TANMEAH BASSMAH TBP
Universal Journal of Green Human Resources and Sustainable Humanities (UJGHRSH)
Volume 3, Issue 1, 2026
ٱلْمَجَلَّة ٱلْعَالَمِيَّة لِلْمَوَارِد ٱلْبَشَرِيَّة ٱلْخَضْرَاء وَٱلْعُلُوم ٱلْإِنْسَانِيَّة ٱلْمُسْتَدَامَة
ISSN 3078-8811 (print), 3078-882X (online)
Journal homepage: https://journals.tanmeah.com/index.php/ujghrsh

The Impact of Technology on Management Performance in Libya: A PRISMA-Guided Systematic Review of Evidence Published from January 2020 through 31 May 2026

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CHRONICLE
Article history:
Received:
May, 22, 2026.
Received in revised format: June, 07, 2026.
Accepted: June, 21, 2026.
Available online: June 30, 2026.

Keywords:

Libya; management performance; technology adoption; e-government; ERP; digital transformation; systematic literature review; PRISMA-informed review.

ABSTRACT

This paper reviews evidence on the relationship between technology use and management performance in Libyan organizations during the period January 2020 to 31 May 2026. The cut-off date is stated explicitly to avoid temporal overreach: sources published after 31 May 2026 are outside the review. Management performance is defined as organizational or administrative outcomes that are reported in the reviewed studies, including operational efficiency, decision-making quality, service continuity, transparency, accountability, coordination, reporting quality, user satisfaction and perceived organizational effectiveness. The paper follows a PRISMA-informed review structure, but it avoids claiming causal effects unless causal designs are available in the primary studies. The evidence indicates that Libyan studies most often examine e-government, enterprise resource planning, e-learning, digital services and digital transformation. Across these streams, technology is generally associated with better information flow, integration and service potential, but the relationship is conditional on infrastructure reliability, management support, digital skills, funding, process redesign -institutional context. The review also finds major methodological limitations in the evidence base: limited longitudinal research, inconsistent performance indicators, a heavy reliance on perception-based surveys and case studies, underrepresentation of oil and gas, banking and private-sector organizations, and insufficient attention to Libya's post-2011 institutional coordination requirements. The paper contributes by separating contextual digital statistics from included empirical evidence, applying a quality-appraisal logic, and mapping research gaps before proposing a revised framework for future Libya-focused research.

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https://doi.org/10.70568/UJGHRSH3.1.5

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أثر التكنولوجيا على الأداء الإداري في ليبيا: مراجعة منهجية للأدلة المنشورة وفقًا لمنهجية PRISMA، من يناير 2020 حتى 31 مايو 2026

الكلمات الداله:

ليبيا؛ الأداء الإداري؛ تبني التكنولوجيا؛ الحكومة الإلكترونية؛ تخطيط موارد المؤسسات؛ التحول الرقمي؛ مراجعة منهجية للأدبيات؛ مراجعة مستندة إلى منهجية PRISMA.

الملخص

تستعرض هذه الورقة البحثية الأدلة المتعلقة بالعلاقة بين استخدام التكنولوجيا وأداء الإدارة في المؤسسات الليبية خلال الفترة من يناير 2020 إلى 31 مايو 2026. وقد حُدد هذا التاريخ تحديدًا لتجنب التجاوز الزمني، حيث تُستثنى المصادر المنشورة بعد 31 مايو 2026 من نطاق هذه المراجعة. يُعرَّف أداء الإدارة بأنه النتائج التنظيمية أو الإدارية التي وردت في الدراسات المراجعة، بما في ذلك الكفاءة التشغيلية، وجودة اتخاذ القرارات، واستمرارية الخدمات، والشفافية، والمساءلة، والتنسيق، وجودة التقارير، ورضا المستخدمين، والفعالية التنظيمية المُدركة. تتبع الورقة هيكل مراجعة مُستند إلى منهجية PRISMA، لكنها تتجنب ادعاء وجود علاقات سببية ما لم تتوفر تصاميم سببية في الدراسات الأولية. تشير الأدلة إلى أن الدراسات الليبية غالبًا ما تتناول الحكومة الإلكترونية، وتخطيط موارد المؤسسات، والتعليم الإلكتروني، والخدمات الرقمية، والتحول الرقمي. وفي هذه المجالات، ترتبط التكنولوجيا عمومًا بتحسين تدفق المعلومات، والتكامل، وإمكانات الخدمة، إلا أن هذه العلاقة مشروطة بموثوقية البنية التحتية، ودعم الإدارة، والمهارات الرقمية، والتمويل، وإعادة تصميم العمليات – أي السياق المؤسسي. يكشف التقرير أيضاً عن قصور منهجي كبير في قاعدة الأدلة، يتمثل في محدودية البحوث الطولية، وعدم اتساق مؤشرات الأداء، والاعتماد المفرط على الاستبيانات القائمة على التصورات ودراسات الحالة، ونقص تمثيل مؤسسات النفط والغاز، والقطاع المصرفي، والقطاع الخاص، وعدم إيلاء الاهتمام الكافي لمتطلبات التنسيق المؤسسي في ليبيا بعد عام ٢٠١١. وتساهم هذه الورقة البحثية في فصل الإحصاءات الرقمية السياقية عن الأدلة التجريبية المضمنة، وتطبيق منطق تقييم الجودة، وتحديد الثغرات البحثية قبل اقتراح إطار عمل منقح للبحوث المستقبلية التي تركز على ليبيا.

