

Digital transformation and its impact on the performance of commercial banks in Algeria - a case study of the payment systems services index during the period (2016 - 2023)

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Abstract:

The current study seeks to demonstrate the impact of digital transformation on the performance of Algerian commercial banks during the period (2016 - 2023), with a focus on analyzing the evolution of payment system service indicators.

The findings of this study reveal that Algeria remains significantly behind in the adoption of digital transformation within the banking sector. The remnants of digital transformation in Algeria are primarily limited to online withdrawal and payment systems using electronic cards and ATMs. These developments have recently gained significant traction among individuals.

Keywords: Digital transformation; banking performance; payment systems; banking sector.

JEL Classification Codes: E42; J33; O33; P47.

1. INTRODUCTION

The 21st century is considered an era of major transformations, where the international business environment is witnessing radical developments represented by significant advancements in information and communication technologies, intense competition, and globalization. As a result, institutional performance excellence has become the most critical factor in achieving organizational goals. It is no longer sufficient to provide high-quality services to citizens; instead, substantial efforts must be made to elevate performance to achieve the level of excellence that organizations aspire to and that citizens expect. Consequently, countries and global organizations have hastened to transition from traditional systems to electronic systems, or what is referred to as "digital transformation".

The concept of digital transformation (DT) has become closely associated with everything that contributes to improving and developing administrative work and the quality of performance to achieve institutional excellence fundamentally. This is because enhancing performance and developing organizations is no longer optional but has become an essential requirement to ensure survival and continuity.

Digital transformation has become a hallmark of the era and an urgent necessity, especially in light of the challenges faced by all economic sectors at the international level in general and in Algeria in particular. Digital transformation is seen as a lifeline to address the challenges that the Algerian banking sector seeks to overcome by transitioning from traditional services to advanced digital services. This transition enables the sector to transform its business models and processes, allowing it to efficiently and effectively manage its resources, achieve performance excellence, and satisfy customers and subscribers.

1.1. Research Problematic

Through this study, we aim to address the following central research question:

What are the impacts of digital transformation on the performance of Algerian commercial banks?.

1.2. Significance of the Study

The significance of this study stems from the importance of its variables. Digital transformation is a relatively recent phenomenon that has brought about radical changes in the banking services sector across various domains through modern technologies. Additionally, banking performance is a critical variable that plays a vital role in sustaining the banking sector's activities, maintaining its equilibrium, and ultimately ensuring its profitability.

1.3. Objectives of the Study

This study seeks to:

- Shed light on a contemporary term in the field of economics, namely "digital transformation";
- Highlight the importance of DT and its role in supporting the banking sector;
- Assess the current state and level of adoption of DT services in the Algerian banking sector;
- Provide an overview of the various changes in banking performance under DT in Algeria.

1.4. Approach of the Study

To address the research problematic, we adopted a descriptive-analytical approach, which is suitable for describing and analyzing statistics and data related to DT in the Algerian banking sector.

1.5. Fields of the Study

The study focuses on the Algerian banking sector during the period from 2016 to 2023.

1.6. Structure of the Study

We have structured this study into the following sections:

- **General Concepts of Digital Transformation;**
- **Overview of Payment Systems in Algeria (2016–2023);**
- **Analysis of the Evolution of Electronic Payment Systems in Algeria under Digital Transformation (2016–2023);**
- **Benefits and Challenges of Adopting DT in Algeria.**

2. GENERAL CONCEPTS OF DIGITAL TRANSFORMATION

2.1. Definition of Digital Transformation

Digital transformation is defined as: "The process of leveraging modern technologies to become more aware, flexible, and capable of predicting and planning for the future. With these attributes, organizations can innovate and adapt more quickly to achieve desired business outcomes and move toward success" (AL SAMAA, 2018, p. 3)

It is also defined as: "A government project encompassing all services of institutions and various sectors within the state. It manifests in transforming vital and essential services related to individuals, institutions, and investments from their traditional form to a smart electronic form, relying on modern and advanced technologies" (AL BALUSHI, AL HARRASI, & AL AWFI, 2020, p. 9).

Additionally, it is defined as: "A process aimed at improving an entity by introducing significant changes to its characteristics through a set of information, computing, and communication technologies" (GORJANKHANZAD & GOOYABADI, 2022, p. 2).

Another definition states: "The use of technology to radically improve performance and achieve organizational goals" (WESTERMAN, CALMÉJANE, BONNET, FERRARI, & MCAFEE, 2011, p. 5).

Based on these definitions, the researcher defines digital transformation as: "The utilization of technological advancements to achieve a radical shift in the way activities and operations are conducted, enabling the delivery of better services to the public, improving performance, and enhancing public satisfaction".

2.2. Importance of Digital Transformation

Digital transformation has recently gained significant attention and scope from countries and companies worldwide, aiming to solve human problems on one hand and to activate and enhance development on the other, encompassing environmental, economic, social, and cultural aspects (AL-MUTREF, 2020, p. 159).

