The Impact of Modernizing the Financial System through Artificial Intelligence Applications on the Algerian Economy during the Period (2024–2015)

Rabab Hazem *[1], Nouar Mansouria [2]

University of Tébessa (Algeria), rabab.hazem@univ-tebessa.dz.
University of Oum El Bouaghi (Country), mensouria.nouar@univ-oeb.dz.

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Abstract: This paper assesses the strategic impact of AI-driven digital transformation on the modernization of financial systems and macroeconomic stability in Algeria during the period from 2015 to 2024. The study identifies positive transmission mechanisms, including reduced transaction costs, improved operational efficiency, and enhanced financial inclusion, while also analyzing potential systemic risks such as cybersecurity threats. A longitudinal and comparative methodology was adopted to evaluate key performance indicators at both macroeconomic and sectoral levels. The findings reveal significant progress in establishing a legislative framework, particularly following the enactment of the new Monetary and Banking Law No. 23-09, which has accelerated the adoption of digital channels. However, the results also highlight structural challenges: the quantitative growth of financial inclusion remains concentrated in government payments and social transfers, as evidenced by the dominance of Algeria Post's "Gold Card." This reflects weak banking localization of digitization and limits the sector's financial efficiency. Furthermore, the transformation has coincided with a sharp increase in systemic risks and a rise in cybersecurity incidents, exposing a gap in operational resilience and insufficient investment in security responses to escalating threats.

Keywords: Digital transformation; Artificial intelligence; Financial systems.
JEL Classification Codes: G20; G28; E44.

* **Rabab Hazem**

Introduction:

Modernizing Financial systems today is a strategic imperative that goes beyond merely improving operational efficiency to reach the core of economic stability and international competitiveness. Rapid growth, globalization, and scientific and technological progress have imposed fundamental changes in the methods of managing liquidity and assets; in this context, it is no longer sufficient for the financial system to remain neutral. Rather, a shift is required from the traditional finance model centered on balancing expenditures and revenues under the aegis of a guardian state to an active finance model that performs direct economic and social functions. This transition aims to deploy public and private financial instruments effectively to achieve developmental and social objectives, and it represents a continuation of transformations that have accelerated today thanks to smart technologies. Within the limits of its resources and human and material capacities, Algeria is working to keep pace with this digital shift and to adopt artificial intelligence technologies for managing financial systems and moving toward modern structures grounded in innovation and the adoption of advanced technological solutions.

From the foregoing, the study's problem emerges and is centered on:

What is the impact of using artificial intelligence on the efficiency and inclusiveness of the Algerian financial system within its modernization trajectory? And what is the effect of this usage on macroeconomic stability?

The study can proceed from several hypotheses, namely:

• H1: Digital transformation supported by artificial intelligence technologies contributes substantially to improving the performance efficiency of financial institutions and reducing the cost of operational transactions compared with the traditional situation.

• H2:AI-enabled digital transformation expands financial inclusion by increasing individuals' and firms' reliance on digital financial services, with spatial and social disparities in the pace of adoption

.•H3 : The integration of artificial intelligence technologies into the structures and systems of Financial services enhances institutions' capacity to detect fraud early and ensure regulatory compliance, resulting in a noticeable reduction in operational losses from fraudulent risks.

The global digital and technological transformation framework has increasingly drawn scholarly attention, particularly from international studies examining the effects of digitization on financial systems and their core functions. For example, (**Raithatha, 2025)** surveyed 156 financial institutions of various sizes in Southeast Asia and found that the share of digital transactions rose by 42% over two years, accompanied by an 18% reduction in transaction costs and improved customer satisfaction metrics. **(Garcia Ruiz & al, 2023)** provided a comparative analysis of 12 European countries, indicating that investments in digital infrastructure and digital identity explain more than 60% of the cross-country variation in financial inclusion levels. **(The World Bank, 2025)** Through case studies in Africa and Asia, the rollout of mobile payment services directly contributes to an increase in access to formal accounts by between 20% and 35%, depending on cellular network penetration.

On the risk side, (**IMF, 2022)** have documented growing cybersecurity risks and increased complexity in liquidity management in environments that include central bank digital currencies, noting marked rises in intrusion attempts and heightened platform dependencies. Experimental studies, such as **(Rinku Kumar, 2024)** showed that integrating FinTech and AI solutions into credit allocation improved credit scoring accuracy by 27% but increased banks' reliance on external technology vendors. Bibliometric and methodological reviews by **(Chen & al. ,2023)** and **(Kshetri, 2024)** observed a concentration of research on digital payments, CBDCs, and digital governance, alongside a clear lack of standardized longitudinal studies that measure long-term economic outcomes. Multiple reviews, therefore, call for strengthened standardized metrics and flexible regulatory policies that invest in infrastructure and digital skills to harness the benefits of digitization while mitigating its risks, especially in Global South countries that face constraints in digital identity and technical governance.