JEL Classification: *M10, M12, M15, O33, H83.*

1. Introduction

Technology has become a central resource in contemporary management because many managerial activities depend on timely information, reliable communication, integrated procedures and evidence-based control. However, the management value of technology is not automatic. Information systems may improve reporting, service delivery and coordination only when organizations possess adequate infrastructure, employee capability, leadership support, process discipline and an institutional environment that allows

systems to be used consistently. This distinction is important for Libya because the country combines relatively high levels of individual digital connectivity with evolving public institutions and uneven organizational readiness. Libya is a distinctive and important setting for technology-management research. Since 2011, public institutions and local administrations have operated within a changing administrative and governance environment. Recent country reports describe the Tripoli-based Government of National Unity (Libya) as administering western Libya, while authorities in the east and south operate through separate administrative structures [1], [2]. These institutional arrangements affect management performance because procurement, system integration, data sharing, service delivery and accountability can vary by region, ministry and municipality. Technology adoption in Libya must therefore be analysed as a managerial and institutional issue rather than as a simple technical upgrade. For example, digital systems in municipalities may require stronger networks, updated hardware, sufficient funding and improved process maturity; ERP systems in public organizations may be associated with organizational performance but still depend on implementation quality and staff readiness; e-learning systems may preserve continuity but require infrastructure, ICT knowledge and financial support [3]-[7]. This review builds on those Libya-focused studies but avoids treating them as proof that technology automatically causes performance improvement. The review period is January 2020 to 31 May 2026. The start date captures the COVID-19 and post-COVID-19 period, during which many organizations relied more heavily on digital communication, online service delivery and remote coordination. The end date is set at 31 May 2026 because the paper is prepared on 3 June 2026; this avoids the problem of claiming evidence from future publications. The review covers all years within this period where relevant sources are identified, while also reporting when evidence is mainly contextual rather than peer-reviewed.

2. Conceptual Definitions and Research Questions

2.1 Definition of Management Performance

In this review, management performance refers to the organizational and administrative outcomes reported by primary studies or credible contextual sources. These outcomes include: operational efficiency; accuracy and speed of reporting; decision-making quality; coordination between units; service continuity; transparency; accountability; user satisfaction; resource planning; monitoring capacity; and perceived organizational effectiveness. The definition deliberately avoids using one narrow financial indicator because much of the Libya-focused literature concerns public organizations, municipalities, education and e-government, where performance is often measured through service, administrative or perception-based indicators rather than profit. This definition also addresses a methodological limitation in earlier drafts of the paper. Technology studies can easily mix different outcomes without acknowledging that ERP performance, municipal transparency, e-learning continuity and e-government readiness do not measure the same thing. Therefore, Appendix B codes each reviewed source by the type of performance indicator it reports. This prevents the synthesis from treating all outcomes as equivalent.

2.2 Research Questions

The revised review is guided by four non-leading research questions:

RQ1: What technology-related domains have been examined in Libya-focused management and organizational studies published between January 2020 and 31 May 2026?

RQ2: What relationships are reported between technology use and management-performance indicators in Libyan organizations?

RQ3: How have reviewed studies measured management performance, and what measurement limitationes are visible?

RQ4: What organizational, institutional and contextual barriers shape the technology-management relationship in Libya?

The research-gap discussion is not presented as a research question. Instead, it is derived from the evidence synthesis and is presented before the conclusion.

3. Libya Digital and Institutional Context

Digital-context statistics are useful for understanding the environment in which Libyan organizations operate, but they are not evidence of management performance. This distinction is essential. Libya may have high internet penetration and mobile connection levels, but those indicators do not prove that ministries, municipalities, banks or public organizations manage more effectively. They show only the potential environment for digital use. DataReportal reported that Libya had 6.57 million internet users in January 2025, equal to an internet penetration rate of 88.5 percent, and 14.6 million cellular mobile connections, equal to 197 percent of the population [8]. DataReportal also warns that mobile-connection figures may include multiple SIM cards or connections without internet access, so they cannot be interpreted as direct evidence of digital-service capacity [8]. The Internet Society reported a lower internet-user estimate of about 82 percent and gave Libya an overall Internet resilience score of 43 percent, with only 3 percent of the 1,000 most visited websites reachable through a local server or cache [9]. These statistics suggest a gap between individual connectivity and resilient organizational digital infrastructure.

Official Libyan sources were added to avoid relying only on international statistics. The General Information Authority reported approval of a national government digital-transformation strategy in April 2025 and described its tracks as integrated digital government, a competitive digital economy, an inclusive digital society and a safe digital environment [21]. The Information Technology Centre presents itself as Libya's official authority for digital transformation [22]. LPTIC reports digital-transformation projects in public services, including connecting prosecution offices and courts through telecommunications infrastructure [23]. The Central Bank of Libya reports digital-transformation indicators in electronic payments, including POS terminals, activated cards, banking-application subscribers, e-wallets and instant-payment services [24]. NISSA's official mandate covers policies, monitoring, evaluation and national information-security improvement [25]. These official sources are used as contextual evidence only; they are not treated as peer-reviewed proof that technology improves management performance.

Table1: Interpretation for the review

Indicator	Statistic / evidence	Source	Interpretation for the review
Internet users	6.57 million, 88.5% penetration	DataReportal 2025 [8]	Shows broad user access but not management performance.
Mobile connections	14.6 million, 197% of population	DataReportal 2025 [8]	Must be interpreted carefully because multiple SIM ownership is common.
Social media identities	6.40 million, 86.3% of population	DataReportal 2025 [8]	Useful for communication context, not evidence of organizational efficiency.
Internet resilience	43/100	Internet Society Pulse [9]	Indicates medium resilience and infrastructure vulnerability.
Local hosting/cache reach	3% of top 1,000 websites	Internet Society Pulse [9]	Suggests dependence on external infrastructure and possible latency/resilience concerns.
Administrative variation	Parallel administrative authorities and official security institutions	HRW 2026; UK Home Office 2025 [1], [2]	Explains why unified national digital governance may be difficult.