Digital transformation enables continuous innovation, interoperability and user-centric models that change how businesses are run and value is

delivered (MEDFOUNI, 2024, p. 450). Its importance for both private and government institutions lie in achieving leadership, innovation, and performance improvement through the following (MATT, HESS , & BENLIAN, 2015, pp. 340-341):

- Efficiency in transactions and government services;
- Improved decision-making through advanced information systems;
- Combating corruption through transparency by creating an efficient and effective environment for executing legitimate financial operations;
- Ease and accessibility of information through platforms that enable equal opportunities for information exchange, fostering trust and transparency between stakeholders and companies;
- Creating innovative and creative opportunities, unlike traditional methods;
- Eliminating bureaucracy and reducing the gap between citizens and service providers to curb corruption and rationalize expenses.

2.3. Drivers of Digital Transformation:

There are numerous justifications that have prompted governments to adopt and implement digital transformation across their various institutions. Among the most significant of these justifications are (DUROU & SAFDER, 2019, p. 7):

- Continuous pressure on governments to meet the growing and diverse demands for government services, including the need to improve and expedite transactions, eliminate bureaucratic red tape, and streamline administrative processes;
- Global trends (globalization) have contributed to openness, interconnectedness, and integration across political, economic, social, and administrative dimensions;
- The accelerated pace of technological advancement and the associated knowledge revolution, which necessitates keeping up with such progress and leveraging it across various aspects of life due to the advantages it offers for a wide range of practical applications;
- Increased social awareness and expectations resulting from global exposure and the emergence of new visions for the public sector regarding improving its performance in delivering public services;

- Scarcity of resources and the urgent need for policies that contribute to the optimal investment of available resources.

3. Overview of the State of Payment Systems in Algeria (2016 - 2023)

Despite the ongoing developments in the global banking system, particularly in electronic payment systems and their expanding use across various fields, Algeria has remained somewhat distant from these advancements. As a result, it found itself compelled to take action in response to these changes. In 2006, the Algerian payment system witnessed a convergence of national efforts, supported by the World Bank, aimed at developing payment methods through the launch of the Real-Time Gross Settlement (RTGS) system and the Electronic Clearing System, replacing paper-based processing.

3.1. Evolution of the Instant Payment System Activity (ARTS or RTGS)

The Real-Time Gross Settlement (RTGS) system, globally known as RTGS, is used for settling high-value and high-priority payment orders. This system specifically handles payment orders between banks through bank transfers or postal transfers, as well as instant payments for large amounts exceeding one million Algerian dinars related to interbank transactions. It was officially adopted on May 15, 2006, following the reforms and legislation enacted by the regulatory authority of this system, the Bank of Algeria.

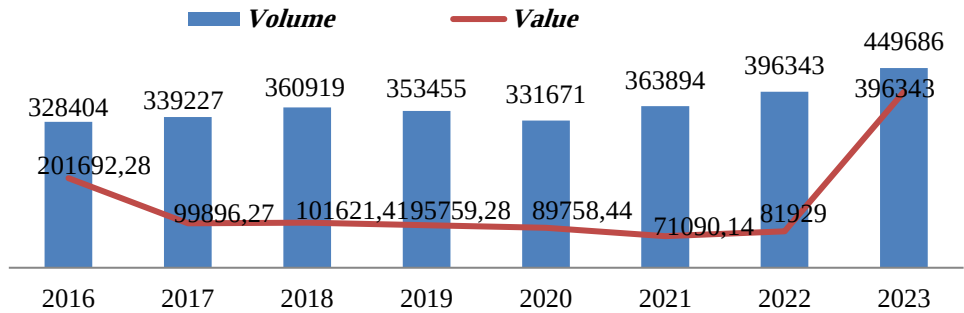
This system holds significant importance in modern banking systems due to its multiple functions and objectives, including:

- Settling payment operations such as checks, cards, and transfers in real-time;
- Mitigating systemic risks, liquidity risks, and credit risks;
- Meeting various user needs through the use of electronic payment systems;
- Reducing settlement periods and encouraging the use of bank money;
- Lowering the overall cost of payments.

The following figure illustrates the value and volume of transactions processed through the RTGS system during the period (2016 - 2023).

Fig.1. Value and Volume of Transactions Processed in the ARTS System (2016 - 2023).

(Unit of Value: Billion Dinar, Unit of Volume: Billion Transactions)



Source: Provided by the researcher based on the annual reports of the Bank of Algeria.

