The Impact of the Generalization of the Electronic Payment System on the Effectiveness of Internal Control: An Analytical Study of the Algerian Experience

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Received: 13/01/2026 *Accepted: 10/07/2026* *Published: 31/07/2026*

Abstract

This study aims to analyze the level of interaction between digital transformation and internal control mechanisms, while evaluating differences in control performance according to the criteria of efficiency, transparency, and operational risk management. The study examines the impact of generalizing electronic payment systems on the effectiveness of internal control within Algerian institutions, through an analysis of Algeria's experience up to 2024, using descriptive-analytical and comparative methodologies, and relying on official reports and recent data.

The results showed that the spread of electronic payments contributed to enhancing the efficiency of internal controls by improving process tracking and reducing human error, although the level of improvement varied according to the digital maturity of the organizations. The study also concluded that digital transformation presents new challenges that necessitate the development of more integrated control systems capable of addressing digital risks and cybersecurity concerns.

Keywords: *Electronic payment, internal control, financial systems, financial institution, digital transformation.*

1. INTRODUCTION

The shift to electronic payments is no longer merely a technical option or a sign of administrative modernity; it has become a fundamental indicator of the evolution of financial systems and their ability to adapt to the demands of the

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digital economy. Modern technologies, such as card payment systems, mobile applications, and electronic platforms, have profoundly changed the nature and speed of transactions. However, they have also opened the door to new operational and security risks that require a high level of oversight. In Algeria, this transformation has accelerated in recent years due to legislative reforms, the development of technological infrastructure, and the increasing demand for digital services. Algeria Post and the National Bank of Algeria have played pivotal roles in this development. Despite the expansion of digital transactions, internal control remains the crucial element in ensuring the robustness of the digital system. It is no longer limited to procedures and regulations but is now linked to a culture of discipline and transparency, data protection mechanisms, and cyber risk management.

1.1 Problem Statement

This study stems from the need for a critical and objective analysis of the readiness of Algerian financial institutions to secure an electronic payment environment in accordance with modern regulatory standards. With the accelerating pace of digital transformation, the fundamental question remains*:*

To what extent does the widespread adoption of electronic payment systems affect the effectiveness of internal controls in Algerian financial institutions, based on the national experience up to 2024?

1.2 Sub-Questions

To answer this main question, a set of sub-questions arise:

1. What are the components of the electronic payment system in Algeria?

2. What is the nature of the relationship between the expansion of electronic payment systems and the level of effectiveness of internal controls in financial institutions?

3. How have new legislation and regulations contributed to strengthening the oversight of the electronic payment system?

4. What are the most prominent regulatory challenges and operational risks facing financial institutions as a result of the widespread adoption of electronic payments?

5. To what extent have Algerian institutions (such as the Bank of Algeria and Algeria Post) been able to achieve a balance between digital transformation and effective oversight?

1.3 Study Hypotheses

Based on the main problem and the preceding sub-questions, the following hypotheses can be formulated:

1.3.1 Main Hypothesis:

- There is a significant positive relationship between the level of adoption of electronic payment systems and the effectiveness of internal controls in the Algerian system.

1.3.1 Sub-hypotheses:

1. The adoption of electronic payments contributes to improving the efficiency of internal controls in terms of the speed of detecting financial transactions and data quality.

2. The expansion of electronic payment services is accompanied by an increase in cybersecurity risks, which negatively affects some components of internal controls.

3. The legal regulations issued during 2023–2024 strengthened the regulatory framework for electronic payment systems, but they still require more integrated digital implementation tools.

4. The level of effectiveness of internal controls varies among financial institutions depending on the level of digital transformation they have achieved.

1.4 Significance of the Study

The significance of this research stems from its addressing a key topic that touches the core of the financial transformation process in Algeria, at a time when financial digitalization intersects with the requirements of governance and transparency. From a scientific perspective, this study fills a gap in Algerian literature, which has rarely addressed the relationship between electronic payment and internal control.

From a practical perspective, the study aims to provide a realistic analysis of the level of control readiness in national institutions and to formulate practical proposals that can assist decision-makers in developing more integrated and effective control policies and procedures.

The practical importance of the research is evident in the following:

- Diagnosing the current state of internal control during the expansion of the electronic payment system.
- Supporting decision-makers in managing operational risks and reducing the likelihood of financial fraud.
- Enhancing user confidence in digital transactions and national financial systems.
- Contributing to building a knowledge base that supports the development of legislative and regulatory frameworks related to digital financial security.

1.5 Study Objectives

This study aims to analyze the relationship between the spread of the electronic payment system and the level of effectiveness of internal control in Algerian financial institutions, focusing on the experiences of Algeria Post and the National Bank of Algeria during 2024.

- Determining the extent of the spread and generalization of the electronic payment system in Algeria in recent years. - Analyzing the relationship between digital financial transformation and the effectiveness of internal controls in financial institutions.

- Evaluating the legal and regulatory framework governing the electronic payment system and its impact on enhancing transparency and oversight.

- Highlighting the oversight challenges arising from financial automation and cybersecurity risks.

