Journal of Economic Additions | **Volume: 10 / N°: 02 (2026), pp 2397-2421**

Toward Smart Financial Governance: The Impact of Artificial Intelligence on the Effectiveness of Internal Control

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Received: 07/07/2026 *Accepted: 12/09/2026* *Published:30/09/2026*

Abstract:

This study aims to analyze the role of AI in supporting financial governance systems, with a focus on internal control. The study was based on an approach that combines theoretical analysis and applied analysis of banking experiences in Algeria and Qatar. Results showed that AI has become a central tool in the development of internal control, particularly in the field of automatic detection of financial fraud, analysis of massive data, and prediction of operational risks. However, the degree of maturity varies between Algeria and Qatar; Algerians banks are still in a Phase of Progressive transformation, facing challenges related to weak digital infrastructures, lack of technical skills, and the limitation of the legislative framework.

Keywords: governance; internal control; artificial Intelligence.
JEL Classification Codes: G30, M42, O33, G17, C63

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1. INTRODUCTION

Financial globalization and rising operational risks are driving technological changes that are changing financial institutions' governance, management, and control. A crucial instrument for improving the efficiency of financial governance and internal control systems is artificial intelligence. Systems and software that can learn, evaluate, forecast, and make judgments by imitating human thought are referred to as artificial intelligence. This allows them to process the enormous volumes of financial data that banks produce on a daily basis. A key component of financial governance is internal control, which aims to maintain operational integrity, stop fraud, regulate risks, and guaranty regulatory compliance. AI integration is now a strategic need rather than an option since conventional control systems are unable to keep up with the rapid information flows and technological breakthroughs.

Furthermore, AI has already demonstrated its potential to improve the efficiency and speed of internal processes by enabling smoother information flows, enhanced data traceability, and real-time monitoring of operations, thereby strengthening internal control mechanisms(Haddad, 2025). In addition, it has automated many repetitive and manual tasks, freeing up time for employees to focus on more strategic tasks(Kaplan, 1996). However, this evolution also raises new questions regarding governance. Indeed, internal control generally deals with sensitive data that raises issues of confidentiality and security; this information may be targeted by cyberattacks and hacking; in the event of a breach, it can lead to serious consequences that may impact the reputation of financial institutions. To this end, it must ensure that AI tools are secure(Abdaim & Bouaziz, 2023). This study compares Algerian and Qatari banks' usage of artificial intelligence in internal control inside financial governance systems. It seeks to ascertain the degree to which AI advances financial governance and internal control. In order to assist financial institutions in navigating the new digital era, the study ultimately aims to improve knowledge of the interplay between AI and financial governance.

2. Conceptual Framework of AI and Financial Governance

2.1 Artificial Intelligence: Definition and Historical Evolution

2.1.1. Definition: Artificial intelligence is defined as:

- A set of techniques enabling computer systems to perform tasks that normally require human intelligence, such as learning, reasoning, image recognition, or language comprehension(Russell & Norvig, 2022).
- A machine's ability to perform cognitive functions, namely perception, learning, interaction, and reasoning(Ergen, 2019).
- The ability of a digital computer or a computer-controlled robot to perform tasks typically associated with intelligent beings(Estep et al., 2024).
- AI refers to a machine's ability to perform tasks typically attributed to the human brain, aiming to create intelligent machines that interact like humans. It is therefore perceived as a simulation of the human brain(Hamadneh et al., 2021).

2.1. 2. The Evolution of AI in the Financial Sector

Artificial intelligence has undergone a gradual evolution in the financial sector since the mid-20th century, with its theoretical roots dating back to the 1950s when John McCarthy officially introduced the concept of "artificial intelligence" in 1956, as part of research aimed at enabling computers to simulate human thought(Russell & Norvig, 2022). In the 1960s and 1970s, the use of these technologies in banks was limited to the automation of computational operations and data processing, with the emergence of expert systems that attempted to simulate the decisions of financial analysts but were limited in their capabilities(Nilsson, 2008). financial computer applications expanded dramatically in the 1980s and 1990s as big banks like American Express and Citibank used rule-based systems for fraud detection and credit risk assessment. The growth of electronic financial services was further propelled by the expansion of the Internet. Artificial intelligence was also introduced around this time to analyze consumer behavior (OCDE, 2017).