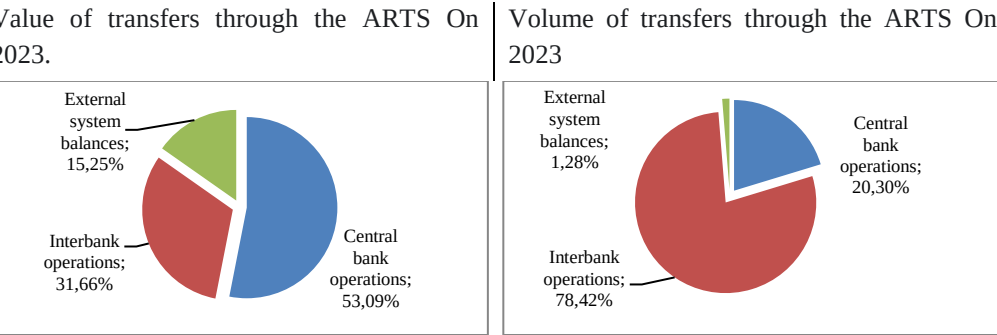
From Figure (1), it is evident that the value of transactions processed through the instant payment system has been on a continuous decline. In 2016, the transaction value amounted to 201,692 billion dinars, which decreased to 99,896 billion dinars in 2017. In 2018, the transaction value rose to 101,621 billion dinars, only to decline again in 2019 and continue decreasing until 2021, when the transaction value reached 07,109 billion dinars, reflecting a decline rate of 64.7% over the study period. This can be attributed to the slow settlement timelines within the instant payment system. Customer transfers of large amounts are settled over a period of up to two months, leading to customer dissatisfaction and a shift from transfers to checks through the clearing system, which explains the decrease in transaction value.

As for the volume of transactions, a slight increase is observed over the years of the study. The transaction volume in 2016 was 328,404 billion transactions, and it continued to rise, reaching 363,894 billion transactions in 2021, with a growth rate of 10.80% over this period.

In 2023, the gross instant payment system for large amounts and urgent payments processed 449,686 transfer transactions, compared to 396,343 transfer transactions in the previous year, marking a noticeable increase of 53,343 transactions (13.5%) in volume. Regarding the total

value of transactions processed by the gross instant payment system for large amounts and urgent payments, it increased from 81,929 billion dinars in 2023 to 100,032 billion dinars, a significant rise of 22.1%. This is primarily due to the considerable and noticeable increases in the operations of the central bank and interbank operations. Additionally, a daily average of 1,784 transfer transactions with a value of 397 billion dinars was recorded, compared to 1,573 transactions with a value of 325 billion dinars in 2022.

Fig.2. Volume and Value of Transfers Processed through the RTGS System in 2023.



Source: Annual Report of the Bank of Algeria for the year 2023.

From Figure 2, it is evident that the largest proportion of the total value of transfers processed by the system was attributed to central bank operations, accounting for 53.09% of the total value, which is more than half of the total transfers. Meanwhile, interbank operations and external system balances represented 31.66% and 15.25% respectively.

3.2. Evolution of the Electronic Clearing System (ATCI) Activity

The Electronic Clearing System, known as Algérie Télé-compensation Interbancaire (ATCI), is a complementary system to ARTS and specializes in the automated processing of general payment instruments, checks, transfers, direct debits, and card-based payment and withdrawal operations using advanced technologies such as optical scanning and various software solutions. This system represents the second component of advanced payment systems in line with international standards, aimed at enhancing

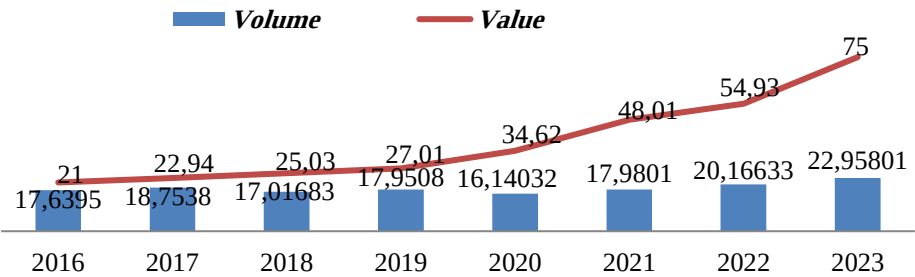
the quality of banking services provided to customers (BEN CHELAT, 2022, p. 102).

The ATCI system was implemented on May 15, 2006, with the involvement of the Bank of Algeria and all banks (Algerian Post, "SATIM" company, the Association of Banks, and financial institutions). On its first day of operation, the system processed checks.

The objectives of the remote clearing system are as follows (SLAOUTI, 2013, p. 92):

- Daily accounting management and providing a comprehensive overview of the treasury situation in the national financial market;
- Reducing processing times, with acceptance or rejection of transactions within a maximum of 5 days, which can be further reduced to 3 days;
- Restoring customer confidence in payment instruments, particularly checks;
- Setting the maximum limit for authorized collateral balances by sending an electronic alert to the concerned joint manager when the permitted limit is approached.

Fig.3. The Value and Volume of Transactions Processed Through the Electronic Clearing System (ATCI) During the Period (2016-2023).



Source: Provided by the researcher based on the annual reports of the Bank of Algeria.