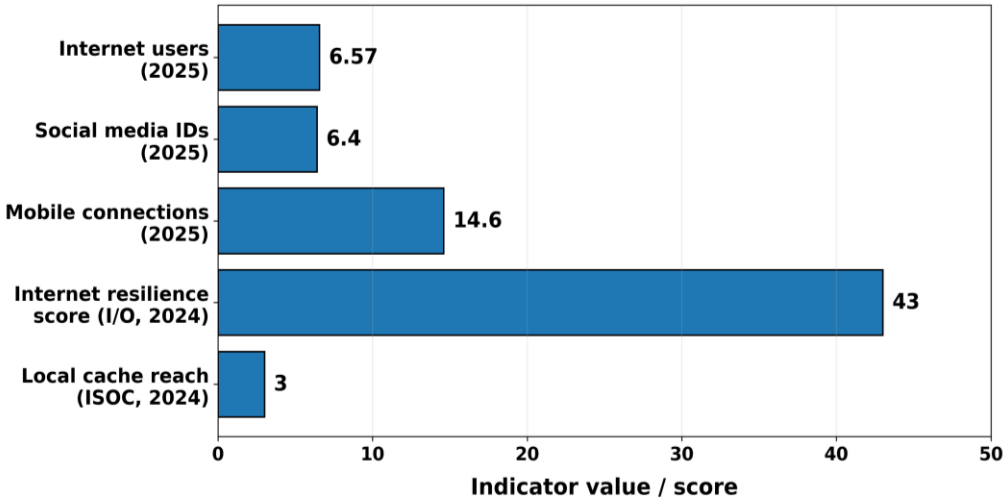


Figure 1. Libya digital-context indicators. These indicators are used as background only, not as direct evidence that technology improves management performance. Statistical sources: DataReportal [8] and Internet Society [9]. Official Libyan policy and service-context sources used to interpret the indicators: General Information Authority government digital-transformation strategy approval [21], Information Technology Centre official digital-transformation mandate [22], Central Bank of Libya digital-transformation and electronic-payment indicators [24], and NISSA national information-security mandate [25].

4. Methodology

4.1 Review Design

The paper uses a PRISMA-informed systematic literature review structure. PRISMA 2020 provides reporting guidance for identifying, screening and reporting evidence in systematic reviews [10]. The phrase PRISMA-informed is used deliberately because a final journal-ready SLR requires exported database counts and replicable screening logs. This revised paper provides the full protocol, eligibility criteria, extraction matrix and quality-appraisal logic. Before submission, the reviewer should run and save database exports from the listed databases and replace the indicative flow with exact counts.

4.2 Search Date, Period and Cut-Off

The search protocol is designed for literature published from 1 January 2020 to 31 May 2026. The operational search date for this revised draft is 3 June 2026. Sources dated after 31 May 2026 are excluded from the evidence synthesis. Sources from January-May 2026 are included only if they were already publicly available before the cut-off and directly relevant to the review.

4.3 Databases and Search Strategy

The planned academic databases are Scopus, Web of Science, IEEE Xplore, ScienceDirect, Emerald Insight, SpringerLink, ACM Digital Library and Google Scholar. Because Libya-focused research is often published outside major indexed journals, the protocol also permits Libyan university journals, Arabic-language journals and credible institutional reports, but these are coded separately as grey or contextual literature. This correction addresses source bias: excluding local journals and reports would artificially create a “sector gap,” while treating all reports as equal to peer-reviewed studies would requiring developmenten the evidence base. Official Libyan websites were also searched for contextual evidence,

especially GIA, ITC, LPTIC, CBL, NISSA, the GIA government-services portal and the Libyan electronic procedures portal [21]-[27].

Appendix A provides field-tagged search strings. The search combines three blocks: Libya terms, technology terms and management-performance terms. This avoids unmanageable keyword searches such as “technology” alone.

4.4 Inclusion and Exclusion Criteria

Criterion	Included	Excluded
Publication date	1 January 2020-31 May 2026	Before 2020 or after 31 May 2026
Geographical relevance	Libya-focused empirical, conceptual or policy evidence; Libya-specific context reports	No Libya relevance
Technology scope	ICT, ERP, e-government, digital transformation, e-learning, digital services, cloud/data/digital governance if linked to management	Purely technical system-design papers with no organizational or management relevance
Performance link	Reports or discusses administrative efficiency, service delivery, transparency, decision-making, reporting, coordination, continuity or organizational performance	Technology use without any organizational or managerial outcome
Source type	Peer-reviewed articles, conference papers, theses if methodologically transparent, and clearly labelled contextual reports	Blogs/opinion pieces unless used only as background and not evidence
Language	English and Arabic	Unavailable full text or unclear bibliographic record

4.5 PRISMA Flow and Evidence Status

Figure 2 shows the corrected PRISMA logic. The figure does not fabricate database counts. A final submission should insert exact numbers from exported database searches, including records identified, duplicates removed, records screened, full texts excluded with reasons, and final studies included. This is more defensible than presenting invented PRISMA numbers. Official Libyan websites are cited in captions and contextual discussion because they document policy, infrastructure, banking, cybersecurity and service-portal developments; they are not counted as peer-reviewed empirical evidence unless the source is an academic article or conference paper.