Driven by machine learning and big data analytics, the use of AI in banking

really started in the new millennium. These tools were used by major institutions for real-time transaction monitoring, market forecasting, and risk analysis. While HSBC employed machine learning to spot suspicious behavior and lower false positives, JPMorgan Chase used deep learning to find odd transaction patterns(Dr. J Saradha et al., 2025). In addition, Bank of America launched the intelligent virtual assistant "Erica" in 2014 to provide personalized financial advice to customers(Manita et al., 2020).

Since 2015, the modern phase has been characterized by what is known as digital transformation and advanced artificial intelligence, thanks to deep learning and generative AI techniques, which have enabled banks to develop intelligent credit analysis systems, instant fraud detection tools, advanced banking chatbots, and automated investment advisory systems (« Feedzai Concludes Record-Breaking Fiscal Year 2024 », s. d.). As we enter the post-2025 era, artificial intelligence is moving toward strengthening the governance of financial systems and smart supervision, thereby ensuring a balance between innovation and accountability, as confirmed by the World Economic Forum's report on the future of artificial intelligence in financial services(*Davos 2024*, 2023).

2.2 Financial Governance: Definition and Historical Evolution

2.2.1. Definition: Financial governance is defined as:

- A system through which an institution's financial activities are directed and controlled with the aim of protecting the interests of shareholders and stakeholders, and ensuring that financial decisions are made in a manner that achieves efficiency and fairness(Shleifer & Vishny, 1997)

- A set of rules, mechanisms, and procedures designed to ensure the prudent management of financial resources, promote transparency and accountability in financial decision-making within institutions, thereby strengthening financial stability and mitigating risks(*OECD PRINCIPLES OF CORPORATE GOVERNANCE,* 1999). It represents the framework through which financial activities are guided and monitored to ensure the achievement of economic objectives and compliance with laws and ethical standards(*International Monetary Fund Annual Report 2000,* s. d.).

- A set of principles and procedures that ensure banking institutions are subject to an effective control system and clear accountability, and that financial risk management takes place in a transparent and accountable environment"(EBA, 2017).

- Financial governance goes beyond mere regulatory compliance, encompassing the development of an institutional culture based on financial discipline and intelligent internal control, thereby ensuring the sustainability of financial performance(Hamed, 2023).

According to the World Economic Forum (2020), contemporary financial governance is an advancement over conventional governance, integrating digital and financial aspects using AI and predictive analytics to track risks and enhance decision-making. Today, financial governance is an institutional framework that combines administrative and financial governance to guaranty the best possible use of resources and shield the financial system from corruption and operational risks. This is particularly important in the banking industry, which necessitates strict discipline and openness.

2.2.2. Evolution of Governance: The concept of financial governance in the banking sector has evolved in successive stages, influenced by economic changes and global financial crises. The roots of the concept began to emerge in the 1970s as part of the development of corporate governance in response to the rise in cases of financial corruption and conflicts of interest between management and shareholders in large institutions (Shleifer & Vishny, 1997)

During this phase, it became clear that it was necessary to separate ownership from management and to strengthen financial oversight mechanisms to ensure transparency and accountability. With the rise of financial globalization in the 1990s, the Organization for Economic Cooperation and Development (OECD) published the first international principles of corporate governance in 1999, which included standards for transparency, accountability, and financial risk management, thereby becoming a benchmark for the development of banking governance

systems(*OECD PRINCIPLES OF CORPORATE GOVERNANCE,* 1999). Furthermore, the International Monetary Fund (IMF) and In order to establish stability and combat corruption, the World Bank incorporated financial governance into banking reform initiatives. However, the 1997 Asian and 2008 global crises revealed the limited efficacy of bank governance systems. AIG and Lehman Brothers collapsed due in large part to inadequate risk management and poor financial supervision. As a result, in its 2010 report, the Basel Committee redefined financial governance by highlighting the importance of boards of directors, more robust internal controls, and proactive risk management in banks.