- Formulating practical proposals to improve the effectiveness of internal controls in light of the widespread adoption of electronic payments.

1.6 Study Methodology

The study adopted a descriptive-analytical approach to present theoretical concepts related to electronic payments and internal controls, and a comparative approach to identify similarities and differences in the application of oversight mechanisms across institutions. Documentary analysis of official data and annual reports issued in 2024 by banking and regulatory bodies was also employed to arrive at accurate scientific conclusions that contribute to a deeper understanding of the reality of oversight in a changing digital financial environment.

1.7 Study Scope

• Timeframe: The study covers the year 2024, which witnessed a significant expansion of the electronic payment system in Algeria.

• Geographical Scope: The study includes financial institutions under the supervision of the Bank of Algeria, particularly Algeria Post. • Subjective limitations: It is limited to studying the impact of electronic payment on the effectiveness of internal control, without addressing other aspects of financial digitization that are not directly related to payment systems.

2. The Theoretical Framework of Electronic Payment and Internal Control:

In light of the rapid digital transformation of the global economy, electronic payment has emerged as a cornerstone for modernizing financial systems and facilitating commercial transactions. Understanding this phenomenon requires exploring the fundamental concept of electronic payment, which transcends being merely a technological tool to encompass an integrated system of stakeholders and processes. Studying the basic components of these systems, from technological infrastructure to the tools used, such as cards and e-wallets, is crucial for understanding their efficiency and rapid adoption. In this context, the importance of the legal and regulatory framework becomes evident. The efforts of regulatory legislation in Algeria are evident in building a reliable and encouraging environment for the widespread adoption of these methods, guaranteeing the rights of users and establishing a solid foundation for the transition to a less cash-dependent society.

2.1 What is Electronic Payment?

The concept of electronic payment refers to the digital transfer of funds for goods and services, primarily facilitated online. Its origins can be traced back to the rise of e-commerce, which necessitated secure and efficient payment methods that transcend traditional cash transactions. Various types of electronic payment systems have emerged, each with its own distinct characteristics and applications.

This section will address electronic payment in terms of its concept, origins, and types, as follows:

A. The Concept of Electronic Payment:

Among the concepts associated with electronic payment are the following:

- Electronic payment is defined as the use of electronic means to exchange value between two parties, whether through money transfers or payments for goods and services online using various payment technologies such as credit cards or mobile payments. This system is a modern alternative to traditional cash transactions and relies primarily on information technology to ensure the speed and efficiency of transfers. These transactions are processed through electronic payment platforms that provide security and confidentiality for users. (COSO C. o., 2013, p. 01).

It is also the system that enables users of e-commerce applications to exchange money electronically instead of Instead of using coins, banknotes, or paper checks, online sellers are providing easy, fast, and secure ways to receive payment for their products from customers. (Abu Shaala, 2024, p. 381).

Electronic payment is money or currency exchanged electronically. This includes electronic money transfers and direct payments, and is also called electronic money. (Moayed & Abdullah, 2024, p. 65)

By comparing these definitions, we observe that they converge on several key points, such as the emphasis on using electronic means for value exchange and expediting payment processes. However, the definitions differ in their level of detail and clarity, particularly when it comes to the various types of electronic payment (such as digital wallets, credit cards, and e-money). Furthermore, the definitions do not address the challenges that electronic payments may face, such as security and fraud.

Researchers agree that electronic payment represents the transfer of value using digital means, via technically secure platforms, whether through cards, wallets, or direct transfers. Definitions vary between those who focus on the technical aspect (COSO, 2013) and those who broaden the framework to include the economic and social dimensions (Abu Shaala, 2024; Mu'ayyad, 2024). Therefore, it can be said that:

Electronic payment is the use of electronic means to exchange value between two parties, where payment for goods or services is made online using various technologies such as credit cards, electronic money transfers, and digital money. This system includes instant payments, transfers between bank accounts, and the use of digital wallets, and it is considered an alternative to traditional cash transactions that ensures speed and security, while taking into account technological developments and the challenges associated with cybersecurity.

B. Types of Electronic Payment Services

Electronic payment methods vary according to customer needs and contribute to facilitating secure and efficient digital purchases. These methods include credit cards, which allow for deferred payment, and e-money, which facilitates transfers without additional costs. They also include smart cards, which store data and ensure security through encryption, and e-checks, a digital alternative to paper checks. In addition, there are electronic money transfers, which expedite the movement of funds, and e-wallets, which facilitate online payments. Mobile payments are witnessing widespread adoption, relying on Near Field Communication (NFC) technology, thus enhancing the digital experience. These methods can be summarized as follows: (Bin Dawood, Al-Faisal, & Jarad, 2024, p. 07)

