

THE USE OF ARTIFICIAL INTELLIGENCE IN THE ALGERIAN BANKING SYSTEM: REQUIREMENTS FOR LEGAL REGULATION AND ITS IMPACT ON STRENGTHENING DOMESTIC FINANCIAL GOVERNANCE

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Received: 17/06/2025 Accepted: 09/05/2026 Published: 03/07/2026

Abstract:

This study explores the expanding role of artificial intelligence as a transformative driver within the Algerian banking system, emphasizing the tension between technological innovation and the imperatives of legal regulation. It analyzes how intelligent systems enhance banking efficiency through credit automation and improved customer service, while contributing to the strengthening of domestic financial governance and the promotion of financial inclusion across regions. Using a comparative analytical approach, the study highlights key legal challenges related to civil and criminal liability arising from algorithmic decision-making, as well as the risks of geographic discrimination affecting spatial equity in the distribution of financing. It concludes by underscoring the need to address legislative gaps in Algerian monetary and banking law (Law No. 23-09) through the establishment of regulatory frameworks that ensure algorithmic transparency and the protection of customer data, thereby achieving a balanced reconciliation between digital innovation and legal certainty.

Keywords : Artificial Intelligence; Banking System; Domestic Financial Governance; Financial Inclusion; Spatial Equity.

1- Introduction

The Algerian banking and financial sector has undergone a profound transformation due to the digital revolution, with artificial intelligence (AI) emerging as a key pillar in modernizing banking operations. Banking activity is no longer solely reliant on traditional methods; rather, financial institutions increasingly employ advanced technologies such as machine learning, big data analytics, and intelligent algorithms to enhance operational efficiency, strengthen transparency, mitigate risks, and provide improved customer services. The novelty of this study lies in addressing the interplay between digital innovation on one hand, and the need for legal regulation to ensure financial system stability and the protection of clients' rights on the other, particularly given the absence of specific AI-related legislation within the Algerian banking framework.

The scientific problem underpinning this study is formulated as follows: How can Algerian banking law accommodate the integration of AI into banking operations in a manner that balances the promotion of technological innovation, the protection of rights, and the preservation of financial system stability?

The general objective of this research is to examine the impact of AI on the efficiency and effectiveness of banking operations. The specific objectives are to:

1. Analyze the practical applications of AI across various banking activities.
2. Identify the legal challenges related to liability, data protection, transparency, and algorithmic bias.
3. Compare the Algerian legal framework with leading international experiences to provide appropriate regulatory recommendations.

To achieve these objectives, the study adopts a descriptive-analytical methodology to review AI applications and assess their legal implications, alongside a comparative approach to examine international practices and contrast them with the Algerian framework, thereby providing a comprehensive understanding of the subject matter.

2 -Practical Applications of Artificial Intelligence in Banking

Artificial intelligence has become an integral component of the technological infrastructure of banks, being deployed across various banking operations with the aim of enhancing operational efficiency, promoting

transparency, mitigating risks, and responding to customer needs. Its principal areas of application can be summarized as follows:

2.1 Credit Assessment

Banks rely on intelligent algorithms to evaluate clients' creditworthiness more accurately than traditional methods, as these algorithms can analyze vast amounts of data, including financial behavior, consumption patterns, and even non-financial information such as activity on digital platforms.

It is noteworthy that these systems enable banks to make faster and more objective decisions regarding loan approvals while reducing the incidence of defaults. In 2022, the World Bank issued a report focusing on the future of artificial intelligence in financial services, particularly in banking and insurance. The report relied on case studies from several countries and provided data on the adoption rates of artificial intelligence in financial institutions, indicating that approximately 56% of global banks had begun employing AI in 2021 in areas related to customer service, risk analysis, and financial transaction forecasting¹.

It is noteworthy that this report raises numerous legal challenges. Accordingly, financial legislation must be updated to keep pace with new data-driven business models, and clear regulatory frameworks should be established regarding legal liability in the event of errors caused by artificial intelligence.

2.2 Anti-Money Laundering

Machine learning and pattern recognition techniques are employed in the banking sector to enhance the accuracy of financial forecasts and to detect illicit activities that may indicate money laundering. These systems enable the analysis of vast volumes of banking data and financial transactions in a very short time, distinguishing between clients' normal behavioral patterns and unusual activities that may raise suspicions—tasks that far exceed traditional human capabilities.