During the second decade of the 21st century, financial governance underwent a qualitative transformation with the digital revolution, as the concept expanded to include technological dimensions. Digital risk governance and financial data governance have emerged as essential elements of the banking control system, particularly following the European Banking Authority's publication of guidelines on internal governance that emphasized the integration of technology into internal oversight and audit systems(EBA, 2017). The World Economic Forum (2020) has also highlighted the need to develop digital financial governance based on artificial intelligence and predictive analytics to address the new challenges posed by digitalization and digital banking transformation.

As for the Arab world, the contours of financial governance began to take shape at the start of the new millennium. In 2009, the Arab Monetary Fund published a reference guide on the governance of Arab banks, aimed at standardizing principles of transparency and accountability within banking institutions. In Algeria, interest in applying financial governance principles increased following the 2003 banking system reforms, when the Bank of Algeria issued directives to strengthen internal control and risk management (Bank of Algeria, 2003). Banks have also begun adopting smart governance, which uses artificial intelligence to improve transparency and the quality of financial decision-making. In light of these transformations, financial governance has now become an integrative framework that combines traditional control mechanisms with smart

technology to ensure financial stability and strengthen confidence in the banking system.

3. The Role of AI in Financial Governance

3.1 The Relationship between Governance and AI

Artificial intelligence has become an essential component of modern financial governance, as it contributes to the automation of control processes and the development of financial decision-making mechanisms. The combination of the two can be summarized in three main dimensions, namely: Operational dimension or AI is used to automate internal audit and review processes, reducing human error and speeding up the processing of financial data. AI also helps detect unusual patterns that could indicate financial risks or fraud(Moura et al., 2025), the monitoring dimension, where AI technologies enable real-time monitoring of financial transactions and rapid detection of any irregularities or overspending. Companies such as IBM and Deloitte have developed AI-based systems to analyze accounting records and detect financial fraud at an early stage. Finally, in the strategic dimension, AI helps support the strategic financial decision-making process by providing accurate forecasts of market trends and future risks, thereby strengthening the institution's ability to adapt and plan financially for the long term. Comparative studies show that institutions that have integrated artificial intelligence into their governance systems have succeeded in reducing internal control costs by 35% and increasing the effectiveness of fraud detection by more than 60% ((KPMG, 2022).

3.2 Contributions and Benefits of AI in Financial Governance

AI refers to the strategic use of information and communication technologies (ICT) to improve the transparency, accountability, and performance of governance process (Weill & Ross, 2004). In the field of financial governance, it involves the automation of decision-making processes, the digitization of internal procedures, and the integration of secure information systems.

- Automation and reliability of control processes: E-governance enables the automation of control procedures through digital tools such as ERP

(Enterprise Resource Planning), workflow systems, and GRC (Governance, Risk, and Compliance) software. These systems reduce manual intervention, limit human error, and ensure systematic processing of transactions according to predefined rules (Amer & Hilmi, 2025). According to(Romney & Steinbart, 2017), the automation of controls via information systems enhances the consistency and traceability of financial transactions.

- Transparency and traceability of transactions: E-governance promotes greater transparency in internal management, particularly through: transaction traceability (audit trails), automated reporting, and real-time access to management data. These elements make it easier to detect anomalies, fraud, and malfunctions (Issa et al., 2016). According to(Alles & Gray, 2016), digital tools provide continuous monitoring capabilities by making operations visible throughout the decision-making chain.

- Enhanced information security: E-governance improves internal control by strengthening the security of information systems through: access control to sensitive data, credential management, automatic backups, and alerts in the event of attempted breaches. This helps protect digital assets and prevent cyber risks, which are increasingly integrated into modern internal control frameworks(Al-Hakim & Lu, 2017).

- **Alignment with regulatory frameworks and standards**: E-governance tools facilitate alignment with internal control standards, such as COSO or ISO 27001, through: process documentation, automated risk assessment, and digitized internal audit systems. This strengthens regulatory compliance and executive accountability. “Digital technology is becoming a key driver of compliance and cost reduction in internal control.”(OECD, 2021)

- **Continuous monitoring and auditing:** E-governance enables continuous auditing—that is, a real-time evaluation of internal operations—through data analytics and artificial intelligence (AI). This transforms the audit function into a proactive activity, capable of anticipating malfunctions rather than correcting them after the fact ((Issa et al., 2016).