- Credit card: Allows the customer to withdraw funds or pay for purchases and settle the amount later.
- Electronic money: Digital money stored on secure media, used for transferring funds without additional cost.
- Smart card: Contains the customer's data and is used to store and process information electronically.
- Electronic check: An alternative to a paper check, allowing electronic payments via computer or mobile phone.
- Electronic money transfers: Transferring funds electronically from one bank account to another.
- E-wallets: Digital applications used to store payment data and conduct online financial transfers.
- Types of cards used in electronic payments:
    - Electronic payment cards: Such as credit and debit cards.
    - Prepaid cards: Open or closed cards, used for payments or online shopping.
- Mobile payments;
    - Digital wallets: Used for purchases and money transfers.
    - Near Field Communication (NFC): To enable easy mobile payments.
- International Electronic Transfers:

Banking operations have diversified with the various sectors of the national economy. These include bank transfers offered by banks to serve their customers and meet the needs of the national economy. Given that the foreign trade sector is one of the most important sectors in the global and national context, banking operations related to this sector are among the most frequently used and crucial. This is due to the increased trade exchanges between countries worldwide, hence the need to use the SWIFT system in banking operations and communication between banks, facilitating the services provided and ensuring the smooth operation of these transactions. (Abu Shaala, 2024, p. 483)

This refers to the transfer of funds or payments between parties located in different countries using electronic payment methods. These transfers take place online using services such as e-banks, digital wallets, and global networks like

SWIFT and SEPA, allowing individuals and businesses to send and receive money across borders quickly and securely. These transactions are conducted through banking channels or electronic financial platforms and offer a fast and efficient alternative to traditional paper-based transfers or direct bank transfers.

It is noted that most of the payment methods prevalent in Algeria are concentrated around bank cards and Algeria Post's gold cards, while electronic wallets and mobile transfers remain limited in use for cultural and technical reasons.

2.2 Classifying Risks Associated with Electronic Payments

The shift to electronic payment methods is a crucial step towards modernizing financial systems. However, it is accompanied by a wide range of risks that require careful management according to modern governance and risk frameworks such as COSO and ISO 31000.

These risks can be classified into four main categories: operational risks related to technical malfunctions or processing errors that may disrupt service continuity; information security risks resulting from cyberattacks and data theft; legal and regulatory risks stemming from non-compliance with national and international legislation concerning electronic transactions; and finally, reputational and trust risks that arise when users are exposed to fraud or hacking incidents, thus weakening their confidence in the digital financial system. A balanced approach to managing these risks is essential to ensuring the sustainability of electronic payments. As follows:

A. Operational Risks:

These risks are embodied in structural deficiencies within information and control systems, particularly those related to varying functional efficiency of information and reporting systems, and weak internal risk monitoring mechanisms. A significant portion is also attributed to the absence of effective tracking and verification systems, leading to the overlooking or neglect of some fundamental risks and limiting the ability to take appropriate corrective actions in a timely manner. This can ultimately result in serious organizational and operational consequences that threaten the integrity of the control system and its institutional stability. (Muqbil & Al-Halimi, 2023, p. 133)

B. Information Security Risks:

Digital payment is considered one of the most prominent innovations in the field of modern financial services, as it has contributed to facilitating electronic transactions and accelerating the flow of funds online. However, this profound technological shift has been accompanied by a significant increase in cyber threats and attacks targeting electronic payment systems, making transaction security one of the most prominent challenges facing the contemporary digital economy.

The vulnerability of these systems stems from a number of factors, most notably users' reliance on sharing their sensitive data, such as credit card and bank account information, through communication channels that may lack sufficient security. Furthermore, the effectiveness of the electronic payment system is linked to the development of the information technology infrastructure and the efficiency of its protection mechanisms. In this context, a weak alignment between market demands and user behavior is a fundamental factor that may lead to the failure of electronic systems to achieve the required levels of security and trust. (Hassan, Shukur, Kamrul, & Al-Khaleefa, 2020, p. 07)

C. Legal and Regulatory Risks:

The research indicates that the legal risks associated with electronic payment methods primarily revolve around two key issues: (Shayeb Pasha, 2020, pp. 40-41)

- Privacy Violations: The text points out that protecting the personal data of consumers and users in the electronic environment is one of the most prominent legal challenges. Digital transactions generate massive amounts of banking and personal information that may be exploited without permission, whether through publication or monitoring of individuals without their knowledge. This constitutes a breach of the principle of banking secrecy and the right of individuals to digital privacy.

- Money Laundering: Using electronic payment methods, due to the ease of transferring funds through digital banking networks and the lack of complete transparency in identifying their source, facilitates money laundering. These practices constitute organized crime that threatens the integrity of financial systems, as illicit funds can be channeled through legitimate channels, leading to negative effects on banking confidence and the stability of financial markets.

D. Risks to user reputation and trust:

The study results indicate (Beheri, Simbawa, & Husain, 2025, p. 723) Consumer trust in digital payment systems is significantly influenced by reputation and credibility. The more reliable and transparent a platform is in handling malfunctions and fraud incidents, the higher the level of trust and reliance on it. Conversely, repeated technical glitches or incidents of hacking and financial fraud gradually erode trust, negatively impacting future usage intentions and damaging the service provider's corporate image in the market. The study concludes that reputational risk management is a strategic dimension in the sustainability of electronic payment systems, particularly in environments where digital trust remains limited.

