5 (Value and Sustainability) focuses on outcome-based metrics aligned with Gartner’s caution on value realisation rates, phased investment calibrated to available budgets, partnership models that deliberately upgrade existing Maghreb and domestic agreements (Ghardaïa, Gabès, Libyan Centre for Future Studies, Nalut Health Services) while seeking new digitally oriented collaborations, and continuous evaluation and learning.

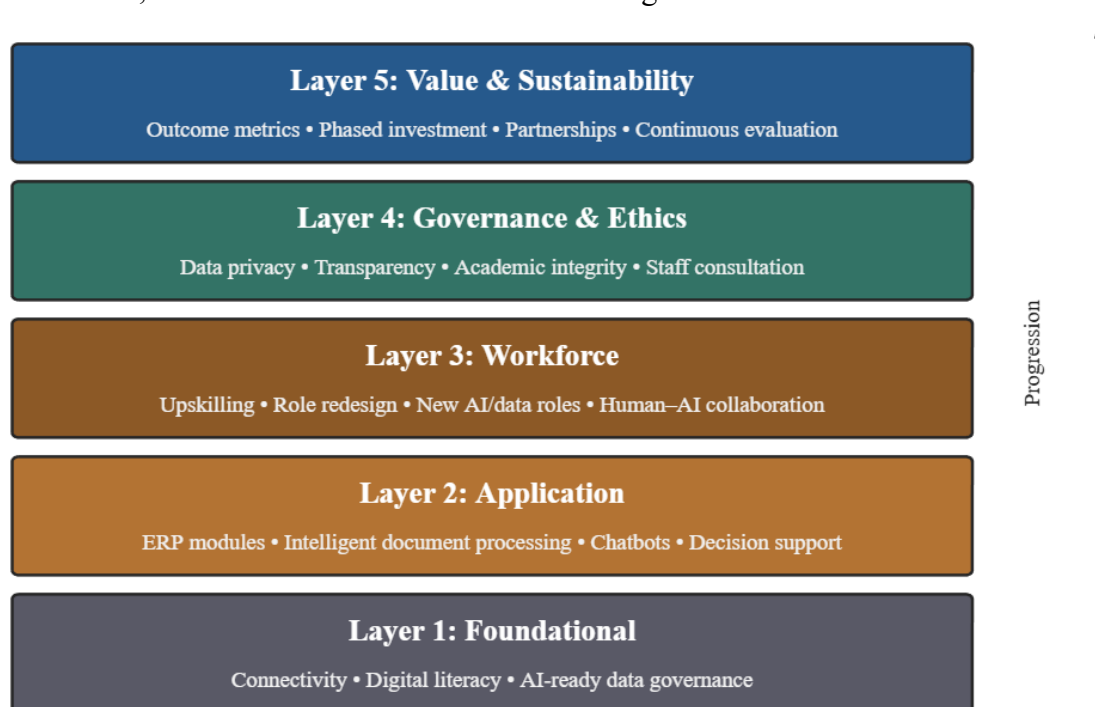
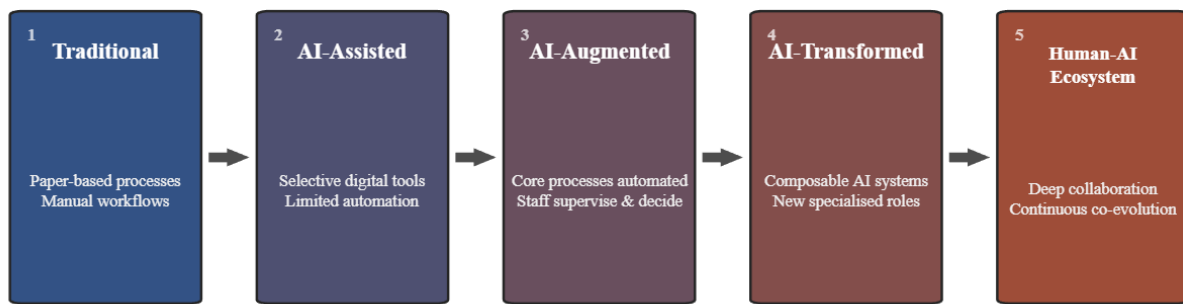


**Figure 1:** Five-layer AI Transformation Framework for resource-constrained, multi-campus universities (Foundational, Application, Workforce, Governance & Ethics, Value & Sustainability).

