Fintech Innovations and their Role in Enhancing Algeria's GDP -E-payment as a Model-

ابتكارات التكنولوجيا المالية ودورها في تعزيز الناتج المحلي الإجمالي الجزائري –الدفع الإلكتروني نموذجا–

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Abstract:

This study aims to show the importance of commercial banks' adoption of Fintech in order to enhance financial inclusion in Algeria, by focusing on the adoption of e-payment methods to support the Algerian GDP. We used multiple linear regression model and least squares method within Eviews program to analyze Algeria's annual financial statements from 2016 to 2021. To ensure the robustness of our results, we adopted three different e-payment systems including the use of online payment, ATM withdrawal, and payment through e-payment terminals and then measuring their impact on the output Algeria's GDP. The study concluded that there is a statistically significant effect of e-payment methods and the GDP. Therefore, the Algerian state had to do its utmost to promote financial inclusion and digitization by embracing all the innovations and products of financial technology.

Keywords: Financial inclusion, Fintech, E-payment, GDP, Algeria.

JEL Classification Codes : D14, G21, M15, O33.

ملخص:

تهدف هذه الدراسة إلى تبيان أهمية تبني البنوك التجارية لمفرزات التكنولوجيا المالية في سبيل تعزيز الشمول المالي في الجزائر، من خلال التركيز على تبني وسائل الدفع الالكتروني لدعم الناتج المحلي الإجمالي الجزائري. قمنا باستخدام نموذج الانحدار الخطي المتعدد وطريقة المربعات الصغرى ضمن برنامج Eviews لتحليل البيانات المالية السنوية للجزائر من 2016 إلى 2021. ولضمان قوة نتائجنا، اعتمدنا ثلاثة أنظمة مختلفة للدفع الالكتروني وتشمل استخدام الدفع عبر النث، والسحب من أجهزة الصراف الآلي، والدفع عبر محطات الدفع الالكتروني ثم قياس أثرها على الناتج المحلي الإجمالي الجزائري. وقد خلصت الدراسة بوجود أثر ذو دلالة احصائية لوسائل الدفع الالكتروني والناتج المحلي الاجمالي. لذلك، كان لزاما على الدولة الجزائرية بذل قصار جهدها في سبيل تعزيز الشمول المالي والرقمنة عبر احتضان كل ما هو جديد من ابتكارات ومفرزات التكنولوجيا المالية.

كلمات مفتاحية: الشمول المالي، التكنولوجيا المالية، الدفع الالكتروني، الناتج المحلي الإجمالي، الجزائر.

تصنيفات JEL : **D14، G21، M15 ، O33**.

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INTRODUCTION:

Modern technology has brought about a systemic boom in all the activities of banks and their financial systems in particular. The rapid revolution in the Internet and the expansion of the use of computers helped to adopt many modern and innovative technologies that would improve the quality of banking services and the speed of accessing to them.

Financial technology (Fintech) has contributed significantly to bringing about a fundamental change in the way the traditional banking industry works, and has helped the emergence of innovative banking services, which have led to increased efficiency and reduced costs. It was well received by many customers, which necessitated its adoption by traditional banks by introducing some necessary changes in their business models by expanding their investments in technology or entering into partnerships with emerging financial technology companies to enhance the digitization of financial services and improve their competitiveness. E-payment methods are among the most important products of financial technology and the most important innovations of this era that banks have been quick to adopt. This latter is an alternative to traditional monetary transactions, which contributed significantly to promoting digitization and financial inclusion by enhancing the financial performance of banks and improving the quality of financial transactions.

The study problem:

The developments that covered the global financial system quickly cast a shadow over the Algerian banking system, which rushed to embrace them in order to adapt to the international environment at the beginning of the nineties of the last century, but its use did not become popular until the beginning of the modern century. Thus, it has become imperative for all countries such as Algeria to expedite the adoption of e-payment methods in order to achieve an additional competitive advantage that would contribute to enhancing the country's gross domestic product as a whole.

In light of the foregoing, the following main question can be asked:

What is the impact of the adoption of modern payment methods on the Algerian GDP?

The study hypotheses:

In order to answer the main question, the hypotheses were formulated as follows:

H_1: There is a statistically significant effect at the level of significance 0.05 for e-payment methods on Algeria's GDP;

H_0: There is no statistically significant effect at the level of significance 0.05 for e-payment methods on Algeria's GDP.