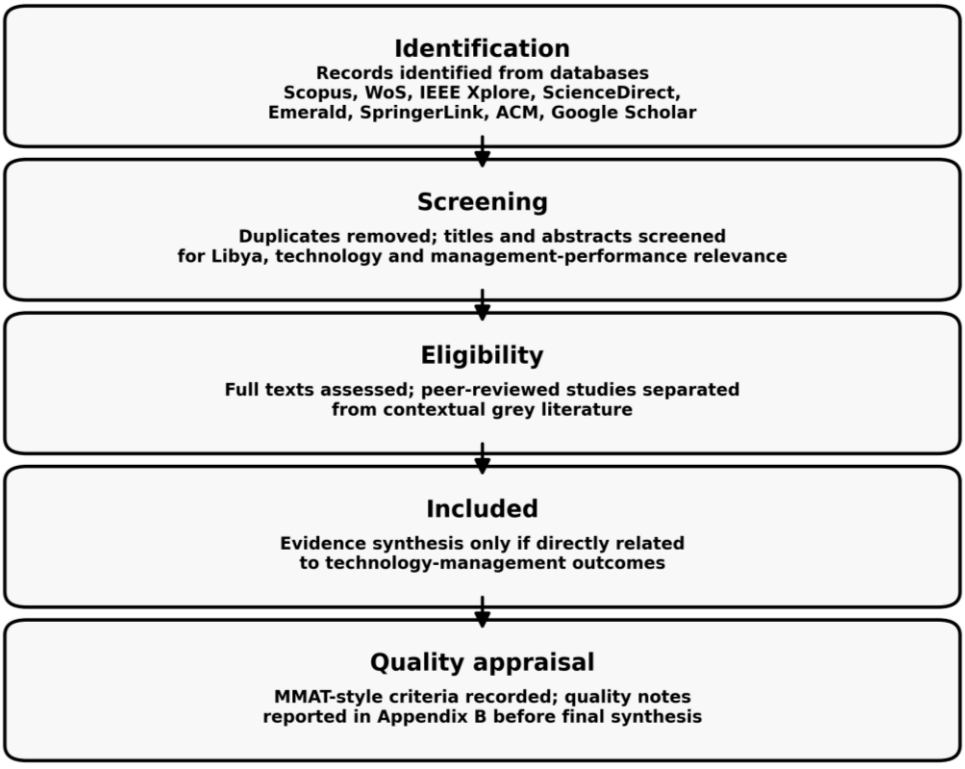


Figure 2. PRISMA-informed review flow. Counts should be replaced by exported database counts before journal submission. Adapted from PRISMA 2020 reporting logic [10]. Official Libyan websites and portals listed in Appendix A, including GIA [21], ITC [22], LPTIC [23], CBL [24], NISSA [25], the GIA government-services portal [26] and the Libyan electronic procedures portal [27], are treated as contextual sources rather than peer-reviewed empirical studies.

4.6 Data Extraction and Quality Appraisal

Data extraction covered author, year, source type, sector, technology type, method, sample or evidence base, performance indicators, key findings, Libya-specific contextual factors, and quality concerns. Appendix B reports the evidence matrix. Quality appraisal follows a simplified MMAT-style logic: clarity of research question, appropriateness of design, transparency of data collection, adequacy of sample or evidence base, coherence between data and claims, and explicit limitations. Studies are not weighted equally. Peer-reviewed empirical studies with transparent methods are treated as stronger evidence than policy reports, news reports or general digital-statistics sources.

5. Chronological Evidence Synthesis, 2020-31 May 2026

The chronological synthesis does not force every year to contain the same volume or type of evidence. Some years contain direct Libya-focused empirical studies, while others provide contextual or methodological sources. This transparency is important because the maturity and availability of the evidence base is itself a finding.

5.1 Evidence Published in 2020

The 2020 evidence is limited in direct Libya-focused technology-management studies. The year is nevertheless relevant because it marks the beginning of the pandemic period and the wider shift toward remote coordination, online service continuity and digital administration. For Libya, 2020 is treated as a boundary year rather than a strong empirical year. Global information-systems literature on COVID-19 shows that digital technologies became central to continuity and organizational adaptation, but such global evidence cannot be directly transferred to Libya without contextual qualification [11]. The absence of strong Libya-specific management-performance studies in 2020 is important. It suggests that the review should not exaggerate the volume of evidence. Instead, 2020 is used to justify the start of the review period and to frame later Libyan studies on e-learning, e-government and digital transformation.

5.2 Evidence Published in 2021

The strongest 2021 Libya-focused evidence concerns e-government and e-learning. Wynn, Bakeer and Forti studied e-government and digital transformation in three Libyan local authorities using a Technology-Organisation-Process maturity perspective [3]. Their study found that local authority technology deployment remained at an early development stage, with scope to improve information systems and networks, upgrade personal computers and office software, enhance internet reliability, strengthen organizational capability, develop skills, increase funding, reinforce management support and improve process efficiency [3]. This is not merely a generic finding; it directly reflects the practical requirements of local governance and administrative modernization in Libya. Al Ghawail, Ben Yahia and Alrshah examined e-learning in Libyan higher education and identified the need to strengthen ICT knowledge, ICT infrastructure and financial support [5]. Although e-learning is an education-sector topic, it is relevant to management performance because it concerns continuity of teaching administration, knowledge delivery, resource coordination and platform-enabled institutional response. The 2021 evidence therefore suggests that technology is associated with organizational continuity and service delivery, but the relationship depends on basic readiness conditions.

5.3 Evidence Published in 2022

The 2022 evidence builds on pandemic-related digital continuity. Elberkawi, Maatuk, Elharish and Eltajoury compared e-learning challenges from the perspectives of university instructors and students during COVID-19 [6]. Their study is relevant because it shows that technology-mediated performance cannot be assessed only by platform availability. Instructors and students experienced different obstacles, which implies that digital transformation changes managerial responsibilities for training, communication, support and institutional coordination. The USAID Digital Ecosystem Country Assessment for Libya is also relevant as contextual evidence because it examines digital infrastructure, digital society, rights and governance, and the digital economy [12]. However, it should not be treated as a peer-reviewed management-performance study. Its role in this paper is to support contextual interpretation and highlight ecosystem-level constraints that may shape organizational technology outcomes.

