

Open Innovation, Artificial Intelligence, and Digital Transformation in Healthcare

Institutions in Morocco : A Conceptual and Contextual Analysis

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Abstract

Healthcare institutions across the world are undergoing a profound transformation driven by digital technologies, artificial intelligence , and increasingly collaborative, boundary-spanning models of innovation. Morocco, as an emerging economy pursuing an ambitious national digital agenda, offers a particularly instructive case for examining how open innovation, AI adoption, and digital transformation intersect within resource-constrained public and private health systems. This paper synthesizes the theoretical foundations of open innovation and digital transformation with empirical evidence on artificial intelligence adoption in Moroccan hospitals, university medical centers, and health-technology start-ups. Drawing on the broader Moroccan innovation-management literature, the paper develops an integrative conceptual framework linking open innovation practices to AI-enabled digital transformation in healthcare. The analysis shows that Morocco has made tangible progress through national strategies such as Digital Morocco 2030, the generalization of social protection, and pilot telemedicine and AI programs, yet continues to face structural barriers including fragmented digital infrastructure, limited interoperability, workforce shortages, regulatory gaps, and organizational resistance to open, collaborative innovation models. The paper concludes with recommendations for strengthening open innovation ecosystems, building institutional absorptive capacity, and aligning digital health governance with national data-sovereignty objectives.

Keywords: open innovation, artificial intelligence, digital transformation, healthcare institutions, Morocco, knowledge management

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Introduction

Healthcare systems in low- and middle-income countries face a common paradox: the demand for higher-quality, more accessible, and more personalized care is rising at precisely the moment when public budgets, human-resource capacity, and physical infrastructure remain constrained. Digital technologies, and artificial intelligence in particular, are frequently presented as a way to resolve this paradox by extending clinical expertise, automating administrative burden, and connecting fragmented care pathways (Idaomar et al., 2024; Sqalli Houssaini et al., 2026). At the same time, no single hospital, ministry, or start-up possesses all of the knowledge, capital, and technical capability required to build a modern digital health ecosystem on its own. This has renewed interest in open innovation, a paradigm in which organizations deliberately combine internal and external knowledge flows to accelerate innovation and reach markets more effectively (Chesbrough, 2003; Chesbrough & Bogers, 2014).

Morocco offers a compelling setting in which to examine how these three phenomena open innovation, artificial intelligence, and digital transformation interact within healthcare institutions. Over the past decade, the Moroccan state has pursued an increasingly ambitious digital agenda, culminating in the Digital Morocco 2030 strategy, the generalization of social protection under Framework Law 06.22, and a series of ministry-led initiatives to unify medical records and expand telemedicine (Elhazziti et al., 2023; Sqalli Houssaini et al., 2026). Simultaneously, Moroccan hospitals, university medical centers, and health-technology start-ups have begun to experiment with AI applications ranging from diagnostic imaging to appointment scheduling and robotic

surgery (Idaomar et al., 2024; Omari Haraké, 2025). Yet these developments have occurred largely as parallel, often siloed initiatives rather than as a coherent open innovation ecosystem in which knowledge, data, and capability flow deliberately across organizational boundaries.

This paper addresses three interrelated questions. First, how do the theoretical frameworks of open innovation and digital transformation apply to healthcare institutions operating in an emerging-economy context such as Morocco? Second, what is the current state of AI adoption and open innovation practice within Moroccan healthcare institutions, and what evidence exists regarding their outcomes? Third, what organizational and policy conditions would allow Morocco to move from isolated pilot projects toward a more integrated, sustainable model of open, AI-enabled digital transformation in healthcare? In addressing these questions, the paper draws on the broader Moroccan management-research literature on digital transformation, knowledge management, and organizational innovation, which provides a domestic theoretical anchor for the analysis that follows.

The remainder of the paper is organized as follows. The literature review situates open innovation, digital transformation, and AI in healthcare within their respective theoretical traditions and reviews Moroccan-specific research on innovation and digital transformation. Subsequent sections describe the structure and challenges of the Moroccan healthcare system, the national digital health strategy, and concrete examples of AI adoption and open innovation practice in Moroccan healthcare institutions. The paper then proposes an integrative conceptual framework, discusses barriers to adoption, and closes with recommendations for policymakers, hospital administrators, and researchers.