1. Research methodology

The study employed a comparative analytical methodology that integrates quantitative and descriptive approaches to measure and interpret the evolution of key performance indicators at both the aggregate and sectoral levels. The method involved compiling harmonized time series for variables such as GDP, inflation, unemployment, non-performing loan ratios, and capital adequacy, followed by trend and statistical analyses to distinguish changes before and after key turning points (for example, 2020) and to estimate the contribution of AI-supported digitalization to those changes. Cross-sectional comparisons across sectors and institutions were used to highlight regional and organizational disparities. Simple analytical tools—such as differences in means and growth rates were applied alongside a descriptive review of legislative and administrative measures in order to link quantitative evidence with the institutional context. The purpose of this approach is to provide an integrated interpretation that balances numerical evidence and qualitative inference to clarify the impact of AI-enabled digitalization on the performance and stability of the financial system.

2. Concept of Modernizing Financial Systems

The modernizing of financial systems refers to a structural and strategic process aimed at updating the institutional, technical, and regulatory architectures of the financial system so that it becomes more efficient, transparent, and resilient to economic and technological shocks. This process encompasses the digitization of payment and clearing channels, the adoption of integrated information systems and distributed ledgers where appropriate, the modernization of regulatory and governance frameworks to accommodate financial innovations, and the strengthening of human and institutional capacities to manage emerging risks such as cybersecurity, third-party risks, and liquidity risks. Success in modernization is measured by performance indicators such as the effectiveness of financial intermediation, the depth of capital markets, the level of financial inclusion, the quality of financial data, and the stability of solvency and liquidity metrics. Modernization is organically linked to the availability of a reliable digital infrastructure, a national digital identity, and a flexible regulatory framework that supports governed innovation and accountability. (**Ben Brih, 2019, P:568)**

3. Smart Technologies for Financial System Modernization

Modernizing financial systems relies on a range of advanced smart technologies that provide analytical, operational, and security capabilities previously unavailable. These technologies constitute the foundational backbone of contemporary financial systems.

3.1Artificial Intelligence and Machine Learning in Analysis and Decision Support

Artificial intelligence (AI) and machine learning (ML) play a pivotal role in transforming financial operations by leveraging their superior capacity to process large volumes of data **(PwC Consulting, 2023**). These technologies function as agentic analytical tools that analyze complex datasets and support decision-making, thereby enhancing operational efficiency (The Digital Transformation Imperative in Financial Services | Deloitte US, 2025).

Key functional applications of AI in the financial sector include:

-Predictive analytics: AI models are used to perform scenario analysis, helping firms identify potential vulnerabilities and design contingency plans to mitigate the adverse effects of risks **(PwC Consulting, 2023).**

-Fraud detection: AI models analyze and are trained on large transaction datasets to detect anomalous patterns that may indicate security threats or fraudulent activity **(PwC Consulting, 2023)**. Such automated analysis improves processes that are prone to human error and can assist staff by automating data entry, thereby freeing personnel to focus on more strategic tasks **(Vuković et al., 2025, p. 22).**

-Regulatory technology (RegTech): One of the most significant AI applications is RegTech, which assists the financial services industry in producing complex, data-intensive regulatory reports **(PwC Consulting, 2023**). Automation enabled by AI helps ensure regulatory compliance

more efficiently, a critical requirement for maintaining financial stability. Consequently, investments in AI for security and anti-fraud capabilities have moved from being a competitive advantage to a prerequisite for building trust in the digital financial system; if customer confidence is undermined by electronic fraud, substantial financial losses and negative systemic stability effects can ensue.

3.2Cloud Computing and Big Data as Enabling Infrastructure

Cloud computing and big data constitute an indispensable enabling infrastructure for digital transformation. Big data refers to the vast streams of information generated daily from diverse sources, including social data, data from smart devices, and transaction records **(Opeyemi E. Aro, 2024, p. 1063).** These datasets are the primary fuel used by banks and financial institutions to run AI models and perform analytics.

Cloud computing represents a fundamental shift in the financing model for infrastructure. It allows institutions to replace fixed-cost investments—such as building data centers and procuring physical servers—with variable operating expenditures: organizations pay only for IT resources they actually consume. Thanks to economies of scale, these variable costs are substantially lower than the expenses institutions would incur if they relied solely on in-house infrastructure **(Transform IT Value with a Cloud Strategy Roadmap, n.d.).**

The migration to the cloud is not merely cost rationalization but a structural transformation of institutional financing models. It markedly reduces administrative overhead and simplifies resource management, providing greater agility to scale operations quickly as activity grows. Crucially, lower infrastructure costs reduce entry barriers for small and medium enterprises and startups, freeing capital and enabling reallocation of savings toward higher-yield investments. This supports inclusive economic growth and increases competition among financial intermediaries, an essential objective of financial system modernization.

3.3Distributed Ledger Technologies (DLT)

Distributed ledger technologies (DLT), led by blockchain, are among the most consequential technologies reshaping financial system infrastructure. DLT can accelerate transaction processing and reduce transaction costs across activities such as securities trading and remittances to relatives abroad (Bank, 2024). Peer-to-peer networks enable participants to validate, update, and alter records by consensus without reliance on a central authority, representing a fundamental shift in trust and intermediation (Tapscott & Tapscott, 2016, p. 256).