The study objectives:

This study mainly seeks to achieve the following objectives:

- Identifying the most important innovations of modern financial technology and their role in promoting financial inclusion;
- Identifying e-payment systems as a modern and innovative alternative to traditional payment systems;
- Shedding light on the Algerian experience in the field of electronic financial dealing;
- Explaining the role of adopting e-payment systems in enhancing the Algerian GDP.

The importance of the study

The importance of this study is reflected in highlighting the effective role played by financial technology (with a focus on e-payment methods) in supporting and developing

financial services available to individuals. Which works to raise the per capita GDP of the country in a way that enhances financial inclusion in Algeria. Commercial banking transactions through modern electronic cards contribute significantly to creating a competitive advantage that will work to achieve leadership in the local and even global markets.

The methodology used in the study

The study structure:

In order to be familiar with all the necessary research elements, the following topics were included:

1. Generals about Fintech innovations;
2. The development of the use of e-payment methods in Algeria;
3. The impact of the adoption of e-payment technologies on the Algerian GDP.

Literature reviews:

- The study of (Al-Obaidi, December 2009) in New Economy Journal entitled "The Impact of Using Electronic Payment Systems on the Performance of Jordanian Banks - A Field Study for Banks Listed in the Amman Stock Exchange -". It aims to show the impact of the use of e-payment systems on the performance of Jordanian banks by analyzing the data collected through the questionnaire technique distributed to four banks representing one third of the study population. The study concluded that there is a positive impact of e-payment systems on raising the efficiency of the internal operations of the banks under study, which was positively reflected on the performance of the banks as a whole;
- The study of (Mark Zandi, Feb 2016). In Moody's Analytics entitled "The Impact of E-payment on Economic Growth". The study aims to show the nature of the relationship between card payments on per capita consumption by analyzing macroeconomic data for nearly 70 countries during the period from 2011 to 2015. The study concluded that there is a positive impact of e-payment methods on growth in GDP as a result of the presence of Positive effect of card usage on economic growth;
- A study of (Boumoud Imen, 2020) in Economic Visions magazine entitled "Fintech innovations and their role in developing the performance of Arab Islamic banks". It aims to clarify the nature of the relationship between Fintech innovations and the performance of Arab Islamic banks, by analyzing the reality of the leading banks in the field in each of Emirates, Qatar and Bahrain with a focus on ALGO Bahrain experience. The study concluded that there is a positive impact of using financial technology innovations in developing the performance of Arab Islamic banks;
- A study by (Ahmad, 2021) in the Middle East Journal of Humanities and Cultural Sciences) entitled "The Impact of the Development of Electronic Payment Methods on the Gross Domestic Product". The study focused on demonstrating the relationship between electronic money as one of the modern means of payment and the gross domestic product through a descriptive presentation of the explanations of economic schools (classical school, Keynesian and monetary) for this relationship. The study concluded that there is a direct relationship between electronic money and the value of GDP.

The added value of the research lies in the different spatial and temporal nature of the study, which sheds light on the reality of adopting Fintech innovations in general and e-

payment methods in particular, and their impact on the GDP in Algeria during the last six years. The study also is standard based on the analysis of financial data according to the statistical program 10Eviews.

The terms of the study.

Financial inclusion: Financial inclusion aims to secure and ensure that all segments of society, including those with low incomes, have access to financial products and services at reasonable and fair prices.

Financial technology: it is the bulk of the newly developed and innovative technologies specifically directed to banks and financial institutions, and it includes all new technological tools, means and techniques aimed at improving services, facilitating financial transactions in particular, and developing financial markets and institutions in general.

E-payment systems: E-payment systems express every electronic digital system that facilitates transactions, transfers and financial and commercial exchanges through channels and means that depend in their entirety on the Internet and modern technologies.

Gross Domestic Product: An international standard approved for knowing the economic situation in a country and predicting its future direction. This indicator reflects the value of all locally produced goods and services available to individuals, reflecting the state's ability to improve its position (Shiban, 2016, p. 29).

1- Generals about Fintech Innovations:

Fintech is a suitable tool for finding innovative solutions and new financial tools in order to improve the quality of financial services for banks in particular. In this axis, we will discuss the most prominent definitions that translated the true meaning of the term "Fintech" and its most important innovations.