Literature Review

Open Innovation: Origins and Core Concepts

The concept of open innovation was formally introduced by Chesbrough (2003), who contrasted it with the traditional "closed innovation" paradigm in which firms rely exclusively on internal research and development to generate, develop, and commercialize new ideas. Under open innovation, valuable ideas can originate either inside or outside the organization, and can reach the market through internal or external pathways. Chesbrough and Bogers (2014) later refined the definition to describe open innovation as a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, achieved through pecuniary and non-pecuniary mechanisms in line with the organization's business model. Subsequent research has distinguished between inbound open innovation, in which external knowledge is acquired and integrated into internal processes, and outbound open innovation, in which internal knowledge or technology is transferred to external partners for further development (Dahlander & Gann, 2010).

Open innovation has been applied across manufacturing, pharmaceuticals, and information technology, but its extension to healthcare service delivery has been comparatively slow. Wass and Vimarlund (2016) conducted an early literature review on open innovation in healthcare and found that, despite growing interest, empirical research remained limited, and that the complexity of healthcare organizations, regulatory constraints, and the need to establish routines for capturing knowledge from patients and clinicians constrained its diffusion. More recent systematic reviews confirm this pattern: open innovation activity in healthcare tends to concentrate in medical-device development and pharmaceutical research, with comparatively less evidence on open innovation in hospital operations, service design, or public health management (Torab-Miandoab et al., 2024).

Digital Transformation in Organizations

Digital transformation refers to the process by which organizations use digital technologies to fundamentally change value creation processes, organizational structures, and stakeholder relationships (Vial, 2019). Unlike simple digitization the conversion of analog information into digital form or digitalization the use of digital technologies to change existing business processes digital transformation implies a more structural reconfiguration of the organization's strategy, culture, and capabilities (Verhoef et al., 2021). In healthcare, this reconfiguration typically involves the interlinked adoption of electronic health records, telemedicine platforms, interoperability standards, and, increasingly, AI-based clinical and administrative tools (Sqalli Houssaini et al., 2026).

A recurring theme in the digital transformation literature is that technology adoption alone is insufficient; successful transformation depends on organizational learning capability, knowledge management processes, and leadership commitment. A large-scale bibliometric analysis of the knowledge-management and digital-innovation literature in healthcare, drawing on 419 Scopus-indexed publications, found that themes such as data-driven decision-making, AI-enabled clinical decision support, and knowledge-sharing platforms have grown rapidly in prominence, and that interdisciplinary collaboration among clinicians, technologists, and policymakers is increasingly recognized as central to translating digital investment into measurable performance gains (Stoumpos, Talias, Ntais, Kitsios, & Jakovljevic, 2024). Although this bibliometric evidence spans healthcare systems generally rather than the Moroccan context specifically, its central argument—that digital transformation outcomes are mediated by knowledge management capability and organizational innovation culture rather than by

technology adoption alone applies with equal force to Moroccan hospitals, where clinical and administrative staff must similarly absorb, adapt, and routinize new digital tools.

Artificial Intelligence in Healthcare: Global Perspectives

Artificial intelligence in healthcare encompasses computational systems that learn from clinical, administrative, or epidemiological data to support diagnosis, treatment planning, resource allocation, and disease surveillance (Omari Haraké, 2025). The World Health Organization has emphasized that, when properly governed, AI can accelerate diagnosis, extend the reach of scarce specialists, and strengthen public health surveillance, while cautioning that the same technologies can exacerbate inequities or cause harm if deployed without adequate ethical safeguards (World Health Organization, 2021). Global evidence points to measurable gains in diagnostic accuracy for medical imaging, more efficient triage and scheduling, and improved epidemiological forecasting, but also to persistent concerns about algorithmic bias, data governance, informed consent, and the allocation of legal responsibility when AI-assisted decisions cause harm (Omari Haraké, 2025).