Beyond banking operations, blockchain enables the creation of new financial services based on “smart contracts” that execute automatically when predefined conditions are met **(Tapscott & Tapscott, 2016, p. 270).** In the context of financial technologies, cryptocurrencies such as Bitcoin and Ethereum exemplify encrypted digital money transferred directly from payer to payee without government or central authority intermediation **(Nakamoto, n.d., p. 4).** However, these technologies present clear risks, including potential misuse for illicit purposes, which pose regulatory challenges.

Despite blockchain’s considerable potential to speed up and secure transactions across the industry, its full promise can be realized only through broad sector-wide collaboration to explore applications and establish common standards (Tapscott & Tapscott, 2016, p. 289).

4. Situation and Prospects of Modernizing Financial Systems in Algeria

Modernizing financial systems in Algeria is a fundamental pillar for achieving macroeconomic stability and providing a conducive environment for sustainable growth independent of hydrocarbon price volatility. This report provides an in-depth analysis of the current situation and prospects of this modernization, based on official data published by the Bank of Algeria and the Ministry of Finance for 2024–2025. The report focuses on assessing the impact of recent legal reforms (the new Money and Credit Law) on the performance of the banking sector and the financial market, and on how these reforms can serve the objectives of financial inclusion and the fight against the parallel economy.

4.1. Indicators of the Algerian Financial System

The Bank of Algeria's report confirmed that the national banking system demonstrated resilience and robustness during 2024, with improvements across most core indicators.

4.1.1 Prudential Strength and Dynamics of Financial Intermediation

The banking sector has witnessed a substantial strengthening of its financial position, with domestic banks maintaining capital levels above minimum regulatory thresholds. The solvency ratio reached 22.8% in 2024, an increase of 3.7 percentage points compared with 2020. This elevated ratio gives banks significant capacity to absorb potential losses and to expand lending activity. Regarding financial intermediation, loans to the economy rose by 5.3% to reach 11,256.5 billion DZD, while resources mobilized increased by 8.9% to 16,246.4 billion DZD compared with 2023. The ratio of non-performing loans remained broadly stable with a slight decline. **(yemen-yba.com, 2022.)**

4.1.2 Liquidity Challenges and Money Market Efficiency

Despite the high prudential strength reflecting the successful implementation of capital standards (Basel), the banking system faced a challenge in managing non-bank liquidity beginning in July 2024. In response, the Bank of Algeria conducted three-month open market operations, injecting 755.93 billion DZD between July and September 2024 to support the banking system and continue financing the economy. In addition, 600 billion DZD was released as potential supply in the interbank money market through the termination of bilateral liquidity repos.

The juxtaposition of solid solvency (22.8%) and the central bank's substantial liquidity injections points to a dual challenge: while solvency confirms the success of the prudential framework, the contraction of non-bank liquidity and the market's need for broad monetary interventions reveal a necessity to improve the efficiency of interbank money market mechanisms to avoid uneven liquidity concentration. This situation calls for structural measures to ensure liquidity is transmitted efficiently to all market participants to bolster financial intermediation.

4.2 Regulatory and Legislative Transformation within Financial Management Modernization

Recent legislative reforms constitute a cornerstone of financial system modernization by providing a flexible legal framework that supports technological innovation and the expansion of digital services.

4.2.1The New Monetary and Banking Law(09 23)

Law No. 23 09 of June 2023 represents a pivotal turning point, aiming to strengthen the governance of the banking system and the banking committee as a supervisory authority. The new monetary and banking law is designed not only to keep pace with current and future developments, particularly in technological and innovative dimensions. (**Bachar**,**2025**,) but also to establish a robust institutional framework, pursuing three main objectives:

• **Firstly**, enhancing banking governance: the law seeks to improve transparency and governance of the banking system, led by the Bank of Algeria, and to strengthen the role of the banking committee as a supervisory authority. This move aims to prevent the recurrence of past crises that revealed insufficient governance practices.

• **Secondly**, integrating innovation and fintech: the law expands the powers of the Council of Money and Credit to grant new licenses to accompany the transformations occurring in the banking environment.

• **Thirdly**, creating an enabling environment: the law seeks to provide favorable conditions for economic actors to access modern banking instruments.

In support of innovation, the law for the first time officially authorizes several new market players, opening the door to competition and innovation and reinforcing the foundations for sustainable economic development. These powers include:

- Licensing and accreditation of digital banks.
- Licensing and accreditation of payment service providers.
- Licensing of investment banks and independent brokers.
- Licensing to open exchange bureaus.