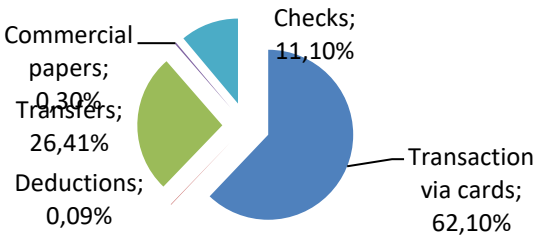
From the figure above, it is evident that payment methods began with limited transaction volumes and values during the period (2016 - 2023). In the first year, the system recorded 21 million transactions, compared to over 75 million transactions in 2023, reflecting a growth rate of 275%. In terms of value, transactions increased from 17,639.5 billion dinars in 2016 to

22,958.01 billion dinars in 2023, marking a growth rate of 30% in the value of exchanged transactions. This growth can be attributed to the Electronic Clearing System's ability to process payments quickly while reducing processing times (acceptance or rejection of transactions within a maximum of 5 days).

The transactions processed through the Electronic Clearing System in Algeria encompass all payments made through various traditional payment methods that have been digitized to acquire an electronic nature and are processed through the system.

The following figure illustrates the values of transactions processed through the Electronic Clearing System (ATCI) for payments in 2023.

Fig.4. Values of Transfers Processed through the Electronic Clearing System (ATCI) for Payments in 2023.



Source: Annual Report of the Bank of Algeria for the year 2023.

Based on the above chart, which represents the transaction volumes processed through bank cards, these transactions accounted for 62.10%, followed by transfers at 26.41%, and checks at 11.11%. Meanwhile, the share of deductions and commercial papers was very minimal.

4. ANALYSIS OF THE DEVELOPMENT OF ELECTRONIC PAYMENT SYSTEMS IN ALGERIA AMID DIGITAL TRANSFORMATION (2016–2023)

The state of implementing electronic payment services in Algeria significantly differs from that of other Arab countries in this domain. The concerned authorities aim to keep up with technological advancements and modernize the banking sector. Algerian banks have thus moved toward adopting innovative financial technologies in payment systems. Nevertheless, the financial services provided remain limited.

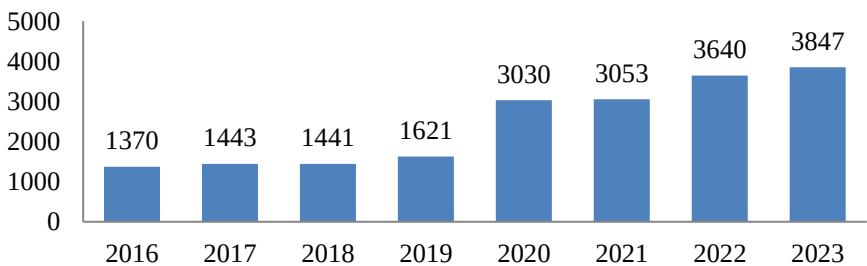
4.1. Cash Withdrawal Service via ATMs

The cash withdrawal service via ATMs allows the withdrawal of funds through automated teller machines (ATMs) without human intervention using bank cards. Customers can withdraw money at any time via these machines. In recent years, Algeria's financial system has sought to provide a considerable number of ATMs and facilitate the issuance of bank cards with the ability to obtain them in a short period. This approach aims to integrate technology into the withdrawal process and reduce the circulation of physical cash.

a. Cash Withdrawal Service via ATMs

This is the most widely used electronic channel, as banks provide ATMs in most of their branches to reduce workload pressure, avoid administrative procedures, and meet customers' financial needs after working hours and during holidays. ATMs operate 24/7 and are installed on the external walls of banks or in public places such as airports, shopping centers, universities, and others. Customers access these machines using an electronic card issued by the bank and a personal identification number (PIN) to log into their account. ATMs enable both traditional and non-traditional banking transactions, such as cash withdrawals, cash deposits, balance inquiries, fund transfers between accounts (either for the same customer or to another beneficiary), obtaining a brief account statement, and cash withdrawals using a credit card (OUSSAGHIR, 2018, p. 370).

Fig.5. The Number of Operational ATMs in Algeria During the Period (2016–2023)



Source: Data provided by the Automated Monetary Group (GIE), available at: (<https://giemonetique.dz/ar/qui-sommes-nous/activite-paiement-sur-internet>).

During the first four years leading up to 2023, the number of ATMs increased significantly, reaching 3,847 devices by 2023, compared to only 1,621 devices in 2019. This growth continued in 2023, albeit at a slower pace compared to 2020. The increase in the number of ATMs demonstrates growing confidence in this channel specifically, as well as in banking services more generally.

The table below illustrates ATM usage during the period (2016-2023):
Table 1. ATM Withdrawal Activity via Automated Teller Machines (ATMs During the Period (2016–2023))

Year	Total Withdrawal Transactions (Million)	Total Withdrawal Amounts (Billion DZD)	Annual Growth Rate of Withdrawal Amounts
2016	6.87	98.82	-
2017	8.31	126.4	27.87
2018	8.83	136.23	7.78
2019	9.93	164.17	20.50
2020	58.43	1,073.01	553.63
2021	87.72	1,728.94	61.13
2022	128.04	2,182.90	26.26
2023	174.42	3,262.25	49.45

Source: Data provided by the Automated Monetary Group (GIE), available at: (<https://giemonetique.dz/ar/qui-sommes-nous/activite-paiement-sur-internet>).