The progression pathway envisaged is: Traditional → AI-Assisted → AI-Augmented → AI-Transformed → Human–AI Ecosystem (see Figure 2). Nalut currently sits primarily at the Traditional stage with pockets of AI-Assisted activity; Goal 7 and the Executive Plan provide a formal bridge toward the AI-Augmented stage.



Current dominant position: Nalut University

**Figure 2:** Workforce progression pathway from Traditional through AI-Assisted, AI-Augmented and AI-Transformed stages to a Human–AI Ecosystem.

### 4.3 Future Scenarios for Nalut University (2026–2035)

Three scenarios are constructed on the basis of the comparative evidence, Nalut’s documented starting conditions, and the current state of its partnership portfolio (see Figure 3).

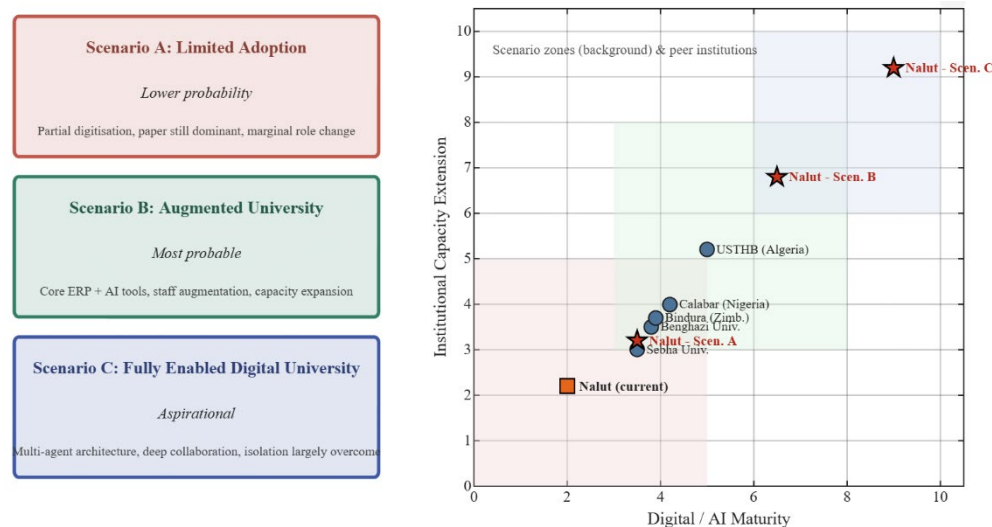


**Figure 3:** Three future scenarios for Nalut University (2026–2035); Limited Adoption, Augmented University, and Fully Enabled Digital University; with comparative positioning of peer institutions and implications of partnership redesign.

- **Scenario A – Limited Adoption (Status-Quo Plus):** Partial digitisation of selected processes occurs, but most administrative work remains paper-based. AI tools are used ad hoc by a minority of early adopters. Staff roles change only marginally. An internal digital divide emerges between faculties or units with better connectivity and those without. Existing partnership agreements remain largely inactive or confined to traditional academic exchange. This scenario is consistent with the early-stage patterns and under-performance cases observed when strategy is not matched by sustained investment and coordination.
- **Scenario B – Augmented University (Most Probable under disciplined implementation):** Core ERP modules and selected intelligent applications are successfully deployed under Goal 7. Routine administrative tasks (attendance, leave,

correspondence routing, basic reporting) are substantially automated. Academic staff gain reliable AI-supported tools for teaching and research. Administrative and support staff transition into supervisory, exception-handling, data-quality, and stakeholder-liaison roles. Overall institutional capacity expands without large net staff reduction. Geographic dispersion is partially mitigated through shared digital platforms. Selected existing partnerships (especially Maghreb and domestic ones) are activated and upgraded with explicit digital and AI cooperation clauses, while new digitally oriented agreements are pursued. This scenario aligns with the more successful trajectories observed at institutions that combined administrative digitisation with targeted capacity-building and with the early phases of Gulf implementations [10,15,16,21–24] (see Figure 3).