Open Innovation in Healthcare Systems

Because healthcare innovation frequently requires combining clinical expertise, technical capability, patient data, and regulatory knowledge that no single actor possesses in full, healthcare has been described as a naturally fertile, if underexploited, domain for open innovation (Torab-Miandoab et al., 2024). Hospitals are increasingly recognized not merely as consumers of medical innovation but as potential generators of it, particularly when they function as academic medical centers with research and training missions (Torab-Miandoab et al., 2024). Nonetheless, systematic reviews identify persistent barriers to open innovation in healthcare, including

regulatory uncertainty, unclear value-capture mechanisms for the various actors in the innovation ecosystem, data-sharing and privacy constraints, and the difficulty of establishing trust between healthcare providers and external technology partners such as AI companies and health-technology start-ups (Wass & Vimarlund, 2016; Torab-Miandoab et al., 2024). These findings suggest that open innovation in healthcare is less a matter of adopting a single practice than of building an ecosystem-level capacity for collaboration across historically siloed actors.

Digital Transformation and Innovation Research in the Moroccan Context

A growing body of Moroccan management research has examined digital transformation, knowledge management, and innovation performance, though much of it has focused on higher education institutions, small and medium enterprises, and start-up ecosystems rather than on healthcare specifically. In a quantitative study of Moroccan higher education institutions, digital transformation was found to strengthen organizational performance primarily through its effect on knowledge management processes, suggesting that the benefits of digital investment are conditional on an institution's capacity to capture, share, and apply knowledge generated through digital tools; a related study of Moroccan start-ups showed that organizational culture, particularly adhocracy cultures characterized by flexibility and risk tolerance, plays a decisive role in shaping the extent to which firms pursue disruptive, as opposed to incremental, innovation (Ait Oufkir, Azzab, El Hijazi, & Elktiri, 2025a, 2025b). Complementary Moroccan studies have examined organizational learning capability and innovation in higher education institutions in the Agadir region, again underscoring that managerial commitment, experimentation, openness, risk-taking, and knowledge transfer jointly determine an institution's innovative capacity.

While this literature does not address healthcare institutions directly, it offers a domestically grounded theoretical vocabulary organizational learning capability, knowledge management process, innovation culture that is directly transferable to the analysis of Moroccan hospitals and health administrations, which face analogous challenges of absorbing digital technologies within hierarchical, resource-constrained public organizations. This paper extends that vocabulary to the healthcare domain, using it alongside the international open-innovation and digital-health literatures to interpret the Moroccan healthcare sector's experience with AI and digital transformation.

The Moroccan Healthcare System: Structure and Challenges

Morocco's healthcare system has historically combined a hospital-centered public network organized around primary healthcare centers, regional hospitals, and university hospitals (CHUs) with a growing private sector concentrated in urban areas (Mahdaoui & Kissani, 2023). Despite notable achievements in expanding health coverage, the system continues to face structural challenges, including geographically uneven distribution of medical personnel, a shortage of specialists relative to population needs, persistent disparities in access to care between urban and rural regions, and fragmented coordination across levels of care (Mahdaoui & Kissani, 2023; Sqalli Houssaini et al., 2026). These challenges are compounded by a rising burden of non-communicable and chronic diseases including diabetes, hypertension, and cardiovascular disease—which now account for the majority of mortality in the country and require sustained, coordinated, longitudinal management rather than episodic hospital-based care (Sqalli Houssaini et al., 2026).

In response, Morocco has undertaken a structural reform of its health system anchored in Framework Law 06.22, which rests on four pillars: strengthening governance across all levels of the health system, investing in human resources, upgrading healthcare services to ensure equitable access, and digitizing the health system through an integrated national information platform (Sqalli Houssaini et al., 2026). A related reform, Law 08.22, establishes Territorial Health Groups that unify primary healthcare centers, regional hospitals, and university hospitals within each region, with the explicit aim of standardizing referral pathways and monitoring protocols for chronic-disease patients. These reforms create an institutional context in which digital transformation and, by extension, open innovation are not peripheral options but explicit pillars of national health policy.