Moreover, these technologies allow banks to develop advanced predictive models that proactively monitor potential risks, thereby improving the effectiveness of compliance and financial crime prevention systems. In addition, the application of machine learning in this context enhances the capacity to adapt to continuously evolving fraud and money laundering methods by dynamically updating algorithms based on new data. This represents a qualitative shift from traditional rule-based systems to more intelligent and flexible frameworks capable of handling the increasing complexity of international banking activities².

2.3 Customer Service

The reliance of banks on virtual assistants has become one of the most prominent manifestations of digital transformation in the banking sector. Banks and financial institutions employ these intelligent tools to provide immediate, round-the-clock services without interruption. These assistants are typically used to respond to simple inquiries, such as checking account balances, monitoring transactions, and transferring funds, in addition to offering preliminary guidance on certain banking products. This approach effectively reduces employee workload and shortens customer waiting times, allowing staff to focus on more complex operations that require human expertise.

Virtual assistants also contribute to enhancing the customer experience by delivering personalized and prompt service, as their responses are based on prior data and user behavior, thereby improving customer satisfaction and loyalty to the bank. Furthermore, these systems help banks lower operational costs and increase efficiency while ensuring consistent and uniform service for all clients, making them a central component of innovation and digitalization strategies in financial services³.

These technologies also contribute, at the level of local financial governance, to reducing geographical disparities, serving as a tool to promote local financial inclusion. Through virtual assistants and smart banking services, citizens in remote municipalities and mountainous areas can access financial advice and loans without the need to travel to major urban centers. This helps to narrow regional development gaps and upholds the principle of equality in access to public financial services⁴.

2.4 Risk Management

Artificial intelligence is considered a strategic tool in the banking sector due to its high capacity to process vast amounts of financial and economic data in real time. These technologies can simultaneously aggregate data from global markets, interest rates, stock market indices, commodity and currency prices, and economic reports, and analyze them at a speed that human capabilities cannot match.

Thanks to machine learning algorithms and pattern recognition techniques, banks can anticipate financial crises or market disruptions by detecting abnormal changes in market behavior or capital flows. Artificial intelligence is also employed in developing early warning systems to identify operational risks, such as liquidity fluctuations or increasing default rates, enabling the formulation of preventive strategies that mitigate the impact of these risks on the stability of the banking system.

Furthermore, AI-based intelligent models provide investment decision-makers with a broader and more accurate perspective when planning, as they do not merely analyze historical data but also learn from it and adapt to future developments. Consequently, reliance on artificial intelligence contributes to avoiding potential losses, enhances banks' ability to manage capital efficiently, and offers greater flexibility in responding to sudden crises⁵.

2.5 Internal Task Automation

The completion of internal tasks using artificial intelligence technologies and Robotic Process Automation (RPA) tools has become one of the most prominent innovations transforming the internal operations of banks. Banks no longer rely solely on human labor to perform routine tasks; instead, they have adopted intelligent systems capable of processing electronic checks, updating customer data in real time, and automatically generating periodic reports in accordance with regulatory standards⁶.

It is noteworthy that the significance of these transformations lies in their ability to substantially reduce human errors and provide banks with time and resources that can be invested in value-added activities, such as risk analysis or financial product development⁷. Recent studies indicate that the adoption of intelligent automation by banks leads to a reduction in operational costs ranging between 25% and 40%, accompanied by a notable increase in transaction accuracy and regulatory compliance⁸. Furthermore, numerous international experiences, including those of Bank of America and HSBC, have demonstrated that the integration of RPA technologies has contributed to enhancing data management efficiency and mitigating operational risks⁹.

From the foregoing, it is evident that the practical applications of artificial intelligence in the banking sector reflect a profound transformation in banking operations through the integration of AI technologies. Banks now rely on these technologies for processing checks, updating customer data, and preparing financial reports, instead of traditional methods. This shift has contributed to enhanced operational efficiency, reduced time and effort, and significant cost savings¹⁰.

However, despite these benefits, such innovations raise serious legal questions concerning liability for automated decisions, privacy protection, and the assurance of transparency, which naturally leads us to the second section.