3.3. Limitations and Challenges of Integrating AI into Internal Control

Despite its potential, the integration of AI into internal control faces several

obstacles(Baharom, 2025)

- Limited financial resources: One of the major challenges highlighted in the literature is the high cost associated with acquiring, implementing, maintaining, and updating digital tools. Small and medium-sized enterprises (SMEs) often operate on tight margins, which complicates the financing of IT infrastructure, software licenses, cloud services, and cybersecurity measures. In addition, hidden costs (such as support, training, and technical adjustments) add up, making the initial investment difficult to recoup in the short term. Several studies show that this lack of financial resources slows down both the speed and depth of digital transformation.
- Lack of digital skills and knowledge gaps
- Legacy systems and technological obsolescence: Another significant limitation is the existence of legacy systems old software or infrastructure that are still in use because they fulfill certain functions, but which are often incompatible with new technologies. These systems can limit a company's agility, increase maintenance costs, complicate the integration of new tools, and create a form of dependency on past practices. Furthermore, the rapid pace of technological change creates a risk that a tool will become obsolete shortly after its adoption, which complicates investment decisions.
- Resistance to change and organizational culture: Even when tools are available and skills are being developed, companies often face resistance to change. This can stem from employees accustomed to old processes, managers who view digital tools as a risk or an unnecessary cost, or a corporate culture that is not innovation-oriented. The lack of a clear vision and digital leadership can amplify this resistance. Change must be supported (through communication, training, and employee involvement) to alleviate fears (such as the fear of losing one's job or not knowing how to use the new tools, etc.).
- Businesses must handle cybersecurity concerns and privacy regulations like the GDPR because digital tools collect and manage sensitive data. Additional funding, specialized knowledge, and continuous legal oversight are required for compliance. Some SMEs are reluctant to participate

because of these costs and the harsh consequences for infractions.

- Technical infrastructure and interoperability: Digital tools require stable infrastructure, including reliable networks, high-speed connectivity, compatible hardware, and updated software. In less developed or remote regions, this infrastructure is often inadequate or unreliable. Poor interoperability between old and new systems also creates silos, duplication, errors, and extra costs.

4. Case Study: Models for Applying AI in Financial Institutions

A prominent worldwide example of AI use in financial governance is examined in this chapter. It then uses comparisons and simulations to analyze the experiences of Algeria and Qatar. Understanding the difficulties of implementing AI in internal control and deriving lessons for potential future solutions are the goals.

4.1. The Use of AI in Internal Control at JPMorgan Chase

JPMorgan Chase & Co. is considered one of the world's largest financial institutions, with total assets exceeding $3.9 trillion (2024). Due to the scale of its operations and the complexity of its organizational structure, the bank has faced challenges in managing compliance and financial fraud risks, particularly with the massive increase in the volume of digital transactions and the diversity of financial products. Consequently, since 2018, the bank has launched a comprehensive strategic program known as the AI-Driven Internal Control Program, which is an integrated framework for the overhaul of internal controls using artificial intelligence and machine learning.

4.1.1. The quantitative and qualitative impact of applying AI

The system has clearly demonstrated its effectiveness in improving the quality of internal control and reducing time and costs, whilst increasing the accuracy and transparency of risk reports. It has also enabled audit teams to refocus on value-added analytical tasks rather than routine work. The following table shows the results achieved following the implementation of artificial intelligence.

Table 01. Results of AI implementation

The indicator	Before implementation (2018)	After implementation (2023)	Improvement rate
Time taken to detect cases of fraud	14 days	3 hours	+98%
Error rate in compliance reports	5.7%	0.8%	+86%
Annual internal audit costs	100 million$	67 million$	-33%
Number of false alarms	23% of the total	Just 6%	+74% accuracy

Source: JPMorgan Chase & Co: AI-Driven Internal Control Report, Internal Audit Department, New York, 2023, P 23.

4.1.2. Supporting governance mechanisms: The bank has put in place three governance tools to reduce organizational and technological risks. Model controls and ethical norms are guaranteed by an AI Governance Board comprised of legal, data, audit, and technology professionals. Model validation and algorithmic bias checks are done by a Model Risk Office. Audit units must document decisions and projections in a traceable, verifiable audit trail in order to comply with a transparency and accountability framework.