National Digital Health Strategy and Governance

Morocco's digital health agenda sits within the broader Digital Morocco 2030 strategy, which allocates significant public investment toward digital infrastructure and digital skills development, with AI identified as a central enabling technology across sectors including healthcare and finance. In the health sector specifically, the 2025 Finance Bill earmarked substantial investment for the digitization of hospitals, and the Ministry of Health and Social Protection, together with the National Social Security Fund and the Digital Development Agency, has moved to unify the shared medical record and the electronic care sheet through a common interface (Sqalli Houssaini et al., 2026). Partnerships such as that between the Mohammed VI University Hospital and private information-systems providers illustrate a public–private approach to hospital digitization, with an explicit target of improving pilot-hospital operational efficiency by a meaningful margin within a defined period.

Governance structures are also evolving. At the November 2025 International E-Health Forum in Casablanca, Moroccan officials announced the creation of a General Directorate for Artificial Intelligence intended to steer public AI policy and to ensure that digital health advances within a secure, ethical, and sovereign framework, while representatives of the General Directorate for Information Systems Security emphasized that the health sector is classified as critical infrastructure subject to continuous monitoring and mandatory incident reporting. These developments indicate a shift from scattered pilot initiatives toward a more structured, if still emergent, national digital health governance architecture one that explicitly foregrounds interoperability, cybersecurity, data quality, and data sovereignty as the pillars of Morocco's future health ecosystem.

At the regulatory level, Moroccan Law 09-08 on the protection of individuals with regard to the processing of personal data establishes requirements for explicit patient consent, transparency in data use, and technical safeguards for sensitive health information, providing at least a partial legal foundation for the data-sharing arrangements that open innovation and AI-enabled digital transformation require (Sqalli Houssaini et al., 2026). However, researchers note that Morocco does not yet have a comprehensive national program dedicated solely to AI in healthcare, and that pilot initiatives remain largely uncoordinated across public authorities, healthcare institutions, and private actors (Omari Haraké, 2025).

Artificial Intelligence Applications in Moroccan Healthcare Institutions

AI adoption in Moroccan healthcare institutions, though still at an early and largely pilot-based stage, spans a range of clinical and administrative functions. A recent analysis of AI applications deployed across Moroccan public and private healthcare establishments identified

improvements in appointment management, surgical planning, diagnostic support, patient-record tracking, and operating-room organization, with radiology and biology among the clinical domains most affected (Idaomar et al., 2024).

Diagnostics and Medical Imaging

AI-assisted image analysis is among the most mature applications in the Moroccan context, supporting radiologists in detecting abnormalities in X-rays, CT scans, and MRIs more quickly and, in some cases, more accurately than manual review alone (Idaomar et al., 2024; Sqalli Houssaini et al., 2026). Industry surveys indicate that a substantial share of Moroccan hospitals now use some form of AI-assisted diagnostic tool, reflecting a broader continental trend in which imaging and predictive analytics are the entry point for AI adoption in resource-constrained health systems.

Hospital Administration and Resource Management

Administrative applications of AI particularly appointment scheduling have achieved comparatively wide diffusion in Moroccan hospitals, addressing chronic problems such as long wait times and missed appointments that disproportionately burden public urban hospitals with limited administrative staff. Beyond scheduling, AI and large-scale data analytics are being explored to streamline contract management, regulatory documentation, and hospital resource allocation, freeing clinical staff to spend more time on direct patient care.

Telemedicine and Remote Chronic-Disease Monitoring

Since the Moroccan Society of Telemedicine and the Ministry of Health launched a nationwide telemedicine pilot program in 2018, Morocco has progressively extended remote-

consultation infrastructure to underserved rural sites, supported since 2018 by a legal framework for telemedicine practice (Sqalli Houssaini et al., 2026). A concrete example is the nephrology department at the Hassan II University Hospital in Fez, which uses telemedicine to remotely monitor patients with end-stage chronic kidney disease undergoing peritoneal dialysis, enabling real-time treatment adjustment through connected dialysis devices and a hospital-based monitoring station. Such initiatives illustrate how AI and connected-device data can be combined with telemedicine to support continuous, data-driven management of chronic disease in a system historically organized around episodic, hospital-centered care.