- **Scenario C – Fully Enabled Digital University:** A composable, multi-agent architecture spans all campuses. Advanced personalised learning and research-support agents are in routine use. Mature AI governance structures operate effectively. Geographic isolation is largely overcome through digital means. New specialised digital roles proliferate. A mature portfolio of digitally enabled international and national partnerships supports continuous capacity exchange. Realisation of this scenario would require sustained multi-year investment, high data maturity, and cultural transformation currently closer to the demonstrated capacity of leading UAE, Saudi, and Singaporean institutions; it remains an aspirational long-term horizon rather than a near-term probability for Nalut (see Figure 3).

#### 4.4 Implications for Staff Categories at Nalut University

- **Academic staff:** The dominant prospect is augmentation rather than replacement. AI tools can reduce the time spent on routine teaching preparation, literature searching, and administrative reporting, thereby releasing capacity for higher-order pedagogical design, student mentoring, and original research. The risk of deskilling exists if tools are adopted uncritically; structured training and clear academic-integrity guidelines are therefore essential. Comparative evidence from Benghazi suggests that perceived benefits materialise when training and infrastructure are adequate [12,13].
- **Administrative staff:** This group faces the highest potential for task automation. Processes documented in the 2019 Manual; attendance, leave, mail routing, basic HR transactions; are prime candidates for intelligent process automation. The constructive pathway is role transition toward process supervision, exception management, data stewardship, and enhanced service interaction with students and faculty. Early and continuous involvement of administrative staff in system design and training is critical to avoid resistance and to surface process knowledge that purely technical teams may lack.
- **Technical and support staff:** Demand is likely to grow for skills in infrastructure maintenance, cybersecurity, system configuration, user support, and basic AI operations. Investment in this cadre is a prerequisite for sustainable operation of any new enterprise or AI systems.
- **Leadership:** The 2020 Selection Guide already incorporates digital literacy and change-related competencies [18]. Future leadership development should deepen strategic

digital literacy, change leadership, ethical oversight, and the ability to evaluate AI investments on outcome rather than purely functional criteria, consistent with Gartner's shift toward outcome-based application selection [1]. Leaders will also need the capacity to redesign and activate partnership instruments so that they actively support, rather than lag behind, the digital and AI agenda.

#### 4.5 Practical Recommendations for Nalut University

Drawing together the institutional analysis, comparative lessons from the Arab world, the Gulf, Africa, Asia, and global practice, the systematic assessment of nine partnership agreements, and Gartner forecasts, the following recommendations are offered:

- (1) Establish a Digital Transformation and AI Steering Committee reporting directly to the University Council, with representation from academic, administrative, technical, and quality-assurance units.
- (2) Commission a rapid AI-readiness and data-maturity assessment, including a baseline inventory of paper-based processes, data quality, connectivity, and staff digital skills, before large-scale procurement.
- (3) Prioritise inter-campus connectivity and foundational digital infrastructure as a non-negotiable prerequisite for subsequent application-layer investments.
- (4) Sequence enterprise-system and intelligent-application deployment to target the highest-volume, most painful paper-based processes first (HR, finance, student records, attendance, leave), thereby generating early efficiency gains and organisational learning.
- (5) Launch a multi-year, role-differentiated staff capability programme covering digital literacy, AI awareness, data stewardship, human–AI collaboration, and ethics, with particular attention to administrative staff in transition and academic staff seeking to integrate AI into teaching and research.
- (6) Embed ethical and governance principles—including data privacy, transparency, academic integrity, and formal staff consultation mechanisms—from the inception of any AI or enterprise initiative.
- (7) Redesign all future partnership agreements to include explicit clauses on digital transformation, AI capacity building, joint virtual laboratories, data-sharing protocols, measurable annual targets, and joint staff upskilling.
- (8) Activate and upgrade existing Maghreb and domestic partners (University of Ghardaïa, University of Gabès, Libyan Centre for Future Studies, Nalut Health Services Administration) as immediate test-beds for digital and AI-related cooperation, while pursuing structured new partnerships with Libyan peers (Sebha, Benghazi), Gulf universities, African partners, and international development actors.
- (9) Adopt outcome-based evaluation criteria for all major digital and AI investments, explicitly recognising Gartner's finding that only a minority of such investments currently deliver measurable value, and build feedback loops for continuous adjustment [1].
- (10) Explicitly monitor and design against the documented failure modes of technology-first procurement, data-quality neglect, inadequate change management, initiative fragmentation, and under-investment in people.