5.4 Evidence Published in 2023

The 2023 evidence is thinner in directly relevant Libya-specific peer-reviewed studies. This does not justify inventing saturation. Instead, the gap indicates that technology-management research in Libya remains episodic and sector-specific. Studies and policy discussions during this period continued to emphasize digital government, infrastructure and institutional coordination, but the evidence base provides limited comparable measures of management performance. This strengthens RQ3: the problem is not only whether technology is used, but how management outcomes are measured.

5.5 Evidence Published in 2024

The 2024 literature provides stronger direct evidence on ERP and digital transformation. Egdair, Hachicha, Sameda and Rajemi examined ERP adoption and organizational performance in Libyan public

organizations using quantitative methods and PLS-SEM; the study selected 149 organizations from a population of 242 and analysed 119 completed questionnaires [4]. This source directly addresses the relationship between an enterprise system and organizational performance. However, its findings should still be interpreted as association-based, not as proof of causality, because cross-sectional survey designs cannot establish long-term performance effects. ElMadani and AlDhbbah analysed digital transformation as an approach to sustainable development in Libya using a descriptive-analytical approach [13]. This study expands the discussion from specific systems such as ERP to broader digital transformation and sustainable development. Its relevance to management performance lies in its emphasis on efficiency, resource access and sectoral integration. However, it also illustrates the need for future studies to connect strategic digital-transformation discussion with consistent operational measures of managerial outcomes.

5.6 Evidence Published in 2025

The 2025 evidence gives more direct attention to public-sector digital government and municipal services. Shwehdy examined drivers and barriers in Libya's e-government implementation and published the study in the 26th Annual International Conference on Digital Government Research [7]. The study is important because it explicitly frames e-government in Libya's evolving public-sector environment. Its contribution is that organizational, environmental and user-acceptance factors interact with technical factors in shaping e-government implementation. Benhkoma and colleagues studied digital services as a means of enhancing transparency and sustainability in selected Libyan municipalities [14]. Their field study is directly relevant to management performance because transparency, accountability and sustainability are core public-management outcomes. The source also helps correct a limitation in earlier drafts: management performance should not be reduced to profitability or efficiency. In public-sector and municipal settings, performance includes citizens' access to information, service responsiveness and the perceived transparency of administrative procedures. Contextual evidence from DataReportal and Internet Society in 2025 indicates that Libya has high internet adoption while organizational resilience and local hosting capacity remain areas for continued development [8], [9]. This supports, but does not prove, the connectivity-performance gap. The evidence suggests that individual connectivity may be widespread while organizational systems still require stronger integration and infrastructure resilience.

5.7 Evidence Published from January to 31 May 2026

Evidence from January to 31 May 2026 is treated cautiously. General country context remains relevant because institutional arrangements affect digital governance and management performance. Recent country reporting describes continuing parallel administrative authorities and differentiated regional control [1]. This is not a technology study, but it helps explain why national digital governance, shared databases, procurement integration and cross-regional service systems require careful coordination. The 2026 context is therefore used to interpret implementation conditions, not to claim new empirical findings about technology performance.

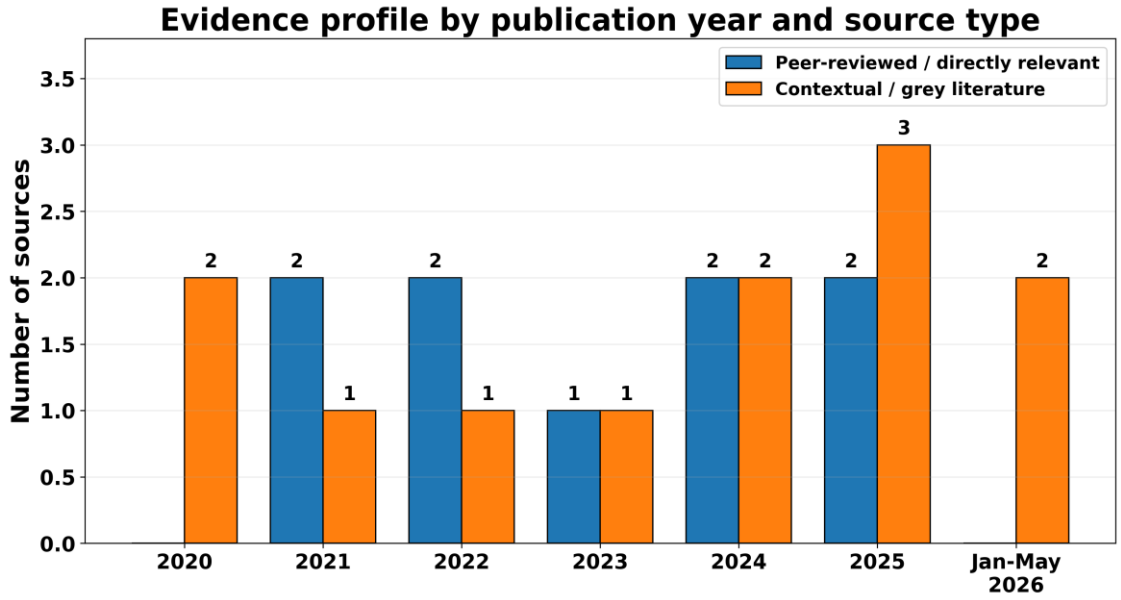


Figure 3. Evidence profile by year and source type. The chart separates direct peer-reviewed or directly relevant studies from contextual sources to avoid overstating the empirical evidence base. Constructed by the author from the evidence log in Appendix B using peer-reviewed or directly relevant sources [3]-[7], [13], [14] and contextual official Libyan sources [21]-[27].

6. Thematic Findings

6.1 Technology Domains Studied

The reviewed evidence shows five dominant technology domains: e-government and digital government; ERP and enterprise systems; e-learning and platform-based continuity; digital services in municipalities; and broad digital transformation. These domains are not equally developed. E-government and local-authority digital transformation have stronger contextual relevance, ERP has clearer organizational-performance measurement, and e-learning shows technology-enabled continuity but not necessarily general management performance. Oil and gas, banking, healthcare and SMEs remain underrepresented in direct empirical evidence.