1-1 Definition of financial technology: There are many definitions of Fintech, but all of them are associated with the technology sector and the financial sector, as they express their intersection together as:

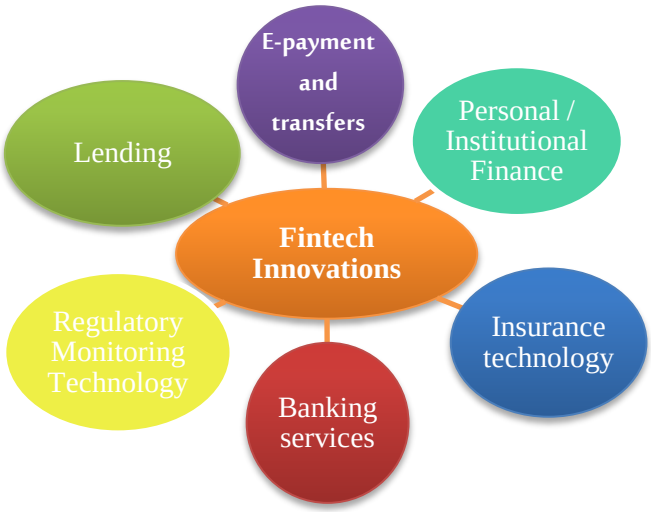
The Financial Stability Board defined it as: “It is a technical financial innovation that can lead to new innovation in business models, applications, processes, products or related services that have a material impact on financial markets and financial institutions in addition to providing financing services” (Banks.Union.of.Arab, 2018);

While the Institute for Digital Research in the Polish capital “Dublin” defined it as: “Modern technological inventions and innovations in the financial sector. These inventions include a set of digital programs that are used in the financial operations of banks, including: transactions with customers and financial services such as money transfer and exchange. Currencies, interest and profit rates calculations and knowing the expected profits for investments and other banking operations” (Mahmoud, 2016).

Through the previous definitions, it is clear that the concept of financial technology expresses the marriage of the terms technology and financial in the sense of developing new technological tools, means and techniques and employing them in the financial aspect to facilitate banking and financial transactions with the aim of developing financial markets and institutions.

1-2 **Fintech innovations:** The use of technology in financial transactions has resulted in many innovations that have facilitated their access and increased their credibility. The most important of them can be shown in the figure shown below:

Fig (1): Fintech Innovations



Source: Prepared by the researchers based on (S&P.Global.Rating, 2017)

where:

1-2-1 Electronic Payments/ Transfers: It includes every new financial innovation that would replace traditional payment methods, as well as money transfers. Among the most popular examples of this are automated teller machines, electronic cards, electronic payment terminals, distributed accounts (block-chain), cryptocurrencies, and others;

1-2-2 Lending: a service that reduces the urgent need for traditional bank mediation, as financiers can communicate with clients who need financing without any outsider or intermediary party. Among the most recent of these innovations, we may find direct lending platforms, crowdfunding platforms...

1-2-3 Personal / Institutional Finance: It is one of the most important features of financial technology as it provides banking services through digital platforms. The latter express simple-to-use electronic business programs that bring financial services closer to customers and facilitate access to them.

1-2-4 Banking services for investors / capital markets: every innovation seeks to offer services that banks often provide (such as underwriting or obtaining financing).

1-2-5 Insurance technology: It is one of the Fintech innovations that seeks to improve the quality and efficiency of insurance industry products in order to deal directly with customers or provide more efficient solutions to assess risks in a timely manner for insurance companies (AbuKarsh, 2019, p. 11).

1-2-6 Regulatory Monitoring Technology: This type of technology helps companies or organizations learn about and comply with regulatory laws and regulations.

2- The Development of the use of e-payment methods in Algeria:

The emergence of electronic banking coincided with the beginning of electronic cash trading in the world. In 1958, the first plastic card was issued by **American Express**, which witnessed a wide response that exceeded all expectations. Ten years later, a group of eight banks launched **Americard**, later known as the **Visa** Global Network. Successive issuances and widespread use of cards in the world as a whole. By 1992, all bankcards became cards that store personal information for their holder (BinAzza, 2017, p. 2).