The enactment of this law acknowledges the necessity of building a resilient institutional framework that combines technological facilitation with robust oversight, particularly in light of lessons drawn from past episodes such as the Khalifa case that highlighted governance deficiencies**. (2025 ,بشار)**

4.2.2 Regulatory Framework for Digital Banking and Payment Services

Following the new law, the Bank of Algeria issued a series of regulations and implementing instructions that specify the detailed conditions for market entry **(Algera's Bank،2025) :**

• **Establishment of digital banks**: The Bank issued Regulation No. 24/02 and Instruction 2025/02 governing the creation and operation of digital banks. A digital bank is defined as an institution that provides banking services and products exclusively via digital platforms, leveraging modern ICT and fintech. The instructions require a comprehensive licensing dossier, including key elements such as:

- A statement of vision and strategic objectives, highlighting expected contributions to economic growth and financial inclusion.A detailed description of the core banking information system to be used for managing banking and financial operations.
- A description of embedded security measures to protect customer data (encryption, firewalls, access control), anti-money laundering and counter terrorism financing (AML/CTF) mechanisms, and data protection and privacy policies.

The speed with which the regulatory framework for digital banks and payment services was issued in 2024–2025, immediately following the new law, indicates that authorities recognize the importance of keeping pace with the fintech race. Nevertheless, this framework must remain flexible and adaptable because swift technological evolution can quickly render some regulations outdated or inadequate.

• **Strong regulatory compliance:** The new regulatory framework for digital banks and payment service providers, which emphasizes strict implementation of Know Your Customer (KYC) and AML/CTF mechanisms, significantly raises Algeria's level of international transparency and provides a strong supervisory infrastructure to curb non-bank money flows.

• **Regulation of payment service providers:** The regulatory package for PSPs was completed by Regulation No. 25 02 (April 2025) and Instructions 03 25 and 06 2025. These provisions aim to ensure the security, reliability, and transparency of payment services, regulate the opening and management of payment accounts, and protect client funds. Instruction No. 03 25 details the components of the founding and licensing dossier. This strong regulatory commitment to combating financial crimes and enhancing international transparency is a key factor in attracting foreign institutional investment.

• **Modernization extends beyond the banking sector to public finance management:** the government is implementing a project to modernize and digitize budgetary information systems, with an integrated system forming the cornerstone of this reform.

The project aims to shift from input-based budget management to an integrated result and performance-based budgeting system and pursues several strategic objectives, including **(Miliani,2022):**

• Providing detailed and clear information on public spending allocation and usage, thereby enhancing transparency in state resource management.

• Combating waste and reallocating public funds to the most effective and efficient programs and projects, thereby rationalizing public expenditure.

• Updating procedures and systems for budget preparation and execution to present financial data that reflects the outcomes of public sector activities.

- Although the SIGBUD system offers significant benefits, its implementation faces major operational challenges, notably:

• The application requires intensive training and capacity building of personnel responsible for effective system use, including modern financial and budgetary management methods.

• Ensuring seamless integration of SIGBUD with other government financial systems under

supervision, including banking and tax systems, to guarantee smooth nationwide digital transactions.

• Ensuring the security of financial data and protecting it against unauthorized access.

• **4.2.4.Modernizing the Accounting Framework**

This modernization is accompanied by a strategy to reform the public accounting system to avoid repeating the failure of the 2002 state chart of accounts implementation, through drafting a new governmental chart of accounts and reorganizing the competent units of the Ministry of Finance and spending ministries around the new procedures.

Slow integration among different government systems threatens to impede the smoothness of national digital transactions. The success of modernization depends on moving from partial digitization (customer-facing services) to comprehensive and integrated digitization (between banks, the government, and investors).

4.3Digitization of Payment Services and Financial Inclusion

Financial digitization is the principal mechanism for achieving financial inclusion and combating the parallel economy. 2024 indicators show substantial quantitative growth, but they also reveal challenges in deepening banking penetration and localizing financial services.

The electronic payment infrastructure experienced significant growth driven by increased consumer uptake. The total number of active payment cards exceeded 19 million by October 2024, marking a 20% increase compared with 2023.

• Cards: La Poste's "Gold Card" accounts for the largest share with over 14 million cards, versus more than 4 million bank CIB cards.

• Payment terminals: The number of electronic point of sale terminals (POS/TPE) deployed among merchants reached 68,140 (+28% growth), and the number of ATMs reached 3,896 units.

• E-commerce and transactions: The number of merchants connected to the online payment platform rose to 582 merchants (+23%). Mobile-based transactions grew dramatically by 49%, reaching 58.4 million transactions**. (Showia, 2025)**

The predominance of La Poste's Gold Card (14 million cards) over bank CIB cards indicates that the current digital expansion is concentrated in governmental payments and social transfers administered through the postal service. For Algeria to genuinely move toward a cashless society, commercial banks (public and private) must strengthen their digital platforms (e.g., BEA_MOBILE of the External Algerian Bank and BN@tic of the National Bank of Algeria) to attract this large user base into their own systems, thereby ensuring greater efficiency in deposit and credit management.**(Algeria's Bank 2024)**

The primary goal of digitization is to reduce the parallel economy and combat corruption by providing advanced tools for tracking and monitoring financial flows. Transitioning to electronic payments as an alternative to cash is an ambitious governmental plan to face corruption and shrink the parallel economy that has hindered financial transparency.