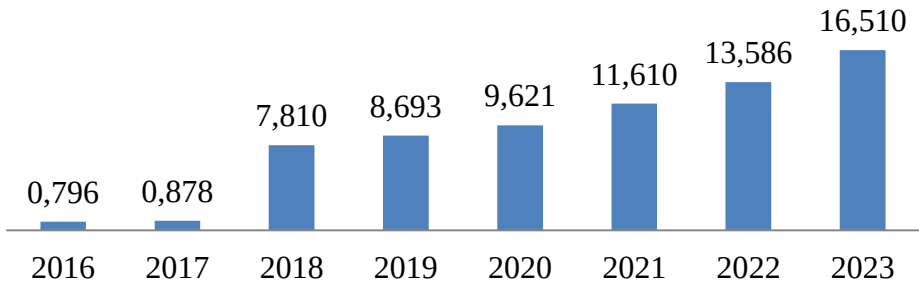
From the table above, we observe a consistent growth in both the number and total value of withdrawal transactions during the first four years of the study period. This activity recorded a sharp increase in 2020, coinciding with the COVID-19 pandemic and the subsequent push toward electronic banking. During this period, total withdrawals reached 58 million transactions, amounting to approximately 1.1 billion DZD a growth rate exceeding 530% compared to 2019. This growth trend continued until 2023, with transactions reaching 174.42 million, valued at 3,262.25 billion DZD. This significant increase is attributed to the inclusion of Algeria Post in the Automated Cash Network Group (GIE Monétique) in 2020.

b. Evolution of Bank Card (CIB) Usage in Algeria

The CIB bank card is issued by most Algerian banks through the SATIM Company. It facilitates the settlement of goods and services in stores equipped with card readers and allows cash withdrawals from all ATMs connected to the interbank cash network (IRM) established by SATIM. The official launch of payment by CIB card occurred on October 4, 2016. Cardholders can also pay their bills and services on certified e-commerce websites.

The introduction of this new payment method was accompanied by the launch of a dedicated website (<http://www.bitakati.dz>) and a portal tailored for cardholders and merchants. These platforms provide information about the CIB payment tools available to them through their respective banks (MIMOUNI & BEN TALEBI, 2021, pp. 119–120).

Fig.6. Number of CIB Cards in Circulation in Algeria (2016–2023).



Source: Data provided by the Automated Monetary Group (GIE), available at: (<https://giemonetique.dz/ar/qui-sommes-nous/activite-paiement-sur-internet>).

The annual report of the Automated Cash Network Group (GIE Monétique) indicated that the number of bank cards in circulation increased to 11.6 million cards by the end of 2023, representing a growth rate of 111.5% compared to 2018. As illustrated in the chart, the use of bank cards was limited and weak in 2016 and 2017 compared to the subsequent years of the study. In 2018, the number of bank cards experienced a significant increase, reaching 7.8 million cards, an addition of 6.9 million cards compared to 2017. This growth continued at relatively stable rates in the following years, reaching 9.6 million cards in 2020, and recording an

additional 2.1 million cards to reach a total of 11.6 million cards in 2021, across various types of cards.

Table 2. Value and Volume of Transactions via Bank Cards During the Period (2016–2023).

Year	Volume (Million Transactions)	Value (Billion DZD)
2016	2.2	23.02
2017	2.99	33.09
2018	3.59	42.11
2019	4.15	52.34
2020	12.92	222.41
2021	23.83	427.76
2022	29.22	439.56
2023	46.44	592.82

Source: Provided by the researcher based on the annual reports of the Bank of Algeria.

The table above shows the value and volume of transactions conducted via bank cards (CIB) during the period (2016–2023). It is evident that both the volume and value of transactions have continuously increased over the study period. In 2016, the volume of transactions exceeded 2 million transactions with a total value of 23 billion DZD. This positive growth trend continued, reaching a transaction volume of 46.44 million operations and a total value of 592.8 billion DZD in 2023.

This growth reflects the authorities’ efforts to modernize and enhance the banking system by adopting an efficient electronic payment system. It also demonstrates the ability of payment cardholders to withdraw cash from ATMs, whether at postal centers or banks. Additionally, this growth was driven by the circumstances imposed by the COVID-19 pandemic, which significantly contributed to the increase in the number of bank cards.

4.2. Online Payment Services

Online payment services can be defined as: "an integrated financial process involving systems and software designed to facilitate financial

transactions over the internet." Online payment refers to the electronic exchange of currency for purchasing goods or services, conducted in accordance with laws that ensure the confidentiality and privacy of buying and selling processes. These transactions occur electronically via the internet using a secure payment system (Al-YAFEI, 2020).