In Algeria, and with the aim of establishing a solid infrastructure base for building an effective electronic monetary system that devote the principles of financial inclusion, seven public banks (BADR BDL BEA, BNA, CPA, CNEP, Al Baraka) took the initiative with CNMA Insurance to establish SATIM Company in 1995, which ensures that:

-Modernization and development of e-payment methods;

- ensuring the settlement of interbank transactions;

-Issuance of cards and marketing of available services;

-Monitoring monetary activities in Algeria.

In the same context, the electronic clearing system and the instant settlement system ARTS were launched in 2006.

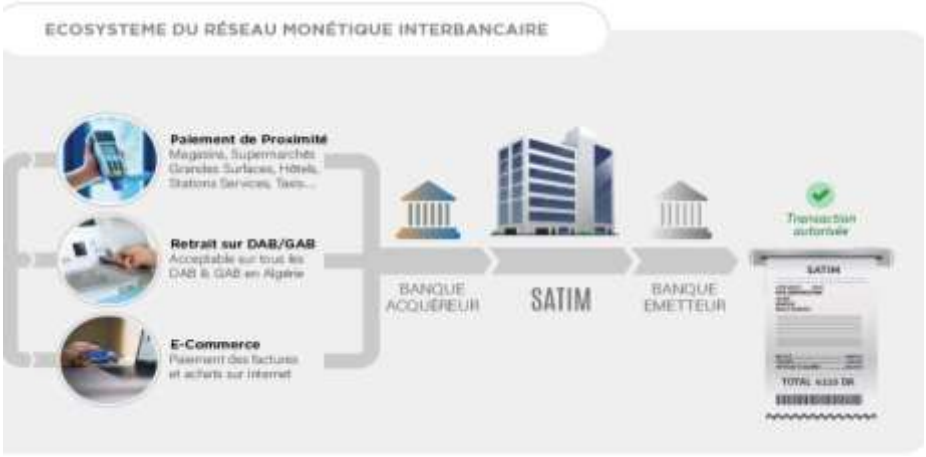
In the context of the modernization of Algerian banking, SATIM established a network for the automated cash pool (GIE Monétique) in June 2014, which is among the most prominent strategies aimed at regulating the e-payment system between banks and defining the tasks and responsibilities of all the actors in it. The grouping includes Bank of Algeria (uninvolved member), Algeria Post (recently joined in 2020) and 18 banks, as shown in the figure below:

Fig (2): Banks and financial institutions formed to GIE for the year 2021

Source: Prepared by the researchers based on (GIE, 2021)

The company has been able (according to what is stated on its official website) to establish a solid infrastructure that will contribute to the acceleration of the modernization of the banking sector, even if slowly, as 2162100 electronic bank cards, 1351 automatic money distributors, 130 web merchants, and 36000 e-payment terminals were counted. The company has a production capacity of 8000 interbank cards per day, which is a record number, especially since the company operates alone in the national arena. These cards are used to facilitate digital financial transactions through three payment channels, including online payment, ATM withdrawal, and payment via e-payment devices as shown in the figure below:

Fig (3): The e-payment system in Algeria



Source: (SATIM, 2021)

According to (SATIM, 2021), online payments were recorded until the end of November 2021, approximately 50316812 transactions, of which 45,228,180 were recorded in the year 2021 alone. The largest percentage recorded the service of paying telephone, electricity and water bills, while the service of selling goods did not see the light of day until the aftermath of the past year (2021).

However, e-payment in Algeria, despite the efforts made by the Algerian authorities to modernize its banking system and enhance financial inclusion, did not achieve the desired results as a result of the reluctance of the Algerian citizen and the loss of confidence, if not to say its absence in the banking system, especially after the Al-Khalifa case. As for the noticeable turnout in recent times, it was due to the spread of the epidemic pandemic that swept the whole world (Covid-19). As the Algerian citizen found himself inevitably forced to enter the world of digitization, technology and the Internet through e-shopping, payment using electronic cards, financing platforms... and others.