4.4Modernizing the Capital Market and Developing Financing Mechanisms

Modernizing the capital market and revitalizing the Algiers Stock Exchange are essential for financing real investment and providing an alternative to traditional bank financing.

4.4.1Qualitative Development of the Algiers Stock Exchange

The reality shows a qualitative leap in the performance of the Algiers Stock Exchange, driven by regulatory reforms and major investment operations. The indicators of the Algiers Stock Exchange are presented in the following table:

Table 01: Algiers Stock

Indicator	Value (2023)	Value (2024)	Rate of Change	Source/Significance
Market capitalization (billion DZD)	71	521	+634%	Impact of CPA listing
Total traded value (billion DZD)	N/A	2.76	+440%	Improved liquidity
Number of new investors (CPA)	N/A	42,000 <	N/A	Increased general confidence

Sources: Algiers Stock Exchange, https://www.sgbv.dz/ar/, accessed 05/11/2025.

This surge in market capitalization—to 521 billion DZD in 2024 from only 71 billion DZD in 2023—was primarily driven by the listing of the Caisse Populaire Algérienne (CPA), which mobilized 112 billion DZD from over 42,000 investors. The total traded value increased by more than 440%, reflecting growing investor confidence in the domestic market.

This transformation resulted from a sovereign decision (the listing of a public bank), which laid the foundations for a stronger and more transparent financial market; nevertheless, it also indicates the market's present dependence on state backing. Sustaining this growth requires further private and mixed listings and leveraging CPA's success as a model to demonstrate that market-based financing can be an effective alternative to bank financing, especially given the limited corporate conversion culture among local firms **.(Zerari, 2024)**

4.4.2 Efforts to Revitalize the Secondary Market for Treasury Bonds

Modernizing the treasury bond market is critical for national economic development and for providing a financial infrastructure aligned with international standards. In August 2024 the Minister of Finance chaired a working session to review the current "Plat TRESOR-X" platform (in service since 2014) and to advance a project for a new platform intended to revitalize the market.

The proposed platform is expected to enhance liquidity, transparency, and system security, representing a step toward positioning the country at the forefront of financial technology adoption.

Despite the progress achieved in 2024, the stock exchange continues to face longstanding obstacles, foremost among them the small number of listed firms and the stagnation of trading volumes, which undermine its liquidity. Moreover, an economic structure dominated by small and medium-sized enterprises lacks a culture of conversion into joint-stock companies.

Looking toward 2025, the committee intends to operationalize collective venture-capital deployment bodies (HCCR) in practice. Activating capital-risk mechanisms reflects the recognition that the traditional exchange infrastructure is ill-suited to finance start-ups and innovation. Such mechanisms are essential to provide flexible financing for high-growth firms and thereby strengthen Algeria's competitive position **(Ben Dida, 2024 p:102:)**

A stimulative plan is also being developed to encourage listings and broaden the issuer base.

5. Macroeconomic Implications of AI-Supported Digital Transformation

The AI-supported digital transformation of Algeria's financial systems has produced several repercussions that have affected the economy's aggregate indicators. These effects can be summarized as follows.

5.1Macroeconomic Indicators of Algeria(2024–2015)

Macroeconomic indicators reflect the impact of financial system digitization in Algeria. GDP measures the capacity of digitization to raise productivity and overall economic growth. Regarding inflation, the expansion of financial inclusion and digital credit can stimulate consumer

spending and demand for goods and services, which may exert upward pressure on prices. The unemployment rate reveals the transformation's effect on the labor market and the development of local capacities. Digitalization reduces the cost and duration of payment settlement through faster electronic channels and payment platforms; this facilitates small and medium scale exports and lowers the cost of imported services, producing a net effect on the current account balance that depends on changes in exports relative to imports. The evolution of these indicators is shown in the following table:

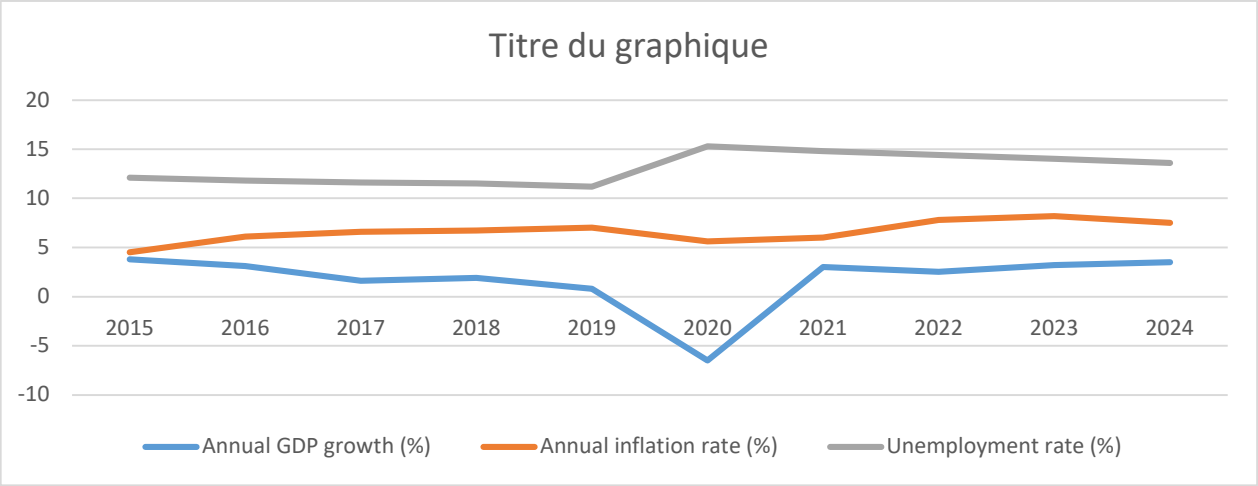
Table 02: Evolution of Algeria's Macroeconomic Indicators