The preceding discussion demonstrates that the approach to classifying electronic payment risks represents a balanced analytical framework. However, it reveals a disparity in the depth of analysis between technical and regulatory aspects. While the operational and security sections addressed technical and regulatory efficiency with relative precision, the legal, reputational, and trust analyses remained more descriptive than causal. Furthermore, the absence of

interactive links between these risks—such as the relationship between operational failure and erosion of trust, or between legal vulnerabilities and increased fraud—limits the framework's comprehensiveness. Therefore, it is advisable to support the analysis with an integrated approach based on the Enterprise Risk Management (ERM) model, according to the COSO or ISO 31000 framework, to ensure a holistic view that links performance, control, and digital governance.

2.3 Risk implications for the internal control system

The escalating operational and cybersecurity risks in the electronic payments environment have reshaped the concept of internal control within financial institutions, including payment system operators. Digital transformation is no longer merely a technological improvement; it has become a source of a wide range of risks requiring different levels of control and necessitating a fundamental review of traditional control structures. Therefore, the following key elements will be emphasized:

a) The relationship between the type of risk and the required level of control:

Recent studies reveal that the level of internal control is directly related to the nature and severity of the risk. Operational risks, such as technical malfunctions or weak tracking pathways, necessitate rigorous procedural controls to ensure the smooth flow of operations and their continuous documentation. Cyber risks, however, represent a higher level of threat and require stringent controls based on advanced encryption mechanisms, multi-factor authentication, and technologies for the immediate detection of abnormal transaction behavior. (Chenxi, Deli, Xincai, & Shun, 2023, pp. 1-3)

Compliance risks, particularly those related to data protection and adherence to the legislative framework, require careful alignment between the regulatory system and modern legal and regulatory requirements, including European legislation on the digital sector and internationally adopted information security standards. (Huidong, 2023, pp. 29-30)

In light of the above, the relationship between the type of risk and the required level of control emerges as a direct one, where the intensity of control increases as the threat level rises. Recent literature indicates that operational risks, including technical malfunctions or weaknesses in tracking pathways, reveal a pressing need for procedural controls focused on ensuring continuity of performance and quality of documentation. This suggests that this type of risk is linked to flaws in the procedural structure rather than in the deep technical infrastructure. In contrast, cyber risks exhibit a more complex nature, requiring advanced technical control based on encryption, multiple authentication, and real-time transaction analysis. This underscores that the level of control increases as the risk's ability to penetrate the system through covert means increases. Compliance risk analysis also reveals that data protection and adherence to the

regulatory framework necessitate a different control model based on continuous alignment between internal controls and regulatory requirements. This implies that legal and regulatory risks take on an institutional character, extending beyond the technical aspect to encompass governance and legislation. Therefore, it is concluded that the diversity of risks necessitates a corresponding diversity in the level of control, so that a tiered control system is formed that is consistent with the nature of each threat and its extensions.

B) The Evolution of the Concept of Internal Control in Light of Financial Digitalization.

Financial digitalization has demonstrated a shift from traditional control based on manual verification to digital control based on data analysis and risk prediction. Recent studies, such as [study name], indicate this shift. (BOUBOUH & GHANIM, 2025, p. 150)

Control in digital systems is increasingly shifting towards proactive control, which anticipates risks before they occur; real-time control, which monitors transactions as they happen; and algorithm-based control, which analyzes abnormal transaction behavior. This evolution reflects the need for an integrated control architecture that adapts to the volume of data and the speed of transactions in electronic payment environments.

It can be argued that there is a fundamental transformation in internal control models due to financial digitization. Recent studies highlight a clear shift from traditional control to digital control based on advanced data analysis. Control in the digital environment is no longer limited to post-transaction verification; rather, it now indicates the adoption of proactive control models that anticipate risks before they occur by processing vast amounts of data in real time. Real-time control also demonstrates that it responds to the speed and dynamism demands of electronic payment systems, monitoring transactions as they happen, thus enhancing the chances of detecting irregularities at their inception. Similarly, algorithm-based control proves its ability to analyze unusual patterns in financial behavior, revealing the role of artificial intelligence and machine learning in expanding the scope of control intervention. These transformations show that the digital environment requires a more flexible and integrated regulatory structure capable of interacting with the massive flow of data and the speed of transactions, supporting the conclusion that digital control has become an indispensable structural element in modern electronic payment systems.

C) COSO standards as a reference framework for evaluating the effectiveness of control.

The COSO framework is the most widely adopted reference for assessing the effectiveness of internal control, given its ability to provide a comprehensive view of the organizational control structure and its essential components. The framework identifies five interconnected components that form the foundation upon which effective internal control systems are built: the control environment, risk assessment, control activities, information and communication, and

monitoring activities. These components function as an integrated system that interacts to ensure the achievement of the organization's operational, reporting, and compliance objectives. (COSO, ACHIEVING EFFECTIVE INTERNAL CONTROL OVER SUSTAINABILITY REPORTING (ICSR):, 2013, pp. 69-70)

The framework highlights internal control as an interconnected system whose elements interact towards achieving operational objectives, reporting, and compliance. The interactive nature of these components indicates that effective control is not achieved through a single element, but rather through the interplay between the governing environment, threat assessment mechanisms, control procedures, information flows, and audit and follow-up activities. This interconnectedness suggests that the COSO framework represents a dynamic control model that allows for measuring system efficiency and identifying strengths and weaknesses. Accordingly, the framework's structure emphasizes that effective internal control is not merely a technical process, but an integrated governance system based on clear principles that can be adapted to different contexts, including electronic payment environments that require more stringent standards aligned with digital development.