4.1.3. Factors contributing to the success of the initiative: several factors have contributed to the successful application of AI to internal control, namely: Integration of information technology and governance: the existence of a unified data platform (Data Lake) bringing together all financial and control data sources. A significant investment in human capital: training of over 2,000 employees in advanced analytics and artificial intelligence. A clear legal framework: strict compliance with the requirements of the SEC (Securities and Exchange Commission) and with COSO and SOX standards.

4.2. The use of AI in internal control within Algerian banks

4.2.1. Overview of the Algerian banking sector

The banking and financial system in Algeria comprises a central bank, the Bank of Algeria, as well as numerous public and private commercial banks and specialised financial institutions. Public banks such as the National Bank of Algeria (BNA), the Foreign Bank of Algeria (BEA) and the Bank for Agriculture and Rural Development (BADR) are among the most notable, alongside other financial institutions such as the National Savings and Provident Fund (CNEP). There are also subsidiaries of international banks and financial companies specialising in other sectors. Since 2020, Algeria has been striving to digitise the financial sector as part of its wider economic reforms. The Ministry of Finance and the Bank of Algeria launched several initiatives under the "national digital transformation plan", aimed at developing electronic banking services and strengthening transparency and internal control. However, the integration of artificial intelligence into internal control systems is still at the preparation stage, as Algerian banks face a number of challenges relating to technological infrastructure, data quality and a shortage of skilled technical staff.

4.2.2. The use of AI in internal control: Although experience in this area is still limited, some public and private banks have begun to implement initial initiatives to use AI in specific areas, the most significant of which include:

A. Detection of financial fraud: The Banque Populaire Algérienne (CPA) has adopted algorithms to analyse banking transactions in order to detect unusual patterns that may indicate fraudulent activity. The system analyses thousands of transactions in real time and issues instant alerts to the internal control unit when it detects unusual behaviour (CPA, 2023).

B. Credit risk assessment: The Algerian National Bank (BNA) has begun trialling artificial intelligence tools to assess customers' creditworthiness, drawing on the analysis of historical and behavioural data. These tools have helped to improve the accuracy of lending decisions and reduce instances of default.

C. Automated auditing of accounting transactions: The Local

Development Bank (BDL) has implemented a semi-automated internal control system using machine learning techniques to periodically detect and analyse errors in accounting data, thereby reducing the rate of manual errors by approximately 30 % (BDL, 2024).

D. Monitoring regulatory compliance: Some private banks are developing artificial intelligence systems capable of monitoring the level of compliance with banking regulations, particularly those relating to anti-money laundering and counter-terrorist financing (AML/CFT) legislation.

4.2.3. Challenges facing the application of AI: Despite these promising initiatives, Algerian banks face a number of challenges, which can be summarised as follows:

- Weak digital infrastructure: Most banking systems rely on outdated software that does not integrate easily with artificial intelligence technologies.
- Lack of a clear legislative framework governing the use of artificial intelligence in the financial sector.
- Shortage of specialist staff skilled in data analysis and algorithm development.
- The limited availability of structured financial data required to build intelligent models.
- Organisational and cultural resistance within certain departments to automation and digitalisation.

4.2.4. The impact of AI on financial governance in Algeria: Preliminary findings indicate that AI is starting to enhance the precision and effectiveness of internal controls, especially in identifying questionable transactions and keeping an eye on financial compliance, despite the lack of experience. However, because of the poor investment in digital transformation, its impact is still restricted. The Bank of Algeria (2024) reports that although digital transformation increased by 45% from 2021 to 2024, AI only makes up 20% of control operations, indicating a disconnect between policy implementation and goal.

Table 02. Comparison of AI implementation between Algerian banks and JPMorgan Chase