This service was officially launched in Algeria on October 4, 2016, using interbank payment cards (CIB). Cardholders can use these cards to pay bills and services online. According to the Automated Monetary Group (GIE Monétique) website, there are currently 510 online merchants integrated into the interbank electronic payment system, with the total number of transactions reaching 91,742,250 transactions to date <https://giemonetique.dz/ar/qui-sommes-nous/activite-paiement-sur-internet>)

Table 3. Volume of Online Payment Services in Algeria (2016 - 2023)

Year	Total Number of Transaction (Million)	Total Amount (Billion DZD)
2016	7, 366	15.01
2017	107,844	267.99
2018	176, 982	332.59
2019	202, 480	503.87
2020	4,593, 960	5,423.73
2021	7,821, 346	11,176.48
2022	9,048,125	18,151.10
2023	15,351,354	32,196.67

Source: Data provided by (GIE), available at: (<https://giemonetique.dz/ar/qui-sommes-nous/activite-paiement-sur-internet>).

From the table, it is evident that the growth in the volume of online transactions in Algeria has been positive and continuous during the period (2016 - 2023) compared to the initial years following the launch of this service. There has been a qualitative leap in both the value and number of transactions. For instance, the table shows that the early years of the study period saw a steady increase, with transaction values reaching 176 million

transactions in 2018, compared to 332 million dinars. In contrast, the later years saw transaction values exceed 32.2 billion dinars for approximately 15.4 million transactions in 2023, marking a 64-fold increase in value compared to 2019. Additionally, growth continued at an accelerated pace in 2022 and 2023 compared to the earlier years of the study period.

This increase in the volume of online transactions can be attributed to several factors, including the global health crisis (COVID-19), which had a positive impact on the growth of various sectors, particularly the digital transformation sector through the expansion of online payment services. This sector was the second most positively affected by the crisis, following the pharmaceutical and semi-pharmaceutical sectors.

After Algerian Post joined the Automated Monetary Group (GIE Monétique), there was a significant increase in electronic payment activities online. The "**BaridiMob**" application, which can be downloaded on mobile phones and used by entering an electronic payment card code, facilitates withdrawals, payments, and even financial transfers. What distinguishes online payment services in Algeria is their initial focus on service-oriented economic activities, including the following sectors: transport, communication, insurance, energy, and others.

The following table summarizes the evolution and distribution of online payment activities during the period (2016 - 2023):

Table 4. Number of Online Payment Transactions by Sector in Algeria (2016 - 2023).

Year	2016	2017	2018	2019
Phone/Communications	6536	87286	138495	141552
Transport	388	5677	871	6292
Insurance	51	2467	6439	8342
Electricity/Water	391	12414	29722	38806
Administrative Services	0	0	1455	2432
Other Services	0	0	0	5056
Goods Sales	0	0	0	0
Year	2020	2021	2022	2023

Phone/Communications	4210284	6993135	7490626	84006869
Transport	11350	72164	195490	371317
Insurance	4845	8372	23571	36996
Electricity/Water	85676	120841	302273	640485
Administrative Services	68395	155640	153957	153957
Other Services	213175	457726	457726	705114
Goods Sales	235	13468	13468	24169

Source: Data provided by the Automated Monetary Group (GIE), available at: (<https://giemonetique.dz/ar/qui-sommes-nous/activite-paiement-sur-internet>).

From the statistics in the table, it is clear that online payment transactions in Algeria have primarily been focused on settling phone and communication bills, such as internet and mobile phone top-ups, as well as water and electricity bills. These transactions began in 2016 and saw a significant increase in volume in recent years, particularly during the COVID-19 pandemic (2019-2020), where they accounted for 90% of the total number of transactions by sector.

Regarding the Insurance and Transport Sectors; the insurance sector has also shown continuous growth with positive rates, especially in recent years. In 2023, the insurance sector recorded 36,996 transactions, compared to 2,467 transactions in 2017. Similarly, the *transport sector recorded 371,317 transactions in 2023, marking an increase of 414.5% compared to 2021, when it recorded 72,164 transactions. This growth is attributed to the emergence of startups in this sector, such as **YASSIR**.

As for the administrative services sector, although it did not record any transactions in the first two years, it achieved significant growth in subsequent years, particularly in 2023, when it reached 4 million transactions. This is due to the government's adoption of digitalization policies, especially in sectors like local administration, education, and higher education.

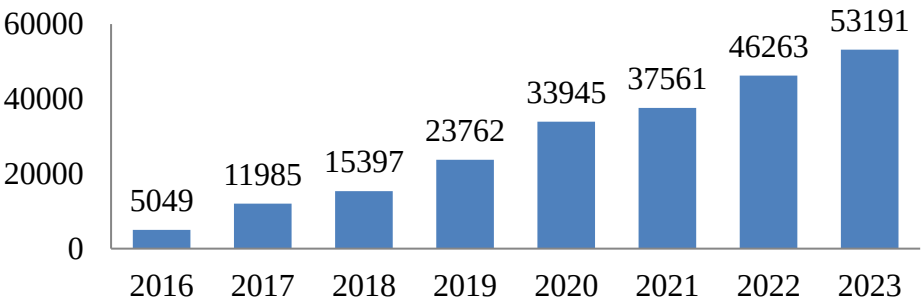
Regarding other services and goods sales, no online payment transactions were recorded in the early years of the study period. However, these sectors began to record transactions gradually, albeit in small numbers, starting from 2019 until 2021.