D) Balancing Technological Flexibility and Regulatory Control

The central challenge lies in finding a realistic balance between digital innovation and regulatory control. Technological flexibility is essential for improving service levels and payment speeds, while the absence of adequate regulatory control leads to digital vulnerabilities that increase the likelihood of manipulation and breaches. Recent literature recommends integrating controls into system design from the outset, rather than adding them later, to achieve performance speed without compromising security and compliance requirements. (Oleiwi, 2024, p. 262)

Technological shifts demonstrate that technological flexibility is now a prerequisite for enhancing service efficiency and accelerating payment processes. Conversely, recent digital experiences show that the absence of appropriate controls leads to digital vulnerability, increasing the likelihood of manipulation and hacking. This illustrates that uncontrolled technological development undermines the resilience of digital systems. The literature also indicates that overcoming this dilemma requires adopting an integrated design approach that incorporates control mechanisms into the system's architecture from its initial stages. This underscores that effective control must be built into the system, not added to it. This approach emphasizes that integrating control during the development phase allows for a balance between performance speed and security and compliance requirements. Therefore, future control models should adopt integrated control as a strategic option to address the growing risks in electronic payment environments.

The decree also outlines the procedures for issuing and accrediting electronic certificates and defines the responsibilities of certification bodies, including ensuring the reliability of users' digital identities and service continuity. This demonstrates that Algerian regulations aim to build a digital trust system that enables institutions and individuals to conduct electronic transactions securely. The decree further details the oversight mechanisms and penalties for violating certification rules, confirming that the legislator intends to establish a legal framework that guarantees the integrity of electronic signatures and the security of the certification infrastructure.

The legislation sets a deadline of December 31, 2024, for merchants to implement this requirement. Failure to comply will be considered an offense punishable by a fine of 50,000 Algerian dinars. This measure represents a practical step towards modernizing commercial transactions and reducing reliance on cash. However, its implementation requires technical readiness and effective monitoring to ensure its comprehensive application across all commercial sectors.(Dehilès, 2024)

Through this legislative framework, it is clear that Algeria seeks to build an integrated system for regulating electronic payment. However, the diversity between general laws (e-commerce) and special laws (monetary and banking) may lead to overlapping regulatory jurisdictions, which calls for clearer institutional coordination between the National Payments Commission and the Bank of Algeria.

2.4 The Relationship Between the Generalization of Electronic Payments and the Effectiveness of Internal Controls

The literature reveals that the shift towards digital payments is causing a structural change in the nature of corporate control. Electronic payment systems are emerging as highly data-driven environments, highlighting the need for controls based on real-time tracking and automated verification. Studies also indicate that the expansion of digital transactions enhances operational transparency and provides accurate, auditable records, demonstrating an increased ability for organizations to detect errors and irregularities as soon as they occur.

Conversely, digitalization reveals new risks related to breaches and cyberattacks, demonstrating that the generalization of electronic payments only increases the effectiveness of controls if it is accompanied by the development of advanced technical controls, such as encryption, multi-factor authentication, and fraud detection algorithms. Theoretical models also confirm that the relationship between electronic payments and internal controls is interactive: as digital transactions expand, the need for an intelligent control system increases, and as the control system strengthens, the reliability of electronic payments increases, and digital trust spreads.

In the theoretical relationship between the widespread adoption of electronic payments and the effectiveness of internal controls, the shift towards digital systems reveals a functional interdependence based on mutual influence.

The literature indicates that the proliferation of electronic payments expands the volume of data generated by transactions, revealing a greater capacity for real-time transaction tracking and, consequently, enhancing the accuracy of internal controls and their ability to detect deviations early. Furthermore, the nature of digital transactions provides highly transparent, automated records, demonstrating that controls become less reliant on manual procedures and more dependent on data analysis tools and algorithms.

Conversely, digitalization presents challenges related to cybersecurity risks and breaches, underscoring that achieving effective oversight in the electronic payment environment requires strengthening technical controls and aligning them with the speed of financial flows. Therefore, it can be concluded that the widespread adoption of electronic payments will only achieve its full potential within a smart and adaptable regulatory framework, and that the relationship between them is complementary: electronic payments enrich oversight with data, and effective oversight grants electronic payments trust and sustainability.