Robotic Surgery and Advanced Clinical Applications

Robotic-assisted surgery has also expanded in Morocco over the past several years, reflecting growing investment in advanced clinical technology within leading university hospitals and private clinics. While the clinical evidence base specific to the Moroccan context remains limited, this growth signals an institutional appetite for frontier medical technologies that, combined with AI-based decision support, could further reshape surgical planning and postoperative monitoring in the coming years.

Open Innovation Practices in Moroccan Healthcare Institutions

Although the language of "open innovation" is rarely used explicitly by Moroccan healthcare actors, several observable practices align closely with the theoretical mechanisms described by Chesbrough (2003) and subsequent healthcare-specific research (Torab-Miandoab et al., 2024).

Public–Private Collaboration

The digitization of Moroccan hospitals has proceeded substantially through public–private partnerships, in which ministries and public hospitals contract with private information-systems providers to design and deploy shared medical-record platforms and hospital information systems. Such arrangements constitute a form of inbound open innovation, in which public healthcare institutions integrate externally developed technological capability into their internal operations rather than attempting to build every digital component in-house.

University Hospitals as Innovation Hubs

Morocco's university hospitals (CHUs) occupy a distinctive position in the innovation ecosystem because their mandate explicitly combines patient care with education, training, research, and innovation. This multi-mission structure positions CHUs as natural boundary-spanning organizations capable of absorbing external knowledge from academic partners, international research networks, and technology firms, and of generating innovations such as locally adapted telemedicine protocols that can subsequently diffuse to regional and primary care levels. Institutions such as Mohammed VI Polytechnic University have similarly launched data-science and modeling programs explicitly designed to prepare professionals to work at the intersection of healthcare and artificial intelligence, reflecting a deliberate strategy of building absorptive capacity for AI-enabled innovation.

Health-Technology Start-Ups and the Broader Innovation Ecosystem

Morocco's wider innovation-policy environment including national engineering schools dedicated to AI in Taroudant and Berkane and a growing base of AI-oriented start-ups provides an ecosystem from which health-technology ventures can draw talent and technical capability.

Organizational research on open innovation capability finds that both extrinsic factors, such as organizational culture and exposure to disruptive technology, and intrinsic factors, such as employees' interactive desire to share knowledge, jointly drive new-knowledge diffusion within organizations, and that this diffusion effect is strengthened where individual employees possess higher absorptive capacity (Chiu, Cheng, & Lin, 2024), a finding with direct relevance for health-technology start-ups seeking to introduce novel AI-based diagnostic or monitoring tools into a historically risk-averse and heavily regulated healthcare sector. The same research underscores that innovation culture, rather than resource availability alone, differentiates ventures capable of translating open external knowledge into new products and services from those that remain confined to incremental change.

Toward an Integrative Conceptual Framework

Building on the preceding review, this paper proposes an integrative framework in which open innovation, artificial intelligence, and digital transformation are conceptualized as mutually reinforcing rather than sequential processes within Moroccan healthcare institutions. In this framework, open innovation functions as the governance mechanism through which healthcare institutions access external knowledge, capital, and technical capability—whether from private information-technology firms, university research laboratories, international health organizations, or domestic start-ups. Artificial intelligence functions as the principal technological substrate through which this external knowledge is operationalized into concrete clinical and administrative applications, such as diagnostic imaging support, predictive analytics for chronic-disease management, and automated scheduling. Digital transformation, in turn, represents the organizational-level outcome: the restructuring of workflows, governance arrangements, and

institutional culture required for AI-enabled innovations to be absorbed, routinized, and scaled across the health system rather than remaining isolated pilot projects.

Consistent with the evidence reviewed above that digital transformation affects organizational performance primarily through its influence on knowledge management processes, this framework treats knowledge management capability the ability of a hospital or health administration to capture, codify, share, and apply knowledge generated through digital tools and external partnerships as the critical mediating variable linking open innovation and AI adoption to sustained digital transformation outcomes. Institutions with weak knowledge management processes may adopt AI tools or enter into open innovation partnerships without translating them into durable organizational change, a pattern broadly consistent with international evidence that most digital health efforts in Morocco remain at the pilot or descriptive stage, with limited data on quantifiable clinical outcomes (Sqalli Houssaini et al., 2026). Conversely, institutions such as leading Moroccan university hospitals, which combine research, training, and innovation mandates, are structurally better positioned to develop the knowledge management routines needed to convert externally sourced AI capability into scalable, measurable improvements in care delivery.