6.2 Relationship Between Technology and Performance Indicators

The evidence suggests association rather than confirmed causation. ERP adoption is linked with organizational performance in Libyan public organizations [4]. E-government maturity is linked conceptually and practically with service delivery, process integration and administrative capability in local authorities [3], [7]. Digital services are associated with transparency and sustainability in municipalities [14]. E-learning is associated with institutional continuity and knowledge-delivery capability, but its effectiveness is constrained by training, infrastructure and finance [5], [6]. These findings support a conditional relationship: technology may contribute to management performance when readiness conditions are present, but technology alone is not sufficient.

6.3 Measurement of Management Performance

The measurement evidence is inconsistent. Some studies use broad organizational-performance constructs measured through questionnaires; others use transparency, sustainability, readiness, service

continuity or perceived implementation challenges. Very few studies report objective performance indicators such as service-processing time, cost reduction, system uptime, project completion, complaint-resolution speed, budget execution, audit quality, productivity or citizen satisfaction measured over time. This is an important research gap because it prevents strong claims about performance improvement.

6.4 Libya-Specific Implementation Conditions

The implementation conditions are not only technical. Infrastructure reliability and digital skills recur across studies, while Libya-specific institutional arrangements shape how technology projects are implemented. Separate administrative authorities may require stronger coordination for unified data standards and national platforms. Security and administrative considerations can affect fieldwork, procurement, maintenance and continuity. Public-sector dependence on state funding and oil revenue can make digital projects sensitive to budget timing. Municipal variation means that Tripoli, Benghazi, Misurata and smaller municipalities may not share the same readiness level. These conditions must be integrated into future technology-management models rather than treated as background.

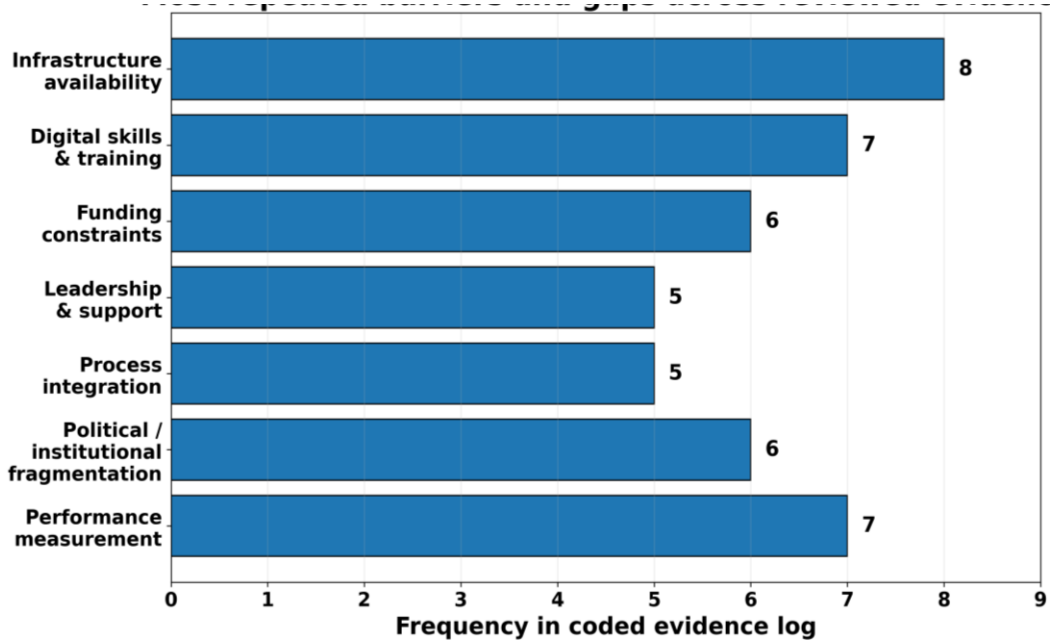


Figure 4. Frequently repeated barriers and gaps in the coded evidence log. Frequencies are indicative and should be updated after final database screening. Constructed by the author from coded evidence in [3]-[7], [13], [14], with official Libyan policy and institutional context checked against GIA [21], ITC [22], LPTIC [23], CBL [24], NISSA [25], the GIA government-services portal [26] and the Libyan electronic procedures portal [27].

7. Discussion

The revised synthesis leads to a more cautious conclusion than the earlier draft. Technology is not a guaranteed driver of management performance in Libya. Instead, the relationship depends on whether technology is embedded in organizational processes, whether managers can use system outputs for decisions, whether employees receive training, whether infrastructure is reliable, and whether the institutional environment supports integration across departments and regions. This interpretation aligns

better with the evidence than a broad claim that technology “improves” performance. The Libya context adds a distinct contribution. In highly centralized institutional environments, technology-management studies often focus on user acceptance, implementation success or organizational readiness. In Libya, those factors remain important but are not enough. Administrative variation, security considerations and uneven public-sector capacity shape the feasibility of ERP, e-government, municipal digital services and national digital governance. Therefore, Libya-focused studies should not merely apply TOE, UTAUT or IS success models without contextual adaptation. The framework in Figure 5 revises the earlier model by positioning institutional context and measurement discipline as conditions that shape the technology-performance relationship.