Through this theoretical framework, it becomes clear that the widespread adoption of electronic payment systems is not merely a technological development, but a comprehensive institutional transformation affecting both the financial and regulatory structures. Every expansion of digital services necessitates a thorough review of internal control mechanisms and financial auditing methods to ensure a balance between financial innovation and regulatory security. Therefore, the second part will be dedicated to analyzing Algeria's 2024 experience as a practical model for applying these theoretical concepts in a real-world financial environment. This will be achieved through a study of quantitative and supervisory indicators derived from the official reports of the Bank of Algeria and Algeria Post for 2024.

2.5 Applied Analysis of Algeria's 2024 Experience in Light of the Generalization of the Electronic Payment System

This chapter examines the applied analysis of Algeria's experience in generalizing the electronic payment system. It aims to measure the actual impact of this digital expansion on the effectiveness of internal controls within financial institutions, in light of the adopted monetary and regulatory policies.

The analysis relies on official data from the Bank of Algeria and Algeria Post, in addition to reports from the Algerian Monetary Association (GIE Monétique) and the Monetary and Banking Law (23-09), to provide a comprehensive quantitative and institutional overview of the regulatory landscape in the Algerian digital environment during 2024.

A. Indicators of Electronic Payment Generalization in Algeria

Electronic payments in Algeria are experiencing remarkable growth thanks to digital transformation policies and the promotion of financial inclusion. The number of electronic payment cards has exceeded tens of millions, with the

expansion of services such as "Al-Dhahabiya," Barid Mob, and online payments, as well as the increased use of electronic payment devices by merchants. This development is linked to regulatory reforms overseen by bodies such as the GIE Monétique to support transaction security and payment settlement. Despite this progress, challenges related to information security, technical reliability, and a lack of digital literacy among some segments of the population continue to hinder the optimal use of the system. The current situation necessitates strengthening internal controls and developing regulations to ensure the sustainability of this transformation and mitigate associated risks.

According to the latest developments in Algeria, electronic payment transactions saw significant growth during the first seven months of this year, reaching 5.2 million transactions worth 47.2 billion dinars, according to data from the Algerian Monetary and Financial Association.

Electronic payment transactions in Algeria reached 5.5 million throughout 2024, totaling 44.5 billion dinars. The highest number of electronic payment transactions in 2025 was recorded in July, with a total of 857,900 transactions valued at 7.6 billion dinars, according to the Algerian Press Agency. This growth in electronic payments was supported by an increase in the number of payment terminals at merchants in Algeria, reaching 77,500 by the end of July, compared to 68,100 in December 2024. The number of electronic payment cards in circulation reached approximately 20.7 million by the end of July, including both bank cards and Algeria Post's gold cards. The number of online payment transactions between January and July 2025 reached approximately 13.2 million, compared to 39.7 million mobile payment transactions.(alarabiya, 2025)

These indicators show that 2024 marked a turning point in the development of electronic payments in Algeria, with a rapid increase in transaction volume, the number of devices, and the number of users. However, the system's reach remains geographically uneven, with services concentrated in major cities, hindering the achievement of balanced financial inclusion. The following details the electronic payment indicators in Algeria up to 2024. The increase in the volume of electronic transactions not only reflects the system's expansion but also imposes new regulatory requirements related to real-time transaction tracking and monitoring of financial compliance.

B. Development of Electronic Payment Indicators:

According to the annual report adopted by the Central Bank of Algeria for 2024, the development of electronic payment indicators was addressed, such as:

- Number of Electronic Transactions: This category includes online payments, mobile payments, and payments made via electronic payment terminals (TPEs).
- Transaction Value: This includes the total value of electronic transactions executed during the year.
- Number of Users: This refers to the number of individuals or institutions that benefited from electronic payment services. - Number of participating

merchants: This indicator shows the number of merchants or commercial establishments that accept electronic payments.

Table N^0(01) :shows the number of financial transactions using gold cards during the year 2024.

Nature of the process	2023		2024		growth rate	
	Size	Value	Size	Value	Size	Value
ATM withdrawal	39.623	552.160	51.821	694.287	30.79%	25.74%
Card payments	6.796	40.476	10.777	69.065	58.57%	70.63%
This includes payment via electronic payment terminals.	3.329	27.959	4.864	40.551	56.08%	45.04%
Including online payment	3.467	12.517	3.913	28.514	70.57%	127.79%
Payment via electronic payment terminals and the internet	0.017	0.167	0.017	0.241	0.99-%	44.12%
Total transactions	46.436	592.803	62.615	763.593	34.84%	28.81%

Source:(bank of algeria, 2024, p. 82)

Table 1 presents information on card transactions in Algeria during 2023 and 2024. It covers several types of financial transactions, such as ATM withdrawals and card payments, and shows the growth rates in volume and value between the two years:

-ATM Withdrawals:

Transactions in 2024 increased by 25.74% (694,287 transactions compared to 552,160 transactions in 2023). This reflects the increasing use of ATMs by individuals in Algeria. The value also increased by 30.79% (51,821 million dinars compared to 39,623 million dinars in 2023), indicating a significant increase in the value of transactions withdrawn from ATMs. This is considered positive growth and reflects the increasing reliance on banking technology, along with a notable development in transaction volume.