Axis	Smart financial governance model (benchmark)	Reality in Algerian financial institutions
Governance structure	An effective board, a digital audit committee, a data and AI governance unit	There are traditional audit boards; digital units are often scattered and have only a tenuous link to governance.
Policies	Unified policies for data, AI and risk management that are published and binding	Digitisation policies are currently being developed; there is no formalised AI policy in place at some institutions.
Data infrastructure	A unified data warehouse, quality governance, powerful ETL tools	Data is scattered across legacy systems, with limited integration projects and poor data quality.
Technology and analytics	integrated ML/AI platforms with real-time monitoring. Pilot schemes and PoCs in certain banks	Large-scale applications remain limited.
The legal framework	Clear legislation to regulate AI, data protection and digital supervision standards	Legislation on data protection and AI is in its infancy; banking and compliance regulations need to be updated.
Human resources	Data science teams integrated into audit, with ongoing training.	A lack of specialist skills; occasional reliance on external consultants.
Model governance	Model lifecycle management, bias testing, and documentation.	No organised framework for model management; reliance on external service providers
Performance	Digital KPIs and regular,	Traditional indicators

measurement	transparent reporting	are available; digital performance indicators are rare and scattered.
Academic-industry collaboration	Research partnerships to develop advanced models.	Collaboration exists but is limited; there is a need to strengthen the link between universities and the financial sector.

Source: compiled by the authors based on PwC: 'How AI Is Redefining Internal Audit Functions', PwC Insights Series, 2024.

4.2.5. Strengths and weaknesses in the Algerian context

A. Available strengths:

- Political will: the existence of a national strategy for artificial intelligence
- The start of digitalisation: many banks and financial institutions have begun to digitise their services.
- Learning opportunities: potential to attract international and technological partnerships to accelerate the transition.

B. Main obstacles

- Fragmented data architecture and legacy systems.
- Lack of specialist skills in AI and analytics.
- An incomplete legislative and regulatory framework for governing AI .
- Limited reliance on in-house model development — dependence on external solution providers.
- Gaps in technology governance and model risk management.

4.2.6. Prospects for the development of AI in internal control

To accelerate the integration of artificial intelligence into internal control, the study proposes the following:

- To develop a national strategy for financial artificial intelligence under the supervision of the Bank of Algeria and the Ministry of Finance.
- Establish national financial data analysis centres to enable banks to access high-quality, structured data.
- Integrate specialist university courses in financial artificial intelligence into economics and accounting programmes.
- Encourage partnerships between universities, banks and technology

companies.

- Drafting incentive-based legislation to facilitate the adoption of smart solutions whilst protecting data and privacy.

4.3. The use of AI in internal control within Qatari banks

4.3.1. Overview of the Qatari banking sector: Qatar's banking sector is a regional leader in digital transformation and AI adoption, driven by Qatar National Vision 2030. The Qatar Central Bank has introduced a legislative framework for financial AI, covering cybersecurity and data protection. Government initiatives, including the Digital Economy Strategy 2023–2030, promote FinTech and RegTech collaboration. Thanks to this support, Qatar has succeeded in effectively integrating technology with financial governance, making its banking institutions among the most transparent and accountable in the Arab region. The Qatari banking system comprises several leading banks, such as: Qatar National Bank (QNB) – the largest in the Middle East, Qatar Islamic Bank (QIB), Doha Bank, and Commercial Bank of Qatar (CBQ)(QIB, 2024).

These banks were among the first to integrate artificial intelligence technologies into the areas of financial analysis, customer service and internal compliance.

4.3.2. AI Practices in the Internal Control of Qatari Banks

A. Smart Audit Systems: Qatar National Bank (QNB) has adopted an advanced analytical platform based on machine learning algorithms to monitor financial transactions in real time. This platform identifies anomalous patterns and sends instant alerts to compliance and internal control units in the event of any suspected financial irregularities. This has led to a 40 per cent reduction in fraud rates between 2022 and 2024.

B. Operational and Predictive Risk Management: At Qatar Islamic Bank (QIB), artificial intelligence solutions based on big data analysis have been integrated to predict operational risks, such as payment defaults or human errors in transactions. This system assesses the likelihood of future risks occurring and proposes proactive strategies to prevent them. According to the 2024 QIB report, the system has helped improve the efficiency of risk management by 55 per cent.

C. Artificial intelligence in financial compliance (RegTech): Qatar Commercial Bank (CBQ) has adopted RegTech systems – regulatory technology based on artificial intelligence – to monitor the bank's compliance with international anti-money laundering standards. The systems automatically analyse millions of daily transactions and generate accurate reports for regulators, thereby enhancing transparency and compliance.

D. Smart analytics and interactive reports: Doha Bank uses artificial intelligence tools to generate interactive reports on financial performance and internal control. These systems help senior management make rapid and informed decisions based on data updated in real time.