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Annual GDP growth (%)	3.8	3.1	1.6	1.9	0.8	-6.5	3.0	2.5	3.2	3.5
Annual inflation rate (%)	4.5	6.1	6.6	6.7	7.0	5.6	6.0	7.8	8.2	7.5
Unemployment rate (%)	12.1	11.8	11.6	11.5	11.2	15.3	14.8	14.4	14.0	13.6
Current account balance (% of GDP)	-2.0	-1.5	-4.2	-6.0	-3.8	-5.5	-3.0	-2.2	-1.8	-1.5

Source: Bank of Algeria reports, 2015–2024.

For improved readability, these data can also be presented graphically:

Figure 01: Evolution of Algeria's Macroeconomic Indicators



Source: Authors' compilation

From the table and the figure, the following observations emerge:

• The general trend shows volatility in growth with a sharp decline in 2020 due to demand shocks and global price disturbances, which increased the economy's vulnerability to external shocks.

• Rising inflation and persistently high unemployment exert pressure on the capacity of monetary and fiscal policies to support comprehensive digitalization without creating additional strains on macroeconomic stability.

• The recurrent negative current account balance signals the economy's reliance on external resources, linking any disruption in digital channels to potential effects on the exchange rate and

aggregate liquidity.

5.2Indicators of Banking Sector Stability and Solvency(2024–2015)

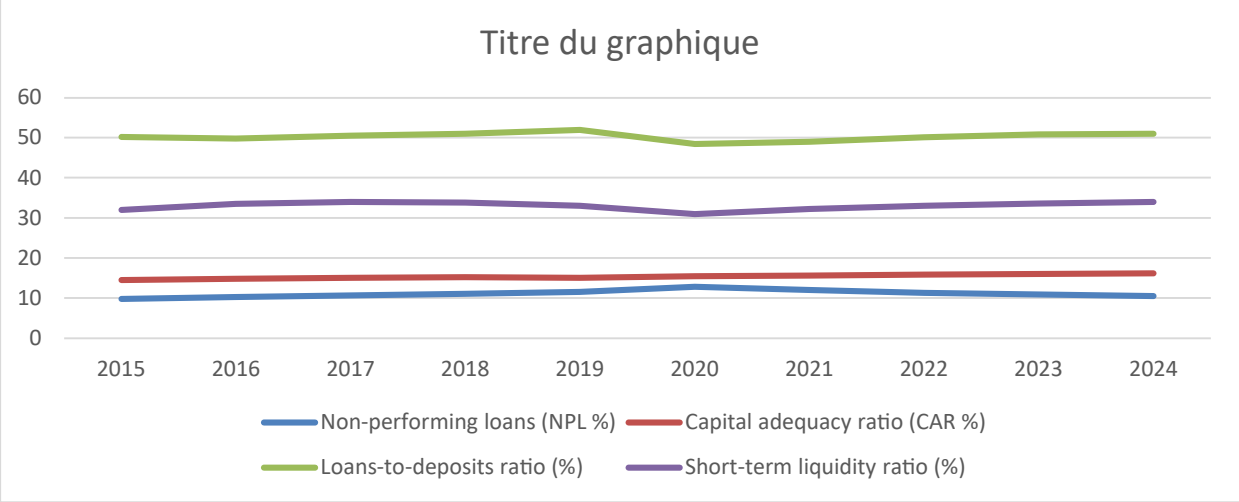
The impact of the financial system's digital transformation on banking activity can be highlighted through the following indicators.

Table 04: Banking Activity Indicators in Algeria

Non-performing loans (NPL %)	9.8	10.2	10.6	11.0	11.5	12.8	12.0	11.3	10.9	10.5
Capital adequacy ratio (CAR %)	14.5	14.8	15.0	15.2	15.0	15.4	15.6	15.8	16.0	16.2
Loans-to-deposits ratio (%)	50.2	49.8	50.5	51.0	52.0	48.5	49.0	50.1	50.8	51.0
Short-term liquidity ratio (%)	32.0	33.5	34.0	33.8	33.0	31.0	32.2	33.0	33.6	34.0

Source: Bank of Algeria reports, 2015–2024.