3- Legal Challenges of Using Artificial Intelligence in Banking

The deployment of artificial intelligence technologies in the banking sector is not limited to the economic and operational benefits they provide; it also raises complex legal issues that require careful analytical consideration. The absence of a specific legislative framework regulating these applications makes it difficult to define their legal implications, particularly concerning challenges related to determining liability for automated decisions, protecting personal data, and ensuring transparency in algorithmic operations. These technologies also raise additional concerns regarding algorithmic bias, banking supervision requirements, and the legal characterization of their use in anti-money laundering and counter-financing activities. Accordingly, examining these challenges constitutes a fundamental approach to assessing the readiness of the national legal system to accommodate digital transformations and highlights the need to draw on comparative experiences that have established advanced frameworks to regulate the relationship between technological innovation and legal security requirements.

3.1 Determining Legal Liability for Automated Decisions in Banking

Legal liability represents one of the most significant challenges posed by the integration of artificial intelligence in banking operations. Banks' reliance on automated systems for decision-making—whether in credit granting or risk management—raises questions regarding the party responsible in the event of errors or damages. Should liability be attributed to the bank as the system's user, to the software developer, or to the algorithm itself, considering its relative autonomy? The absence of explicit legal provisions in Arab legislation renders this issue more complex, necessitating recourse to general principles of contractual and tort liability¹¹.

It is noteworthy that automated decisions issued by artificial intelligence in banks may result in serious errors, such as the unjustified rejection of loan applications or discrimination against certain categories of clients. Such outcomes may constitute a breach of the principle of equality and expose the bank to civil or even criminal liability in some cases. In the absence of a specific legal framework for artificial intelligence, judges are compelled to interpret these situations in light of traditional legal rules, creating a degree of legal uncertainty and highlighting the necessity for legislative intervention to establish clear regulations delineating responsibilities¹².

It should be noted that, unlike Arab jurisdictions, which still lack a dedicated legal framework for artificial intelligence in the banking sector, some comparative systems have taken significant steps in addressing this issue. The European Union, for example, adopted the Artificial Intelligence Act (AI Act), which classifies systems used in credit assessment as high-risk, thereby imposing additional obligations on banks regarding transparency and accountability. In contrast, Arab legislators in general, and Algerian law in particular, continue to rely solely on general civil or criminal liability rules, creating a legislative gap that may affect customer confidence and the stability of banking transactions. This contrast between experiences underscores the urgent need for legislative reform inspired by the European model to ensure clarity in liability and its equitable distribution among the relevant parties¹³.

3.2 Personal Data Protection

The issue of personal data protection constitutes one of the most significant challenges in the deployment of artificial intelligence in banking. Banks primarily rely on the processing of vast amounts of highly sensitive data, such as clients' financial status, consumption behaviors, and even biometric information. The use of such data by intelligent systems in credit decision-making or risk assessment raises legitimate concerns regarding the respect for privacy and the assurance of information security¹⁴.

In Algeria, Law No. 18-07 of 10 June 2018, concerning the protection of natural persons in the processing of personal data, established a general legal framework regulating the collection, processing, and storage of such data. The law sets out fundamental principles, including the requirement for the data subject's explicit consent, the specification of the purpose of processing, and the protection of data against any unlawful use¹⁵. However, the issue lies in the fact that this law does not directly address applications based on artificial intelligence, leaving the legal characterization of automated processing in banks a subject of extensive doctrinal debate¹⁶.

At the comparative level, the European Union adopted the General Data Protection Regulation (GDPR) in 2018, which, in its Article 22, provides individuals with the right not to be subject to decisions based solely on automated data processing, including decisions with significant legal effects, such as the granting or refusal of loans¹⁷. This approach highlights the gap between the Algerian system, which lacks specific provisions on artificial intelligence, and the European framework, which gives the matter particular attention. It thus calls for Algerian legislative amendments inspired by the European experience to ensure effective protection of client data in the context of the digital revolution¹⁸.

3.3 Transparency and "Black Box" Algorithms

Among the core legal challenges in integrating artificial intelligence into the banking sector is the issue of transparency. The algorithms used in banking decision-making are often described as "black boxes" due to their complexity and the difficulty of understanding the underlying logic behind their outcomes¹⁹. This opacity may prevent clients from challenging decisions that affect their rights, such as the denial of a loan or being classified as high-risk, which conflicts with fundamental principles of fair trial and the right to defense²⁰.