## 5. Conclusions

AI-enabled enterprise applications offer Nalut University a strategically significant opportunity to extend institutional capacity beyond the limits imposed by geography, specialised-staff shortages, and traditional administrative processes. Comparative evidence from Sebha University, the University of Benghazi, Houari Boumediene University of Science and Technology, Tunisian and Moroccan initiatives, leading universities in the United Arab Emirates and Saudi Arabia, South African institutions, Singapore's higher-education AI ecosystem, the University of Calabar, Bindura University of Science Education, and broader global practice confirms that strategic intent is increasingly common, yet success remains uneven and tightly coupled to foundational readiness, human capacity, and governance. Equally, internationally documented failure cases demonstrate that neglecting data foundations, change management, staff development, and ethical frameworks produces low value realisation and organisational frustration. The systematic review of nine cooperation agreements signed by Nalut University between 2019 and 2023 reveals a consistent pattern of traditional, largely non-binding academic memoranda of understanding focused on staff exchange, joint research and scholarly activities, with almost no provisions addressing digital transformation, artificial intelligence or enterprise-system modernisation [31–39]. This historical gap is actionable: future partnership instruments can and should be deliberately redesigned to support Strategic Goal 7. Based on the documentary evidence and comparative cases examined, the most plausible near- to medium-term trajectory for Nalut University, provided Goal 7 is pursued with discipline, is the Augmented University scenario. In this scenario academic and administrative staff work alongside intelligent systems rather than being displaced by them; routine processes are substantially automated; scarce specialised expertise is partially extended across campuses through digital means; and overall institutional capacity expands. Nalut University's explicit commitment to digital transformation and artificial intelligence in its 2025–2030 Strategic Plan, together with the concrete activities set out in the Executive Plan 2025–2026, provides a necessary and valuable starting point. The five-layer framework, comparative lessons (including both success factors and failure modes), partnership assessment, scenarios, and recommendations advanced in this paper are offered to support that journey and to contribute to the still limited literature on AI in small universities of the Arab region and the wider Global South. The study is limited by its reliance on official documents and secondary comparative sources; no primary interviews, surveys, or live system audits were conducted. Institutional documents may contain aspirational elements, and Gartner predictions are themselves forward-looking estimates subject to revision. In addition, several of the nine partnership agreements were available only in partial form (missing pages or incomplete operative clauses), which constrained the depth of analysis regarding implementation mechanisms, financial arrangements, and monitoring provisions. Findings are therefore indicative and transferable primarily to similar small public universities rather than statistically generalisable to all higher-education contexts.

Future research should pursue longitudinal tracking of Goal 7 implementation and staff-role evolution at Nalut University, evaluation of the activation rate and digital content of existing and future MoUs, mixed-methods comparative studies across Libyan, Maghreb, and Gulf institutions, systematic investigation of staff perceptions and skills gaps, rigorous evaluation of

specific AI-enabled applications once deployed, and the development of ethical and governance frameworks suited to Arabic-language, resource-constrained higher-education settings.

### Acknowledgment

The authors acknowledge the public availability of Nalut University's institutional planning documents, the nine cooperation agreements examined in this study, and the Gartner research that provided the technological forecast baseline. Appreciation is also extended to the comparative institutional sources from Libya, Algeria, Tunisia, Morocco, the United Arab Emirates, Saudi Arabia, South Africa, Singapore, Nigeria, Zimbabwe, and regional and international bodies that enabled external validation of findings and the analysis of both success factors and failure modes.