Figure 02: Banking Activity Indicators in Algeria Source: Authors' compilation



Source: Authors' compilation

Brief observations:

•A slight increase in the non performing loan ratio during 2018–2020 reflects credit pressures that intensified amid economic shocks; the improvement after 2020 suggests credit containment measures or selective recovery in microeconomic conditions.

•The central bank's maintenance of capital standards (CAR) provides absorption capacity but does not eliminate short term liquidity risks in the event of major digital platform outages or cyberattacks.

•The stable loans to deposits ratio is consistent with a conservative system but indicates limited room to expand lending.

5.3Digitalization Indicators of the Financial Sector(2024–2015)

The following indicators can be used to illustrate the scale of the financial system's digital transformation. They are presented in Table 05 below.

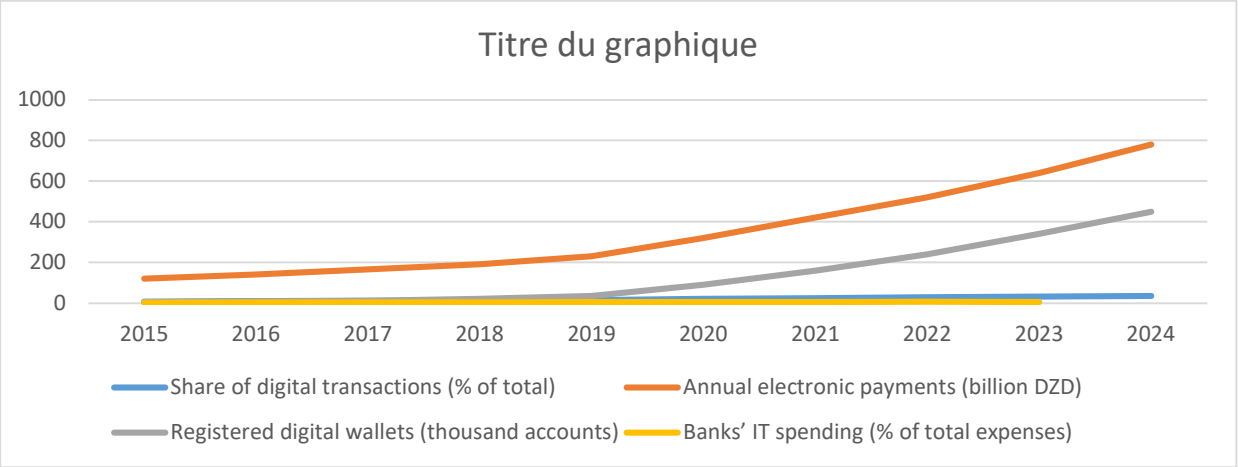
Table 05: Digitalization Indicators of the Financial System

Indicator	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Share of digital transactions (% of total)	8.0	9.2	10.5	12.0	14.0	20.0	24.5	28.0	32.0	35.0
Annual electronic payments (billion DZD)	120	140	165	190	230	320	420	520	640	780
Registered digital wallets (thousand accounts)	5	8	12	20	35	90	160	240	340	450
Banks' IT spending (% of total expenses)	3.2	3.5	3.8	4.0	4.3	4.8	5.2	5.6	6.0	6.3

Source: Bank of Algeria reports, 2015–2024.

For clearer visualization of the trends in the table above, the following chart is used:

Figure 03: Digitalization Indicators of the Financial System.



Source: Authors' compilation

Observations from the above figure and table:

• A clear acceleration in the adoption of digital channels since 2020, mirroring the global trend linked to the COVID-19 pandemic, which made digital channels a primary mode for transactions.

• Growth in payment values and the number of wallets reflects market expansion with geographic disparities; however, IT expenditure as a share of total expenses remains below levels seen in banks in advanced markets, indicating room for further investment.

• These indicators are direct channels through which operational efficiency is improved, but they also increase dependence on infrastructure and third-party service providers, thereby raising related risks.

• In addition, cybersecurity incidents increased from 3 incidents in 2015 to 30 incidents in 2024, which heightens attention to the threat landscape surrounding the digital transformation of financial systems and the need for protection and cybersecurity measures.

6. Challenges of Digital Transformation for Algeria's Financial Systems and Strategic Outlook

The digital transformation of Algeria's financial systems presents a major opportunity to improve efficiency and financial inclusion, but it faces a set of structural and regulatory challenges. Despite progress in legislative and quantitative infrastructure, digital transformation remains limited and encounters several obstacles, most notably:

• Weak digital financial inclusion: Current conditions show that digital financial inclusion in

Algeria remains very low, revealing a large gap between modern legislation (e.g., the new Money and Credit Law) and the actual uptake of digital services by citizens and firms.