Among the leading sectors in online payments over the past year is the sports and entertainment sector, which appeared for the first time as a beneficiary of electronic payment services in May 2022. This was due to the experience of selling sports event tickets directly through the electronic platform (<http://www.tadkirati.mjs.gov.dz>). This was the first operation of its kind for purchasing match tickets online, specifically for the football match between Algeria and Uganda in June 2022, as part of the African Cup of Nations qualifiers. This was considered a pilot experiment in the sports sector.

4.3. Electronic Payment Terminal (TPE) Services

An Electronic Payment Terminal (TPE) can be defined as an electronic payment device deployed in commercial establishments and large stores. It allows customers to pay their dues to merchants using bank cards (CIB Classic or Gold). At the end of the day, all transactions are recorded, and the merchant fills out their card and goes to the bank managing their account to settle the accounts by deducting the amount from the customer's account and automatically transferring it to the merchant. This process operates through the interbank automated cash network (BOUKHARI, 2020, p. 137).

Fig.7. Number of Electronic Payment Terminals (TPE) Operating in Algeria (2016-2023).



Source: Data provided by the Automated Monetary Group (GIE), available at: (<https://giemonetique.dz/ar/qui-sommes-nous/activite-paiement-sur-internet>).

From the figure above, it is evident that the number of Electronic Payment Terminals (TPE) has been steadily increasing during the study

period (2016 - 2023). The highest growth rate in the number of TPE devices was recorded in 2017, increasing from 5,049 thousand devices in 2016 to 11,985 thousand devices in 2017. This growth continued throughout the study period, reaching 33,945 thousand devices in 2020 and further increasing to 53,191 thousand devices in 2023. The year 2020 was exceptional due to the COVID-19 pandemic, which led to a significant rise in the adoption of electronic payment methods by citizens, marking a positive step towards digital transformation.

Table 5. Volume of Transactions via Electronic Payment Terminals (TPE) during the Period (2016 - 2023).

Year	Total Number of Payment Transactions (Million)	Total Value of Payment Transactions (Billion DZD)
2016	65, 201	0.44
2017	122,694	0.86
2018	190,898	1.34
2019	274,624	1.92
2020	711.777	4.73
2021	2,150,529	15.11
2022	2,712,848	19.34
2023	3,997,165	31.52

Source: Data provided by (GIE), available at: <https://giemonetique.dz/ar/qui-sommes-nous/activite-paiement-sur-internet>).

From the table above, it is clear that the volume of transactions has been steadily increasing during the study period. In 2016, the total number of payment transactions in Algeria was 65,000 transactions with a value of 0.44 billion dinars. By 2017, the total number of electronic payment transactions doubled to 122,000 transactions with a value of 0.86 billion dinars. This positive growth continued in 2018 and 2019, with the value exceeding 1 billion dinars. The number of transactions via TPE devices increased from approximately 711,000 transactions with a value of 4.7 billion dinars in 2020 to over 2 million transactions with a value exceeding

15 billion dinars in 2021, representing a growth rate of 147% in 2020 and over 202% in 2021. This upward trend continued, reaching 2.7 million transactions with a value of 19.34 billion dinars in 2022 and approximately 4 million transactions with a value of 31.52 billion dinars in 2023.

This increase in the volume of transactions via Electronic Payment Terminals (TPE) can be attributed to the preventive measures taken by authorities during the COVID-19 pandemic. Banks and financial institutions, particularly Algerian Post, distributed TPE devices to merchants and economic operators to promote the widespread use of electronic payment methods. As a result, this service experienced the highest growth rate during the pandemic compared to other digital transformation services.

5. BENEFITS AND CHALLENGES OF ADOPTING DT IN ALGERIA

Although DT is one of the most promising innovations that have contributed to financial stability, Algeria faces several challenges in adopting digital technologies in its banking sector. In this context, we will present a set of recommendations to ensure continued growth in the volume of DT services in the coming years.

5.1. Benefits of Adopting DT in the Algerian Banking Sector

Our study has shown that the importance of DT in Algeria is currently limited to electronic payment systems and methods. The adoption of these tools has helped the Algerian banking sector in the following ways:

- **Achieving Financial Inclusion:** DT has overcome the geographical barriers between banks and individuals, thanks to digital technologies;
- **Ease of Use and Time Savings:** Digital tools have simplified transactions, saving time and effort.
- **Providing Innovative Financial Solutions:** Such as cross-border transfers;
- **Increased Adoption of Electronic Payments:** Facilitating easier settlement of banking transactions;
- **Quick and Secure Access to Funds:** Enabling withdrawals and payments through electronic cards.