### References

- [1]. Gartner. Predicts 2026: AI's Impact on Enterprise Applications. Gartner, Inc.; 2025.
- [2]. Nalut University. 2030–2025 الخطة الاستراتيجية الثانية لجامعة نالوت [Second Strategic Plan of Nalut University 2025–2030]. Nalut: Nalut University; 2025.
- [3]. Nalut University. 2026–2025 الخطة التنفيذية لجامعة نالوت [Executive Plan of Nalut University 2025–2026]. Nalut: Nalut University; 2025.
- [4]. Gartner. Gartner predicts 40% of enterprise apps will feature task-specific AI agents by 2026. Gartner Press Release; 2025.
- [5]. Manyika J, Chui M, Miremadi M, et al. Jobs lost, jobs gained: Workforce transitions in a time of automation. McKinsey Global Institute; 2017.
- [6]. Holmes W, Bialik M, Fadel C. Artificial Intelligence in Education: Promises and Implications for Teaching and Learning. Boston: Center for Curriculum Redesign; 2019.
- [7]. Zawacki-Richter O, Marin VI, Bond M, Gouverneur F. Systematic review of research on artificial intelligence applications in higher education – where are the educators? *Int J Educ Technol High Educ*. 2019;16(39).
- [8]. Al-Emran M, et al. A comprehensive analysis of AI adoption, implementation strategies, and challenges in higher education across the Middle East and North Africa (MENA) region. *Educ Inf Technol*. 2025. doi:10.1007/s10639-024-13300-y.
- [9]. UNESCO ICHEI. Digitalisation and Artificial Intelligence in African Higher Education: An Exploratory Study. Shenzhen: UNESCO ICHEI; 2025.
- [10]. UNESCO ICHEI. Case studies on University of Calabar (Nigeria) and Bindura University of Science Education (Zimbabwe). In: *Digitalisation and AI in African Higher Education*. 2025.
- [11]. African Association of Universities and UNESCO ICHEI. Institutional case studies on digitalisation and AI. 2025.
- [12]. Mohamed ASI, Abdulrahman AMA, et al. Artificial Intelligence Technologies and Their Impact on Higher Education in Libya: A Field Study at the University of Benghazi. *Afr J Adv Pure Appl Sci*. 2025.
- [13]. Investigating Students' Awareness, Usage, and Perceptions of ChatGPT in Libyan Higher Education: A Case Study at the University of Benghazi. *AlQalam J Med Appl Sci*. 2025.
- [14]. أثر الذكاء الاصطناعي التوليدي وأدواته المتاحة في دعم الأكاديميين والتعليم الجامعي في ليبيا. *Comprehensive J Sci*. 2025.
- [15]. Sebha University. Sebha University launches the first stages of the digital transformation project using artificial intelligence techniques. Official announcement; December 2024.
- [16]. Sebha University. Reports on electronic personnel-affairs system implementation. 2026.
- [17]. Bali N. Innovative tools in higher education in Algeria: The experience of the USTHB. In: UNESCO ICHEI. *Digitalisation and Artificial Intelligence in African Higher Education*. Shenzhen: UNESCO ICHEI; 2025. p. 82–87.
- [18]. Nalut University. دليل اختيار وتكليف القيادات الإدارية والأكاديمية بجامعة نالوت [Guide for the Selection and Assignment of Administrative and Academic Leaders]. 2020.
- [19]. Nalut University. دليل الإجراءات الإدارية لموظفي جامعة نالوت [Administrative Procedures Manual]. May 2019.
- [20]. Nalut University. الهيكل التنظيمي لجامعة نالوت [Organisational Structure Chart]. n.d.
- [21]. United Arab Emirates. National Strategy for Artificial Intelligence 2031. UAE Government; 2017 (with subsequent implementation reports 2023–2025).
- [22]. UAE University. Integrating AI into Higher Education: A Case Study of UAEU's AI Agenda 2025–2031. 2025.