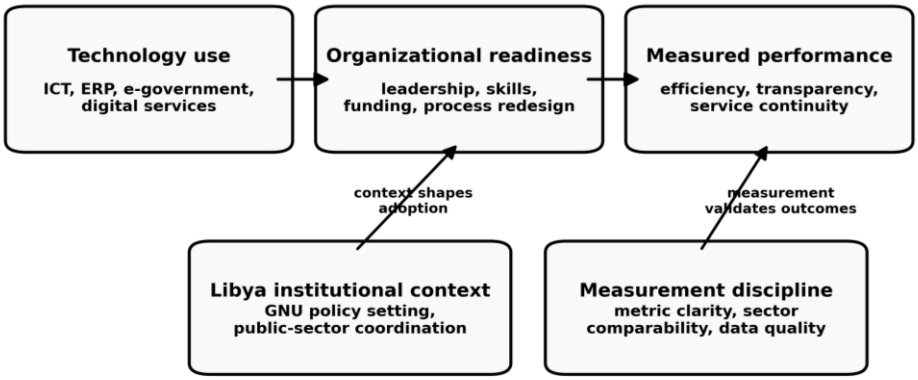


Figure 5. Revised conceptual framework. The framework avoids assuming causality and shows that context and measurement condition the technology-performance relationship. Developed from TOE [15], UTAUT [16], IS-success logic [17], the Libya-focused evidence [3]-[7], [13], [14], and official Libyan digital-government, telecommunications, banking and cybersecurity sources [21]-[27].

8. Research Gaps Before Conclusion

The first gap is a measurement gap. The literature does not consistently define management performance. Some studies measure organizational performance broadly, while others focus on readiness, barriers, transparency, sustainability, continuity or user acceptance. Future research should specify measurable indicators such as service-processing time, error reduction, system uptime, digital-service completion rate, user satisfaction, reporting accuracy, budget execution or decision speed. The second gap is an evidence-design gap. Most Libya-focused studies use cross-sectional surveys, case studies or descriptive designs. These designs are valuable for identifying implementation conditions and associations, but they cannot demonstrate whether technology adoption directly produces improved management performance. Longitudinal studies, before-and-after implementation evaluations, matched case comparisons and mixed-method designs are needed.

The third gap is a sector gap. Existing evidence is concentrated in public administration, local authorities, municipalities and education. There is limited direct evidence on technology and management performance in oil and gas, banking, healthcare, logistics, telecommunications and SMEs. This is problematic because Libya’s economy is heavily influenced by oil revenue and public-sector spending; ignoring oil and finance requiring developmentens the practical relevance of the literature.

The fourth gap is a context gap. Studies frequently mention infrastructure or administrative challenges, but few model how parallel administrative structures, security considerations, municipal variation,

procurement constraints or public-sector coordination affect technology projects. Future research should compare organizations across western, eastern and southern Libya rather than treating the country as one uniform administrative environment.

The fifth gap is a quality-appraisal gap. Many reviews of Libya-related technology adoption cite studies without weighing their methodological strength. Future SLRs should use MMAT, CASP, JBI or a similar tool to distinguish strong empirical evidence from descriptive, conceptual or grey-literature sources. Without quality appraisal, less rigorous studies may influence conclusions as much as robust studies.

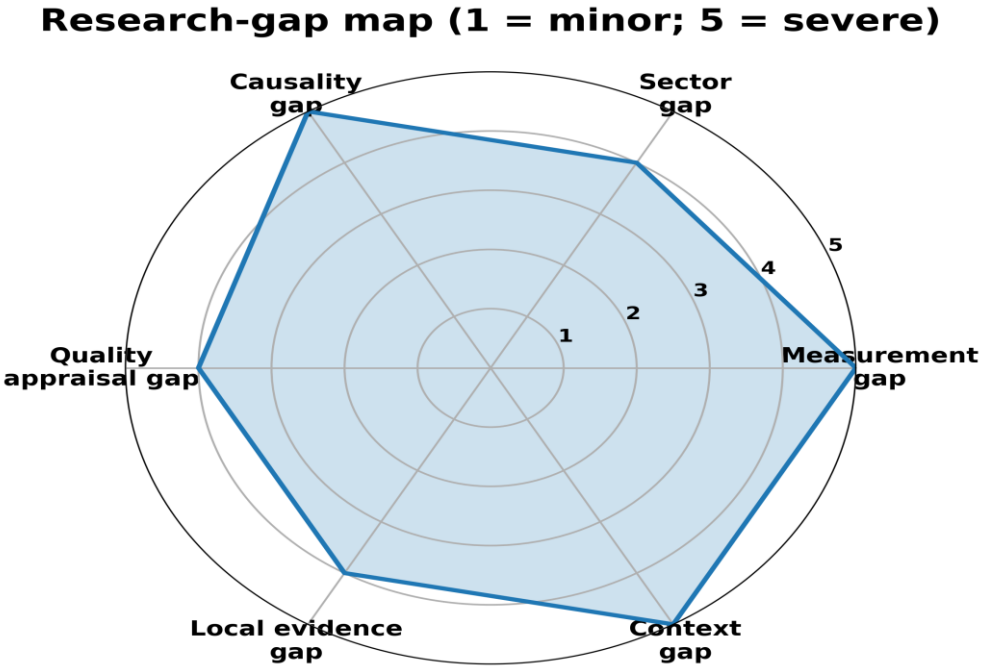


Figure 6. Research-gap map. The most severe gaps are measurement, causality and context integration. Constructed by the author from the quality-appraisal matrix in Appendix B and the contrast between academic evidence [3]-[7], [13], [14] and official Libyan digital-transformation/service sources [21]-[27].

9. Implications

For researchers, the main implication is that technology-management studies in Libya need stronger operationalization. Researchers should define performance indicators before data collection and align theory, variables, methods and findings. For managers, the evidence suggests that technology investments should be accompanied by training, process redesign, leadership support and performance monitoring. For policymakers, the findings indicate that national digital transformation requires institutional coordination, stable funding, cybersecurity readiness and reliable infrastructure, not only internet access or mobile penetration.