Algorithmic transparency also raises a specific challenge concerning spatial fairness. AI systems may be programmed to assess creditworthiness based on a client's geographic location, potentially excluding loan applicants from less developed areas ("shadow regions") based on historical statistical data. This calls for legal regulation to ensure the neutrality of algorithms with respect to the geographic distribution of populations, thereby guaranteeing equitable allocation of local financing²¹.

It is noteworthy that, under Algerian law, there are no clear legal provisions obliging banking institutions to disclose the technical or methodological foundations on which algorithms rely in decision-making. One can only refer to the general principles found in civil or commercial legislation, which emphasize the requirement to respect good faith and transparency in transactions. However, this remains insufficient given the complex technical nature of artificial intelligence, leaving clients in a vulnerable position vis-à-vis banking institutions.

In contrast, comparative experiences highlight stronger safeguards. The Council of Europe, in its 2020 report on artificial intelligence and human rights, emphasized the need to ensure transparency and algorithm explainability, enabling individuals to understand automated decisions that affect them and facilitating monitoring of compliance with principles of non-discrimination and equality²². Meanwhile, Algerian legislation remains lagging in this area, underscoring the need for legal reform that imposes disclosure and transparency obligations on banks when using intelligent systems, thereby protecting client rights and reinforcing trust in the banking system²³.

3.4 Risks of Algorithmic Bias in Banking Transactions

Algorithmic bias represents one of the most serious challenges associated with the use of artificial intelligence in banking operations. Intelligent systems may exhibit discriminatory behavior when making credit decisions or assessing clients' financialworthiness. This bias typically stems from the nature of the data fed into the algorithms, which may contain social or economic prejudices, thereby reproducing these biases in automated decisions²⁴.

It is noteworthy that, under Algerian law, there are no specific legal provisions addressing algorithmic discrimination in the banking sector. Reliance is limited to the general principles enshrined in the Algerian Constitution, which affirms the principle of equality and non-discrimination among citizens²⁵. However, these provisions remain general and are insufficient to confront the technical challenges posed by artificial intelligence, particularly in the absence of mechanisms for technical oversight of algorithmic operations.

Comparatively, certain jurisdictions, such as the European Union, have begun imposing obligations on banks to ensure the absence of bias in credit assessment systems. Under the Artificial Intelligence Act (AI Act), these systems are classified as high-risk, requiring verification that they are free from discrimination²⁶. This approach underscores the urgent need to introduce similar provisions in the Algerian legal system, both to protect the principle of equality and to ensure trust in digital banking services²⁷.

3.5 Challenges Related to Banking Supervision

One of the most prominent legal issues arising from the integration of artificial intelligence in banks concerns how supervisory authorities can perform their traditional role in overseeing banking activities. Banks' reliance on complex algorithmic systems makes it difficult for regulatory bodies, such as the Bank of Algeria or the Banking Supervision Committee, to assess the legality and soundness of automated decisions²⁸.

It is noteworthy that Algerian law, particularly Law No. 23-09, which encompasses the Monetary and Banking Law and regulates the legal framework for the operation and supervision of banks, grants the Monetary and Banking Council²⁹ and the Banking Supervision Committee³⁰ broad powers to oversee banks and financial institutions. However, this new law does not directly address the supervision of intelligent systems used in banking operations³¹, leaving a legislative gap regarding appropriate oversight tools for AI systems that may be employed in risk management or crisis prediction. Errors in programming or deviations from intended objectives could thus pose a direct threat to the banking sector as a whole³².

In comparative practice, the Basel Committee on Banking Supervision, in its 2021 report, recommended the establishment of flexible regulatory frameworks that enable supervisory authorities to understand and monitor AI mechanisms, ensuring their alignment with core banking safety principles³³. This approach may serve as an important reference for Algerian legislators to develop an effective supervisory system that keeps pace with digital transformation in banks and mitigates systemic risks³⁴.

3.6 Challenges Related to Anti-Money Laundering

The integration of artificial intelligence into banking operations raises precise legal challenges in the field of anti-money laundering (AML). Banks now rely on algorithms capable of analyzing financial behavior patterns and detecting suspicious transactions more rapidly than traditional tools. While these technologies enhance monitoring effectiveness, they also give rise to legal questions regarding the evidentiary value of the results they produce and the extent to which such outputs can be relied upon as evidence in investigations or before courts, particularly in the absence of clear provisions regulating the legal status of automatically generated data³⁵.