- **Contribution of "SATIM":** The company has managed the technical and organizational infrastructure, ensuring full compatibility among users of the electronic network in Algeria;
- **Convenience for Customers:** Electronic payments allow customers to conduct transactions through cards, mobile phones (*Baridimob*), or the internet;
- **Low or No Fees:** Online payment transactions are either free or involve minimal fees;
- **Enhanced Transparency:** The use of the internet in banks serves as an informational window to promote transparency, introduce banks, advertise their services, and reach a broader customer base.

5.2. Challenges of Adopting DT in the Algerian Banking Sector

The adoption of DT in the Algerian banking sector faces several obstacles and difficulties, which can be summarized as follows (HAMDOUCHE, AMANI, & BEN ALI, 2021, p. 550):

- **Weak Infrastructure:** Insufficient infrastructure to support digital transformation, coupled with a lack of financial resources, low internet penetration, limited bandwidth, and high costs.
- **Lack of Trust in Electronic Transactions:** Algerian society tends to prefer cash for settling transactions, despite the existence of legal frameworks supporting electronic payments. Although recent laws (such as the 2018 E-Commerce Law and the 2020 Finance Law) have abolished credit card fees and reduced service charges for merchants, these measures are still relatively new.
- **Limited English Proficiency:** This hinders the ability to benefit from global platforms, such as crowd funding sites, which are predominantly in English.
- **Lack of an Enabling Environment:** The absence of innovation labs and effective testing grounds for new technologies.
- **Financial Exclusion:** A significant number of individuals and companies face financial exclusion due to low levels of banking competition, resulting from high levels of banking concentration. A small number of banking institutions dominate the market in terms of deposits and lending activities.

- **Low Public Spending on IT Infrastructure:** Government efforts are primarily focused on meeting basic needs such as education, leaving limited resources for digital transformation.

- **Low Financial Literacy:** Financial literacy rates among Algerian adults are low, and there is a lack of regulatory frameworks to support new financial players, such as digital transformation companies.

- **Weak Business Environment:** According to the World Bank's 2019 Ease of Doing Business Index, many Arab countries, including Algeria, rank poorly.

6. CONCLUSION

In this study, the researcher attempts to diagnose the state of digital transformation in Algerian banks and its impact on their financial performance. We concluded that Algeria is still significantly behind in the adoption of digital transformation within the banking sector, as its use is largely limited to banks. The remnants of digital transformation in Algeria are primarily seen in online payment and withdrawal systems using various electronic payment methods, such as electronic cards and ATMs, which have gained significant traction, especially in recent times.

The current study revealed that digital transformation in Algeria remains far from the desired level in the Algerian economy compared to some global and Arab countries that have advanced in this field. Therefore, we can offer several recommendations that we believe will contribute to enhancing and increasing the adoption of digital transformation technologies, thereby improving the quality of the banking sector and extending its application to all sectors. The most important recommendations include:

- **Accelerating the Adoption of New Technologies:** Financial institutions should quickly adopt new technologies and financial innovations to maintain their stability in the market.

- **Allocating Budgets for Training:** The government should allocate budgets to banking institutions to develop competencies and skills through training programs on the latest technological advancements and retain skilled personnel.

- **Incentivizing Electronic Payments:** Implement incentives to encourage individuals to adopt electronic payment methods over traditional ones.
- **Improving ICT Infrastructure:** Work on enhancing information and communication technology infrastructure.
- **Providing Affordable Internet Services:** Ensure low-cost internet access to encourage widespread adoption of electronic payments.
- **Creating a Regulatory Environment:** Provide the necessary regulatory environment for startups in the field of digital transformation.
- **Establishing Legal Frameworks for Partnerships:** Develop a legal framework that allows partnerships between digital transformation companies and banking institutions to enhance collaboration and build trust.
- **Government Support for Startups:** Offer necessary government support to individuals for creating startups, especially in the field of digital transformation.
- **Fostering Legal and Legislative Frameworks:** Enhance legal and legislative frameworks to protect funds, combat cybercrime, and ensure information security to safeguard the rights of individuals involved in digital transformation.
- **Fostering International Cooperation:** Sign cooperation agreements between Algeria and other countries to promote the use of digital transformation.
- **Encouraging Collaboration Between Stakeholders:** Strengthen cooperation between the government, universities, research centers, and the private sector to support digital transformation, using business incubators and providing appropriate funding.
- **Learning from Successful Arab Countries:** Benefit from the experiences of successful Arab countries that have made significant progress in this field by adopting initial programs such as digital transformation accelerators to introduce this sector and encourage entrepreneurs to undertake small projects in this area as a first step.
- **Attracting Foreign Investments:** Open the door to foreign investments to provide capital and facilitate its growth through the entry of emerging digital transformation companies.

By implementing these recommendations, Algeria can accelerate its digital transformation journey, enhance the quality of its banking sector, and extend the benefits of digitalization to all economic sectors, ultimately contributing to sustainable economic growth.

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