-Card Payments:

A significant increase of 70.63% was recorded in 2024 compared to 2023 (69,065 transactions versus 46,796 transactions), reflecting the growing reliance on card payments. The value of transactions also increased by 58.57% (10,777 million dinars versus 3,796 million dinars in 2023). This remarkable growth in card payments reflects a shift in individual preferences towards digital payments over traditional methods.

-Including Payments via Electronic Payment Terminals:

Increased by 45.04% in 2024 compared to 2023, representing a 56.08% increase in value. This growth demonstrates the increasing use of electronic payment terminals in commercial transactions, reflecting a shift in payment methods across the retail sector.

-Including Online Payments:

Seen a massive increase of 127.79%, reflecting the significant shift towards online payments. The value of payments increased by 70.57%. This figure demonstrates a significant shift in user preferences towards online electronic payments, particularly following the adoption of digital payment technologies.

-Payments via electronic payment terminals and the internet:

Increased by 44.12%, but the value decreased by 0.99%, indicating fluctuations in the use of this method compared to others.

-Total transactions:

Increased by 28.81% in 2024 compared to 2023. The value also increased by 34.84%. This indicates a significant increase in the overall use of electronic payments in Algeria, reflecting a marked improvement in the use of digital methods across all areas of financial transactions.

It can be said that there is rapid growth in all transactions related to electronic payments across various media and devices, whether via ATMs, cards, the internet, or electronic payment terminals. The largest increase was recorded in online payments, indicating a growing reliance on digital solutions in financial transactions. A slight decrease in payments made via electronic payment terminals and the internet suggests the need for further guidance or incentives to fully utilize these methods. The researcher believes that despite the growth in transactions, it is essential to consider the long-term sustainability of this growth. Furthermore, it is necessary to monitor whether this growth is linked to the growth of specific sectors or a result of increased digital banking infrastructure.

C. According to GIE Monétique, the primary source of statistics related to electronic payments in Algeria. According to their report, Algeria recorded the following in 2024:

Table N^0(02) :Shows the growth rate of electronic payment transactions in Algeria for the year 2024

Statement	Number of operations	Growth rate compared to the previous year
Online electronicpayment	19594482	28%
Mobile payment	58465858	49%
Payment via electronic payment devices (TPE)	5579708	40%
Withdrawals from automated teller machines	197323075	13%
the total	280963123	Averagegrowth 32.5%

Source: Prepared by the researcher based on(Habati, 2025)

Table 2 shows that Algeria witnessed a significant expansion in electronic payments during 2024. However, cash transactions still dominate the behavior of individuals and institutions. The number of electronic payment transactions across all channels reached approximately 83.6 million, while cash withdrawals exceeded 197 million. This highlights the continued reliance of the Algerian economy on cash despite the ongoing digital transformation. This disparity suggests that financial digitization in Algeria is still in the quantitative growth phase and has not yet reached the qualitative shift towards a cashless economy.

The payment structure reveals that mobile devices represent the cornerstone of digital financial transformation, accounting for nearly 70% of all electronic transactions. This is followed by online payments at 23.4%, and then point-of-sale (POS) terminals (6.7%). The dominance of mobile channels is likely due to their ease of use, low cost, and widespread adoption of smartphones. Conversely, the limited use of POS terminals reflects merchants' reluctance to embrace electronic systems and the absence of tax and regulatory incentives. In terms of annual trends, mobile payments achieved the highest growth rate (+49%) compared to internet (+28%) and point-of-sale (POS) payments (+40%), while cash withdrawals continued to rise (+13%). We can conclude that the continued increase in cash withdrawals, despite the expansion of digital channels, is linked to cultural and economic factors, including weak trust in electronic transactions and the dominance of the informal economy, which prefers cash.

In conclusion, achieving a qualitative shift towards a cashless economy requires redesigning the national payment infrastructure by expanding commercial transactions, reducing transaction costs, enhancing interoperability and cybersecurity, and promoting financial literacy and encouraging consumers and merchants to adopt electronic payment as part of modern financial governance, transparency, and achieving sustainable development in Algeria.

3. The Impact of Electronic Payment System Generalization on Internal Control Effectiveness

In recent years, Algeria has witnessed a significant acceleration in the generalization of electronic payment methods, driven by regulatory reforms, the expansion of digital infrastructure, and changing consumer behavior, particularly up to 2024. This transformation was not purely technical; it touched the very core of financial control and auditing systems in terms of data processing speed, transaction transparency, and real-time traceability. Therefore, evaluating this experience necessitates analyzing its positive effects on control practices on the one hand, and anticipating the new challenges posed by digital transformation in a financial environment that is still maturing on the other. The following sections will address the positive effects of digitalization as well as the new control challenges:

a. The Positive Impact of Digitalization

-Enhanced Real-Time Audit Speed and Traceability: The expansion of electronic payments in 2024 created a substantial and mechanizable "Digital Audit Trail." Strong growth was recorded in digital payment channels (mobile payments +56%, electronic payment terminals +41%, and online payments +61%), according to indicators based on GIE Monétique data, as reported in multiple press releases. This expansion directly increases real-time traceability across transaction records and reduces testing/reconciliation time in continuous auditing compared to a cash-based environment.