It is noteworthy that the Algerian legislator has attempted to address this issue through recent amendments to Law No. 05-01 on the prevention and combating of money laundering and terrorism financing, which oblige banks to strengthen internal control systems using advanced technological tools and to notify the Financial

Intelligence Processing Unit of any suspicious transaction³⁶. Nevertheless, the legal provisions remain general and do not contain sufficient details regarding the legal framework for the use of artificial intelligence, creating a legislative gap concerning liability in the event that these systems fail to detect illicit activities.

Moreover, the use of artificial intelligence in this domain raises the issue of balancing strict financial supervision with the protection of banking confidentiality and clients' personal data. Excessive reliance on automated processing may infringe upon individual rights if legal provisions do not accompany these developments with effective safeguards, either by setting clear rules for data usage or by establishing mechanisms for reviewing automated decisions³⁷. Accordingly, the legal challenge lies in formulating a legislative framework that ensures the efficient use of artificial intelligence in combating money laundering without harming client rights or undermining trust in the banking system. This calls for the adoption of a flexible governance model that balances the rigor of centralized supervision with the requirements of technological innovation, thereby ensuring the stability of the financial system and protecting the economic fabric at both national and local levels³⁸.

4 Conclusions

The present study highlights that the integration of artificial intelligence (AI) technologies into the banking sector represents a decisive step toward enhancing banking performance. AI has contributed to improving operational efficiency, reducing costs, and enhancing the quality of financial services. However, these advantages are accompanied by serious legal challenges, notably regarding liability for automated decisions, protection of personal data amid increasing reliance on sensitive information, and the lack of transparency in algorithmic operations, which may undermine client trust and the stability of banking transactions. Comparative analysis with advanced systems, such as those in the European Union, reveals a legislative gap in the Algerian system, necessitating urgent legal reform.

Findings:

1. The study demonstrates that AI has become a central tool in modernizing banking operations, contributing to enhanced operational efficiency, development of banking services, and improved predictive and risk management capabilities. Nonetheless, this central role is accompanied by complex legal issues related to liability for automated decisions, protection of client rights, and ensuring algorithmic transparency, making AI deployment legally sensitive and prone to potential risks.
2. The results indicate that the current Algerian legal framework is insufficient to regulate AI in banking, as the applicable legal provisions are limited to general rules of civil and criminal liability, without specific legislation addressing the peculiarities of AI. This deficiency creates a legislative vacuum, resulting in legal uncertainty for both banks and clients.
3. It is also evident that personal data protection and privacy in Algeria remain inadequately aligned with technological developments, despite the enactment of Law No. 18-07 on the protection of natural persons in the processing of personal data. The law does not directly address AI-based applications, making the legal adaptation of automated banking processes subject to extensive doctrinal and practical debate, and weakening the level of protection afforded to clients compared to international experiences.

Recommendations:

1. Develop specific legislation on AI in the banking sector that clearly defines the scope of AI use and delineates legal responsibilities among the various parties (banks, software providers, programmers), thereby reducing ambiguities and ensuring rights protection. The EU approach, which classifies high-risk applications and subjects them to specific obligations, may serve as a useful reference.
2. Activate legal mechanisms to protect sensitive banking data by introducing amendments that explicitly regulate data processing through AI while balancing data utilization with privacy protection requirements. Additionally, enhance oversight of banks' compliance with security standards in the collection, storage, and processing of client data.
3. Establish clear standards for transparency and the right to challenge automated decisions, allowing clients to obtain explanations for decisions affecting their financial status, such as loan denials or classification into high-risk categories. Legal provisions should require banks to disclose the general principles underlying their algorithms, reinforcing the right to defense and preventing potential arbitrariness.

4. Draw on comparative experiences, particularly from Europe, where the General Data Protection Regulation (GDPR) and the AI Act provide advanced models for regulating the interface between technology and fundamental rights. This adaptation should, however, take into account the specificities of the Algerian economic, social, and legal environment to ensure contextual relevance.
5. Strengthen banking supervision and develop human capacities to meet digital transformation requirements by equipping the Bank of Algeria and the Banking Supervision Committee with advanced technological tools for examining AI systems and training specialized personnel in law, finance, and technology. This approach ensures effective supervision and enables safe and sustainable AI adoption in banks.
6. Establish a legal framework that harmonizes centralized banking supervision with local development needs, ensuring that AI technologies serve financial transparency in both public and private transactions at the municipal level.

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