- [23]. Mohamed bin Zayed University of Artificial Intelligence (MBZUAI). Institutional reports on AI research, education programmes and talent development. 2019–2026.
- [24]. Hamdan Bin Mohammed Smart University. “An Artificial Intelligence Agent for Every Faculty” initiative. Official announcement; September 2025.
- [25]. Modiba FS, Segooa MA, Motjopolane I. Generative Artificial Intelligence in South Africa’s Higher Education: Assessing Readiness and Responsible Adoption. *Artificial Intelligence in Digital Society*. 2026;1.
- [26]. Artificial intelligence in South African universities: curriculum transformation and decolonisation—aid or obstacle? *Front Sociol*. 2025. doi:10.3389/fsoc.2025.1543471.
- [27]. Ministry of Education (Singapore). Baseline AI Competency Frameworks for Autonomous Universities, Polytechnics and ITE. Announced 2026 (implementation from 2027).
- [28]. Nanyang Technological University. NTU2030 plan: Embedding AI in undergraduate education and mandatory responsible-AI course. 2026.
- [29]. Singapore Management University. Framework for the Use of Generative AI Tools. Centre for Teaching Excellence; 2025/2026.
- [30]. Infocomm Media Development Authority (IMDA) and Ministry of Education (Singapore). Model AI Governance Framework and AI-in-Education (AIED) Framework.
- [31]. Abu-Madi F, et al. Spotting the Critical Success Factors of Enterprise Resource Planning Implementation in the Context of Public Higher Education Sector. *Int J Public Adm*. 2022. doi:10.1080/01900692.2022.2085300.
- [32]. Williamson B, et al. Turning universities into data-driven organisations: seven dimensions of change. *High Educ*. 2024. doi:10.1007/s10734-024-01277-z.
- [33]. Memorandum of Understanding on Academic Co-operation between Nalut University (Libya) and Ainul Hayat International University (Somalia). Signed 02/07/2021.
- [34]. مذكرة تفاهم وتعاون مشترك between Nalut University and the International Union of Universities. Signed 7 December 2019.
- [35]. Memorandum of Understanding between Nalut University – Libya and Guru Nanak Dev Engineering College – Ludhiana, India.
- [36]. Memorandum of Understanding / Contract on Academic, Scientific and Business Technical Cooperation between International Astrolabe University (Turkey) and Nalut University. Signed 02/07/2021.
- [37]. مذكرة تفاهم للتعاون العلمي between Nalut University (Libya) and University of Ghardaïa (Algeria).
- [38]. مذكرة تفاهم وتعاون أكاديمي between the Libyan Center for Future Studies and Nalut University. Signed 6 April 2023, Tripoli.
- [39]. اتفاقية للتعاون العلمي between University of Gabès (Tunisia) and Nalut University (Libya).
- [40]. Memorandum of Understanding between Nalut University and Jadara University (Jordan).
- [41]. مذكرة تفاهم للتعاون المشترك between Nalut University and Nalut Health Services Administration.
- [42]. Zarouqa EBM, Thlej ETF. The Role of Higher Education in Achieving Sustainable Development Goals: A Comparative Study between Jordan and Morocco with Potential Applications in Libya. *Sharwes Scientific Journal* ;6(1): 190-208. <https://doi.org/10.26629/ssj.2025.11>
- [43]. M Alsharif M, Khalat J. The impact of implementing digital transformation on accounting education programs in Libyan universities to achieve sustainable development. *Sharwes Scientific Journal*. 2026, Special Issue: 0706-31. <https://doi.org/10.5281/zenodo.20059522>
- [44]. Al-Ajeel, Haytam Basheer Al-Ajeel, and Toufik Mokeddem. "Digital Transformation as a Catalyst for Sustainable Spatial Development in Libya: An Analytical Study of Institutional Constraints and Implementation Challenges in Light of the Algerian Experience." *Sharwes Scientific Journal* (2026): 0813-0838. <https://doi.org/10.5281/zenodo.20707885>
- [45]. Reeh, K., Alshiteewi, H., & Smew, I. (2026). Reality and Challenges of Digital Transformation in Accounting Education in Libyan Universities. *Sharwes Scientific Journal*, 2026, Special Issue, 0522-0548. <https://doi.org/10.5281/zenodo.19929909>