-Reduced Human Error and Improved Operational Transparency: The shift from paper-based records to digital flows reduces manual data entry errors and increases the transparency of reconciliations. In practice, in 2024, the number of online card payment transactions reached approximately 19.59 million (+28%), with a value of nearly 51.945 billion DZD (+61%), while mobile payments reached approximately 58.47 million (+49%), with a value of 43.59 billion DZD (+56%). This volume of digital transactions improves the ability to implement standardized audit tests (matching and exception testing) instead of relying on a limited sample of manual entries.

-Facilitating automated monitoring and compliance auditing via digital systems: The rise of digital transactions creates a favorable environment for automated monitoring approaches (rules/alerts, transaction limits, indicators of suspicion, KYC/AML compliance), as data becomes structured and pattern-detection amenable to analysis. In 2024, peer-to-peer (P2P) transfers also increased to 36.24 million (+103%), according to the same statistical series, a trend that drives the strengthening of automated compliance rules in institutions. - Integration of financial information between institutions and the central bank (in principle and readiness): The expansion of the card base and usage increases the demand for institutional integration. In 2024, the number of payment cards in circulation was estimated at approximately 19.84 million (including about 15.6 million "gold" cards and nearly 4.2 million CIB cards), which means the expansion of "payment identity" across a wide population. This increases the feasibility (and necessity) of unifying standards for data exchange, settlements, and regulatory reporting among stakeholders, as payment flows become one of the largest sources of operational financial data that can be linked and analyzed.

B- New Regulatory Challenges

-Increased cyber risks and technical breaches: As digital payments expand, so does the "attack surface" on payment infrastructure, including service providers and interconnection networks. International regulatory literature considers cyber incidents a threat to financial stability and necessitates strengthening reporting, testing, and readiness for response and recovery. - Weak digital human capabilities within some financial institutions: The transition to digital oversight is not successful simply by having the systems in place; it requires digital auditing

skills (record analysis, understanding payment systems, information security, and systems auditing). IMF reports indicate that financial innovation oversight arrangements fail when they isolate technical expertise or are built without clear application and a suitable institutional framework.

-Limited automated electronic auditing tools in the Algerian environment: Despite the growth of digital channels, the challenge of "tools" (CAATs platforms, integration with payment databases, fraud risk alert dashboards, and near-real-time compliance audits) remains. Local studies on electronic payments and digital transformation in Algeria highlight the need to strengthen payment systems, governance, security, and interconnection to achieve a full institutional impact.

-Coordination gap between operational oversight (Algeria Post) and regulatory oversight (Bank of Algeria): The expansion of payments via "Al-Dhahabiya," mobile applications, and P2P transfers increases the importance of coordination between those who possess operational data and those who set prudential and regulatory oversight requirements. In the absence of standardized data exchange protocols, common Key Risk Indicators (KRIs), and standardized incident reporting procedures, gaps emerge: differing definitions of indicators, delayed reporting, and duplication of oversight instead of integration. International literature emphasizes the need to address these issues through governance frameworks, cybersecurity coordination, and cross-organizational operational coordination.

4. CONCLUSION

This study concluded that the widespread adoption of electronic payment systems in Algeria by 2024 represents a profound structural transformation of the financial and regulatory framework, rather than simply a technological upgrade of payment methods. The theoretical and applied analysis demonstrated that electronic payments have reshaped internal control mechanisms in terms of data nature, processing speed, and control logic. Institutions have gradually transitioned from ex-post control based on sampling and manual procedures to digital control based on real-time tracking and automated risk analysis.

Furthermore, the Algerian experience, particularly through Algeria Post and under the supervision of the Bank of Algeria, has shown that the expansion of electronic payments has contributed to improved transparency in financial transactions and a reduction in the margin of human error. However, this impact has varied depending on the level of digital maturity and institutional readiness. Conversely, the digital rollout has revealed new regulatory challenges, especially in the areas of cybersecurity, systems integration, and the availability of specialized human resources. Therefore, the study's findings confirm that the effectiveness of internal controls in an electronic payment environment is not a result of technology itself, but rather the product of a complex interaction between the regulatory framework, governance, digital infrastructure, and organizational culture. This necessitates a comprehensive and continuous approach to developing controls in light of the accelerating digital transformation.

4.1 Study Findings:

The study reached a number of conclusions, including:

1. A significant positive relationship exists between the widespread adoption of electronic payments and the effectiveness of internal controls.

2. Electronic payments contribute to enhancing real-time transaction tracking and improving financial auditability.

3. A tangible reduction in human error resulting from manual transaction processing.

4. Improved operational transparency and the quality of financial data within the studied institutions.

5. The emergence of proactive digital controls as a gradual replacement for traditional reactive controls.

6. Increased cybersecurity risks as a direct consequence of the expansion of digital transactions.

7. The limited availability of automated electronic auditing tools hinders maximizing the control impact of digital transformation. 8. The persistent coordination gap between regulatory and operational actors limits the integration of the regulatory system.

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