• Need for education and awareness: Successful digital transformation requires specialized training programs and comprehensive awareness campaigns targeting all segments of society to clarify rights and obligations related to electronic transactions and data protection. Many citizens and businesses lack sufficient familiarity with the provisions of the new electronic transactions and data protection laws, necessitating broad campaigns to promote safe and responsible use of technology.

• Slow legislative adaptation to technology: Rapid technological change poses another challenge, as laws can become outdated or unsuitable quickly; this calls for maintaining a flexible and adaptive regulatory framework.

• Administrative and institutional inertia in banking digitalization: Moving from traditional methods to electronic operations in banks faces administrative obstacles. Modernization requires intensive training and capacity building for staff on updated systems and procedures, and presents the challenge of ensuring seamless integration between the government's budgetary system (SIGBUD) and other financial systems used by banks and ministries **(Ben Dida & Bousmaha, 2024).**

7. Discussion and Analysis of the Results

The researchers reached the following conclusions:

• Rapid digitization of transactions: the share of digital transactions rose from 8% in 2015 to 35% in 2024, and electronic payment values grew from 120 billion DZD to 780 billion DZD, indicating a clear shift toward digital channels.

• Improved IT spending efficiency but below global benchmarks: banks' IT expenditure rose from 3.2% to 6.3% of expenses, showing increased resource allocation to digitalization while leaving room for investment in advanced capabilities.

• Relative improvement in banking capital with asset quality volatility: CAR increased gradually from 14.5% to 16.2%, while NPLs rose until 2020 and then declined to 10.5% in 2024—reflecting credit pressures from economic shocks followed by credit containment measures or selective improvement in risk management.

• Rising cybersecurity incidents with an expenditure response: annual incidents reached 30 in 2024 versus 3 in 2015, while the share of IT spending devoted to cybersecurity rose from 8% to 16%, indicating growing threats and a relatively delayed investment response.

• Third-party risk management requirements mitigate the potential negative effects of digitalization on financial stability.

• Administrative barriers accompany the shift from traditional to electronic banking, reflecting institutional inertia. Despite growing awareness within banks of digitalization's importance and political will to develop the sector, slow project implementation remains an obstacle to achieving stated objectives.

• Human resources and training challenges: digitalization requires new skills in IT, data management, and cybersecurity that are insufficiently available within traditional banking structures. Training staff on updated systems and procedures remains essential to ensure effective use of new systems.

• Uneven technological infrastructure: despite major progress in telecom infrastructure, regional disparities persist that may affect the reliability and quality of digital services in remote areas, impeding comprehensive financial inclusion.

Conclusion

Data from 2024 confirm that modernizing Algeria's financial systems is a comprehensive, top-down effort spanning monetary supervision, daily payments, and investment financing. The necessary legislative infrastructure for this leap has been established. Long term success requires converting quantitative advances in electronic payment indicators into qualitative efficiency gains, ensuring effective public–private coordination, and—most importantly—translating strong

political will into practical results by overcoming administrative obstacles and raising citizens' digital financial literacy.

The study's main findings are:

• AI supported digital transformation enhances financial institutions' efficiency and reduces transaction costs, lending conditional support to Hypothesis H1; remaining shortcomings relate to structural challenges such as market rigidity and liquidity constraints.

• Large quantitative growth in user numbers has been achieved; the dominance of the government Gold Card in the digital landscape indicates that expansion is driven by social transfers and has not yet penetrated deep banking services or achieved the localization and commercial competition needed to activate banks' intermediation role—this gives qualified support to Hypothesis H2 while pointing to deficiencies in the qualitative spread of electronic payment methods.

• The pace of risk proliferation has outstripped security responses, which remain below global standards. The rising threats mean that the new systems' capacity to reduce fraud-related losses has yet to be confirmed at the systemic level, leaving Hypothesis H3 unproven at present.

Recommendations

Based on the analysis of the financial system's status and modernization prospects, the report offers the following strategic recommendations:

• Design continuous, comprehensive awareness campaigns in cooperation with La Poste (given the Gold Card's dominance with over 14 million users and public banks) to educate citizens on safe and responsible use of digital services.

• Simplify remote account opening and registration procedures fully, and use the new legislative framework to enable payment service providers to reach underbanked geographic areas with greater flexibility.

• Allocate substantial, sustained investments to strengthen the security infrastructure of the entire banking sector, and periodically review cybersecurity requirements for digital banks to keep pace with rapid technological developments and protect customer data.

• Link public banks' modernization plans to clear performance indicators to measure the success of digital transformation and improve operational efficiency, and work to reduce the effectiveness gap relative to private banks.

• Offer differential tax incentives to small and medium enterprises that convert into joint stock companies and list on the stock exchange to break the historical reluctance toward listing.

• Establish a clear, fixed timeline to operationalize collective venture capital financing bodies (HCCR) in 2025 to provide necessary funding for high-growth start-ups.

• Develop Sharia-compliant financial instruments in the capital market (e.g., sovereign and investment sukuk) to leverage the rapid growth of Islamic banking (20% annually) and convert it into a source of long-term investment financing.

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