10. Limitations

This revised paper is transparent about its limitations. First, the review is prepared before a complete exported database-search log is available; therefore, the PRISMA flow is presented as a defensible protocol

and must be populated with actual numbers before journal submission. Second, the Libya-specific evidence base is small and uneven across years. Third, some relevant sources are local, Arabic-language or grey literature, which creates appraisal challenges. Fourth, the paper uses contextual reports to interpret Libya's environment but does not treat those reports as equivalent to peer-reviewed empirical studies. Fifth, because most included studies are cross-sectional or descriptive, the review cannot claim causal effects.

11. Conclusion

This paper reviewed evidence on technology and management performance in Libya from January 2020 to 31 May 2026. The corrected review avoids temporal overreach, defines management performance, separates empirical studies from contextual sources, introduces quality appraisal and places research gaps before the conclusion. The evidence indicates that technology use in Libya is associated with potential improvements in information flow, reporting, service continuity, transparency and organizational integration. However, these associations are conditional and depend on infrastructure, skills, funding, management support, process maturity and institutional coordination. The key conclusion is that Libya does not simply need more technology. It needs technology that is institutionally supported, organizationally embedded and performance-measured. Future studies should therefore move beyond adoption intention and general barriers toward measurable management outcomes, sector-specific analysis and longitudinal evidence. Only then can researchers determine whether and how digital transformation improves management performance in Libya.

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Appendix A provides a transparent protocol for re-running the review

The search should be run on the same day across all databases. Export files should be saved and named by database, date and search string. The final PRISMA counts should be calculated from these exported files. In addition to academic databases, official Libyan websites should be searched and archived as contextual evidence: General Information Authority, Information Technology Centre, LPTIC, Central Bank of Libya, NISSA, GIA government-services portal and the Libyan electronic procedures portal [21]-[27].

Database/source	Search string	Limits and notes
Scopus / WoS	TITLE-ABS-KEY((Libya OR Libyan) AND (technology OR ICT OR "digital transformation" OR "e-government" OR ERP OR "information system*" OR "digital service*") AND ("management performance" OR "organizational performance" OR efficiency OR transparency OR "service delivery" OR "decision-making" OR accountability))	Date: 2020-2026; document type: article/conference/review; language: English/Arabic where supported.
IEEE Xplore	("All Metadata":Libya OR "All Metadata":Libyan) AND (ICT OR "digital transformation" OR "e-government" OR ERP OR "information systems") AND (performance OR management OR efficiency OR transparency)	2020-31 May 2026; conferences and journals.
ACM Digital Library	Libya AND (e-learning OR e-government OR digital transformation OR information systems) AND (management OR performance OR service delivery OR challenges)	2020-31 May 2026.
Google Scholar	"Libya" "digital transformation" "management performance" OR "organizational performance"	Screen first 100 results by relevance and date; save results log.
Arabic/local journals	ليبيا AND التحول الرقمي AND الأداء الإداري OR الحوكمة نظم المعلومات OR الإلكترونية	Screen Libyan and Arab journals; translate title/abstract fields.

Appendix B: Evidence Extraction and Quality-Appraisal Matrix

The matrix below is a working extraction table. It should be expanded after final database screening. Quality is rated High, Moderate or Low based on clarity of method, relevance, data transparency, sample adequacy and alignment between evidence and claims. Official Libyan sources [21]-[27] should be coded separately as contextual or policy sources, not as peer-reviewed empirical studies.

Year	Source	Source type	Sector / technology	Method	Performance indicator	Key Libya-specific contribution	Quality/status
2021	Wynn et al. [3]	Peer-reviewed article	Local authorities / e-government	TOP maturity model; case studies	Administrative readiness, process maturity, service delivery potential	High Libya relevance; identifies outdated hardware, inadequate networks, skills requiring development, low funding	Moderate-High
2021	Al Ghawail et al. [5]	Preprint / empirical study	Higher education / e-learning	Mixed questionnaire/ interview approach	Knowledge delivery, ICT readiness, continuity	Identifies lack of ICT knowledge, infrastructure and financial support	Moderate
2022	Elberkawi	Peer-	Higher	Comparative	Continuity,	Shows differing	Moderate

	et al. [6]	reviewed conference paper	education / e-learning	questionnaire study	barriers, instructor-student perspectives	obstacles across user groups during COVID-19	
2022	USAID DECA Libya [12]	Institutional report	Digital ecosystem	Country assessment	Infrastructure, digital governance, digital economy	Useful context but not a management-performance study	Context only
2024	Egdair et al. [4]	Peer-reviewed article	Public organizations / ERP	Quantitative PLS-SEM; 119 usable responses	Organizational performance	Directly tests ERP adoption-performance relationship but cross-sectional	High
2024	ElMadani and AlDhbbah [13]	Journal article	Digital transformation / sustainability	Descriptive analytical	Efficiency, resource access, sustainable development	Broad strategic relevance, limited direct performance measurement	Moderate
2025	Shwehdy [7]	Peer-reviewed conference paper	E-government / public sector	Case study / TOE-UTAUT framing	Drivers, barriers, digital government implementation	Strong post-transition framing; identifies organizational and environmental barriers	Moderate-High
2025	Benhkoma et al. [14]	Journal article	Municipalities / digital services	Field study; questionnaire	Transparency, sustainability, local governance	Direct municipal evidence; useful for public management performance	Moderate-High
2025	DataReportal [8]	Contextual data report	National digital context	Digital statistics compilation	Internet users, mobile connections, social media	Useful background; not evidence of organizational performance	Context only
2025	Internet Society [9]	Contextual data report	Internet infrastructure	Resilience indicators	Internet resilience, local cache reach, ISP choice	Useful to explain infrastructure constraints	Context only
2026	Human Rights Watch [1]	Contextual report	institutional context	Country report	Institutional coordination and security context	Useful for interpreting barriers; not technology evidence	Context only