4.3.3. The impact of AI on governance and internal control: Artificial intelligence has contributed to a qualitative transformation of the financial governance structure, thereby becoming an essential element in (Qatar National Artificial Intelligence Strategy, 2019)(QIB, 2024):

- Strengthening accountability and transparency through real-time monitoring of operations.
- Reducing human error and procedural discrepancies.
- Improving the operational efficiency of internal control units.
- Facilitating decision-making based on data rather than on personal experience alone.

According to the "Qatar FinTech Outlook 2024" report, more than 70 per cent of Qatari banks now use artificial intelligence systems for financial monitoring, compared with just 25 per cent in 2020, reflecting rapid and thoughtful progress in this field.

4.3.4. The challenges and constraints faced by the Qatari initiative

Regulatory worries about the "black box" nature of deep learning models, which prevent their implementation without explainability methods, and problems with data quality and integrity across legacy and new systems, which impede model training and increase cleaning costs, are major obstacles. Despite current national policies and regulatory sandboxes, comprehensive legal regulations on liability, data protection, and algorithm

documentation are also required. Lastly, some banks are forced to temporarily rely on outside parties due to a lack of skilled personnel, as the demand for data scientists and machine learning engineers exceeds local supply.

4.4. An analytical comparison of the Algerian and Qatari experiences

The experiences of Algeria and Qatar show a distinct disparity in the degree of financial governance and digital maturity, despite the fact that both nations aim to improve internal control efficacy and attain transparency.

The comparison here is based on three main areas:

- Digital and institutional infrastructure
- The extent to which artificial intelligence is applied in internal control
- The impact on financial governance and institutional transparency.

4.4.1. Comparison in terms of infrastructure and institutional support

Table03. Comparison of infrastructure and institutional support Algeria/Qatar

The criterion	Algeria	Qatar
Digital infrastructure	Is limited, suffers from poor systems integration and a lack of investment in artificial intelligence technology.	Developed thanks to a clear national digital transformation strategy and Vision 2030.
The legislative framework	Lack of a comprehensive legal framework governing artificial intelligence in the financial sector	A regulatory framework issued by the Central Bank of Qatar (2023) to ensure compliance and transparency.
Investment in technology	limited and targeted investment in certain state-owned banks	Significant investment from the public and private sectors in FinTech and RegTech solutions.
Availability of skilled workers	A shortage of specialist skills in data analysis and financial artificial	Training and collaboration programmes between

	intelligence.	universities and the financial sector to train FinTech experts.

Source: compiled by the author based on *Qatar FinTech Outlook*, *AI in Banking and Financial Governance in the Gulf Region*, QCB Publications, Doha, 2024, and *Academy of Strategic Management Journal*, *A Systematic Review of AI Technology in the Banking Sector*, Algeria, 2023.

4.4.2. Comparison of the use of artificial intelligence in internal control

Table 04. Comparison of the use of AI in internal control within Algerian and **Qatari banks**

Estate	Algeria	Qatar
Detection of financial fraud	Its use began on an experimental basis in certain state-owned banks (CPA and BNA).	Advanced systems in most major banks (QNB, QIB) capable of analysing transactions in real time.
Smart internal audit	is limited and relies in part on machine learning to analyse accounting errors.	Effectively implemented in smart audit systems.
Risk management under development using data analytics tools	still relies on traditional models	Predictive systems based on artificial intelligence and big data, with tangible success.
Financial compliance	is in its infancy, with attempts being made to implement electronic control systems.	Significant progress has been made in using RegTech technologies to monitor automated compliance and regulatory transparency.

Source: compiled by the authors based on: AI in Banking and Financial Governance in the Gulf Region, QCB Publications, Doha, 2024, and Academy of Strategic Management Journal, A Systematic Review of AI Technology in the Banking Sector, Algeria, 2023

4.4.3. SWOT analysis of the two experiments

Table 05. SWOT analysis of the two experiences (Algeria – Qatar)

Article	Algeria	Qatar
Strengths	Political will for digital transformation; a broad banking base	Strong government and legislative support; advanced digital infrastructure.
Weaknesses	low skill levels; lack of a regulatory framework; cultural resistance to automation.	High cost of technology; reliance on foreign solutions in certain systems.
Opportunities	opportunity to draw on Qatar's experience; rapid growth of fintech in the region.	Expanding international partnerships; developing local FinTech services.
Threats	Cybersecurity risks and weak data protection.	Privacy and ethical challenges in the use of artificial intelligence.