Barriers and Challenges

Infrastructure and Connectivity

Reliable digital infrastructure, including broadband and mobile connectivity, remains unevenly distributed across Morocco, particularly in rural and mountainous regions where chronic-disease burden and specialist shortages are often most acute. Researchers consistently identify

infrastructural constraints including limited connectivity and incomplete rollout of higher-generation mobile networks as a fundamental precondition for the successful scaling of telemedicine, AI-based remote monitoring, and interoperable health information systems (Sqalli Houssaini et al., 2026).

Interoperability and Data Governance

A recurring theme across the Moroccan digital-health literature is the persistence of heterogeneous, weakly interoperable legacy information systems across primary, regional, and university levels of care, compounded by the largely proprietary systems used by private clinics and hospitals (Sqalli Houssaini et al., 2026). This interoperability gap constrains the ability of AI systems to draw on comprehensive, longitudinal patient data and limits the extent to which open innovation partnerships—particularly those involving external AI companies can access the data necessary to develop and validate clinically useful models, a constraint also identified in the international open-innovation-in-healthcare literature as a central barrier to inbound innovation (Torab-Miandoab et al., 2024).

Workforce Capacity and Digital Skills

Multiple analyses point to a shortage of professionals combining clinical expertise with digital and data-science competencies, alongside broader workforce shortages in digital health and medical research more generally. New hybrid roles such as clinical AI validation specialists and telemedicine data coordinators are emerging in the Moroccan labor market, but training pipelines have not yet scaled to meet demand, creating a risk of skill bottlenecks that could constrain the broader diffusion of AI applications across the public health system.

Organizational Culture and Institutional Resistance

Consistent with the broader innovation-management literature, organizational culture appears to be a decisive, if underappreciated, determinant of successful digital transformation in healthcare. A large-scale PLS-SEM study of Norwegian hospital employees found that an internal market-oriented culture and supportive leadership climate significantly strengthened employees' individual innovative behavior, largely by increasing employees' perception of their hospital as an attractive place to work and invest discretionary effort in (Mutonyi, Slåtten, Lien, & González-Piñero, 2022). This is consistent with earlier survey evidence from 192 hospital administrators showing that organizational culture shapes hospitals' absorptive capacity, their ability to recognize, assimilate, and apply new information, and that this absorptive capacity was in turn a significant predictor of successful information-technology implementation (do Carmo Caccia-Bava, Guimaraes, & Harrington, 2006). Read together, these findings suggest that hierarchical and clan-oriented organizational cultures, common in traditional Moroccan public institutions, likely favor incremental rather than disruptive innovation, which may partly explain why AI adoption in Moroccan healthcare has concentrated on relatively low-risk applications, such as scheduling and imaging support, rather than on more transformative uses involving autonomous clinical decision-making. Overcoming this pattern is likely to require deliberate investment in organizational learning capability, managerial commitment to experimentation, and structured mechanisms for capturing and transferring knowledge gained through pilot projects.

Ethical, Legal, and Regulatory Considerations

As AI becomes more embedded in Moroccan clinical practice, questions of informed consent, algorithmic bias, data protection, and legal responsibility for AI-assisted errors have

become increasingly salient (Omari Haraké, 2025). Moroccan regulatory guidance currently affirms that AI should never substitute clinical judgment in therapeutic decision-making, positioning AI as an assistive rather than autonomous technology; however, researchers note the continued absence of a comprehensive national legal and ethical framework specific to AI in healthcare, alongside unresolved questions about how liability should be apportioned among clinicians, software developers, and healthcare institutions when AI-informed decisions cause harm (Omari Haraké, 2025).