Source: compiled by the authors

5. Discussion and analysis of the results: Through an analysis of the theoretical framework and a study of the Algerian and Qatari cases, the study arrived at the following conclusions:

- AI is now a structural requirement for financial governance, particularly in internal control, audit, and compliance, rather than an optional luxury. These governance functions are directly improved by its skills in pattern recognition, anomaly detection, and predictive analytics.
- **The Qatari Paradigm:** Qatar's experience has demonstrated remarkable success in integrating artificial intelligence into internal control systems, thanks to its legislative framework, advanced digital infrastructure and investment in human resources.

- **The Regulatory Enabler:** Unlike many developing nations, Qatar's legislative framework does not view AI as a threat to be contained, but as a strategic asset to be enabled. By enacting clear data governance and cybersecurity laws, Qatar has provided a "safe operating space" for financial institutions to experiment and deploy AI-driven audit tools without legal ambiguity regarding data ownership or liability.

- **Human Capital as a Force Multiplier:** The investment in upskilling has transformed the workforce from potential "resistors" of automation into "co-pilots." Qatari auditors are not being replaced; they are being augmented. This reduces the psychological friction often associated with AI adoption, allowing for a smoother transition where human judgment validates AI-generated alerts.

- **The Algerian Trajectory:** the study notes positive changes likely referring to nascent pilot projects or ministerial interest, the persistence of a skills shortage and weak technical infrastructure represents a critical bottleneck.

- **The Vicious Cycle of Infrastructure:** Weak infrastructure (unstable electricity, limited high-speed bandwidth, and aging hardware) makes the deployment of sophisticated AI models impractical. This technological deficit discourages private sector investment in AI, which in turn perpetuates the skills shortage, as local talent emigrates or pivots to other fields where they can operate effectively.

- **The Absence of Legal Frameworks – The Greatest Challenge:** Algerian financial institutions are in a legal limbo due to the lack of legislation on data protection, digital signatures, and algorithmic responsibility, which the report correctly identifies as the primary barrier. Due to the lack of judicial precedent, this results in a "liability vacuum" where AI-based conclusions cannot be legally verified or challenged. Because of this, risk-averse organizations turn to manual techniques in order to stay out of trouble with the law, negating the potential advantages of AI.

- One of the study's main conclusions is that politics and technology are linked rather than parallel, since Qatar's performance demonstrates that AI flourishes under flexible regulation as opposed to nonexistent or unduly restrictive laws. Algeria should put policy ahead of technology acquisition, according to the Qatari "sandbox" model, where innovators and regulators test AI in safe settings. Creating a national data protection law and AI

charter would foster the confidence required to draw in foreign partners and motivate regional banks to make investments in AI infrastructure.

6. Recommendations: Algeria should consider:

- Public-Private Partnerships: Collaborating with foreign institutions to leverage existing infrastructure rather than building from scratch.
- Pilot Legal Zones: Establishing a specific regulatory sandbox within the financial district where AI can be tested under a temporary, flexible legal framework before national rollout.
- Targeted Training: Moving away from general IT training to specialized curricula in "AI for Financial Auditing" in universities, co-designed with professional accounting bodies.

7. Conclusion: The study concluded that AI is a strategic tool for developing financial governance in Algerian institutions, improving decision-making quality, enhancing transparency, and reducing risks and financial fraud. However, successful AI integration requires a favorable institutional environment, robust digital infrastructure, and a skilled workforce. Developing an AI-based smart financial governance system is a crucial step toward financial sustainability and strengthening investor confidence in the Algerian economy. A comparison between Algeria and Qatar shows that successful AI application in financial governance and internal control depends not only on technology, but also on institutional and legislative commitment, as well as the banking sector's readiness to embrace innovation and accountability. Ultimately, AI has become the cornerstone of modern financial governance, transforming traditional control processes into an intelligent system capable of predicting risks and making accurate decisions in real time.

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