Discussion

Taken together, the evidence reviewed in this paper suggests that Morocco has assembled many of the individual components of an open, AI-enabled digital health transformation—national strategy documents, targeted infrastructure investment, pilot telemedicine programs, university-based AI training initiatives, and an evolving data-protection framework—without yet having integrated them into a coherent, ecosystem-level model of open innovation. This pattern echoes findings from the international literature, which similarly describes healthcare's engagement with open innovation as limited relative to sectors such as pharmaceuticals and consumer technology, notwithstanding healthcare's evident need for distributed, cross-boundary knowledge flows (Wass & Vimarlund, 2016; Torab-Miandoab et al., 2024).

The Moroccan case also illustrates a broader theoretical point emerging from the evidence reviewed above: digital transformation outcomes are contingent on organizational-level absorptive capacity knowledge management processes, learning capability, and innovation culture rather than being automatic consequences of technology adoption or external partnership. Applied to healthcare, this implies that expanding AI adoption or entering additional open innovation

partnerships is unlikely, by itself, to yield the improvements in care quality, efficiency, and equity that Moroccan policymakers seek. Rather, sustained investment in the organizational and human capabilities needed to absorb, adapt, and institutionalize externally sourced knowledge and technology is likely to be at least as important as the technologies themselves.

At the same time, Morocco's institutional architecture particularly its university hospitals, whose formal mandate already combines care, training, research, and innovation offers a structurally advantageous starting point for building this capacity, provided that knowledge generated in pilot programs is deliberately captured, codified, and diffused across the wider Territorial Health Group network established under Law 08.22, rather than remaining confined to individual departments or facilities.

Recommendations

Based on the preceding analysis, several recommendations emerge for Moroccan policymakers, healthcare administrators, and researchers seeking to strengthen open innovation and AI-enabled digital transformation in the health sector.

First, national digital health governance should move beyond infrastructure investment to explicitly institutionalize open innovation mechanisms, such as structured data-sharing agreements, innovation challenges, and formal partnership frameworks between public hospitals, university research laboratories, and health-technology start-ups, building on models already used successfully in other Moroccan innovation ecosystems.

Second, priority should be given to closing the interoperability gap between public and private health information systems, since fragmented, non-interoperable data infrastructure

constrains both the clinical usefulness of AI applications and the feasibility of external open innovation partnerships that depend on access to representative patient data.

Third, workforce development strategies should extend beyond training data scientists and AI engineers to include structured digital-literacy and knowledge management training for practicing clinicians and hospital administrators, consistent with the evidence reviewed above that digital transformation outcomes depend heavily on an institution's knowledge management capability rather than on technology deployment alone.

Fourth, university hospitals should be formally resourced and mandated to function as regional innovation hubs, responsible not only for piloting new AI and telemedicine applications but also for systematically documenting and transferring lessons learned to affiliated regional and primary healthcare facilities within their Territorial Health Group.

Fifth, Morocco's evolving AI governance architecture, including the announced General Directorate for Artificial Intelligence, should prioritize the development of a comprehensive, healthcare-specific ethical and legal framework addressing algorithmic bias, informed consent, and liability, in order to build the institutional and public trust that open, data-intensive innovation partnerships require.

Conclusion

This paper has examined how open innovation, artificial intelligence, and digital transformation intersect within Moroccan healthcare institutions, situating this analysis within both the international open-innovation and digital-health literatures and the domestic Moroccan management-research literature on digital transformation, knowledge management, and organizational innovation. The evidence indicates that Morocco has made genuine, policy-backed

progress toward a more digitized, AI-supported health system, exemplified by national reform laws, targeted infrastructure investment, and a growing array of pilot AI and telemedicine initiatives. However, this progress remains constrained by infrastructural gaps, weak interoperability, workforce shortages, organizational cultures oriented toward incremental rather than disruptive innovation, and an incomplete ethical and regulatory framework specific to AI in healthcare. Realizing the full potential of open, AI-enabled digital transformation in Moroccan healthcare will require not only continued technological investment but also deliberate, sustained development of the organizational learning capabilities and knowledge management processes needed to convert external knowledge and internal experimentation into durable, system-wide improvements in care access, quality, and equity.

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