3-The impact of adopting e-payment technologies on the Algerian GDP

In order to show the nature of the relationship between e-payment methods and Algeria's GDP, we built a multiple linear regression model on Eviews10 using the least squares method where:

3-1 Study Variables:

Based on previous studies that focused on the impact of e-payment methods on the GDP, we chose the most important variables that could explain this effect. The dependent variable for the study is the Algerian GDP, the values of which were obtained from the World Bank website. While the independent variable is the means of e-payment, which was measured through three indicators: online payment, ATM withdrawal, and payment through e-payment terminals. The values obtained by these measures and indicators during the period 2016-2021 can be summarized in the following table:

Table (1): Statistical values of study variables (unit: trillion D.A.)

years	INT	ATM	TPE	GDP
2016	0,000015	0,09882	0,00044	18,51
2017	0,00027	0,1264	0,00086	18,75
2018	0,00033	0,13623	0,00134	18,86
2019	0,00050	0,16412	0,00192	19,15
2020	0,00542	1,07300	0,00473	18,17
2021	0,00989	1,55814	0,01356	19,26

Source: Prepared by the researchers based on the statistics of the World Bank and the GIE

3-2 Statistical processing of the form:

In our study, we relied on data analysis within the Eviews 10 program, using a multiple linear regression model that is based on the assumption that there is a linear relationship between the dependent variables (Yi) and the independent variables (Xi). Thus, the formula is given as:

$$Y_i = B_0 + B_1X_{1i} + B_2X_{2i} + \cdots + B_kX_{ik} + \varepsilon_i$$

(B_i) regression coefficients;

(B_0) is a constant;

(ε_i) a random bound.

Table 02: Results of Multiple Linear Regression

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: Y
Method: Least Squares
Date: 01/08/22 Time: 12:46
Sample: 2016 2021
Included observations: 6

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1	-1602.617	739.9673	-2.165794	0.1627
X2	5.647379	3.359679	1.680928	0.2348
X3	624.3967	188.6423	3.309951	0.0804
C	17.83540	0.451717	39.48359	0.0006

R-squared	0.964671	Mean dependent var	18.80000
Adjusted R-squared	0.911677	S.D. dependent var	0.410658
S.E. of regression	0.122044	Akaike info criterion	-1.134145
Sum squared resid	0.029790	Schwarz criterion	-1.272972
Log likelihood	7.402436	Hannan-Quinn criter.	-1.689881
F-statistic	18.20346	Durbin-Watson stat	1.996242
Prob(F-statistic)	0.052523		

Source: Prepared by the researchers based on the outputs of the Eviews 10 program

3-2-1 The overall significance test of the model: since the "Prob(F-statistic)" is greater than 5%, the model is not significant, i.e. it is rejected, and the model must be repeated. And since the coefficient of the independent variable X1 (push through feminization) is negative, we deliberately delete the variable from the model. On this basis, the new model became significant because the value of Prob(F-statistic) became equal to 4.06% which is less than 5% as shown below:

Table (3): Results of Multiple Linear Regression for the Modified Model

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: Y
Method: Least Squares
Date: 01/09/22 Time: 16:43
Sample: 2016 2021
Included observations: 6

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ATM	-1.608855	0.373041	-4.312811	0.0230
TPE	221.5483	46.94290	4.719527	0.0180
C	18.80272	0.100928	186.2980	0.0000

R-squared	0.881812	Mean dependent var	18.80000
Adjusted R-squared	0.803020	S.D. dependent var	0.410658
S.E. of regression	0.182260	Akaike info criterion	-0.259913
Sum squared resid	0.099656	Schwarz criterion	-0.364033
Log likelihood	3.779738	Hannan-Quinn criter.	-0.676714
F-statistic	11.19165	Durbin-Watson stat	0.895344
Prob(F-statistic)	0.040631		

Source: Prepared by the researchers based on the outputs of the Eviews 10 program

Based on the above table, the final form of the model can be written as follows:

$$\mathbf{Y\ (GDP) = 18{,}803 - 1{,}608\ X_1 + 221{,}239\ X_2}$$

3-2-2 Quality model test:

Using the data shown in the above model, we were able to determine the value of the coefficient of determination for the dependent variable (Yi) and the ratio of the interpretation of the independent variables (Xi) to the changes that occur for (Yi), which reached 88.18%. Thus, we say that the model is of high quality because the independent variables (e-payment methods) explain a large percentage of the changes that occur in the dependent variable at a very high rate (more than 88%).

3-2-3 Fisher statistic test:

This test is based on two assumptions:

- There is no linear relationship between the independent variables and the dependent variable, ie., $H_0: \hat{B}_1 = \hat{B}_2 = \cdots = \hat{B}_K = 0$
- There is a linear relationship between the independent variables and the dependent variable, ie., $H_1: \hat{B}_1 \neq \hat{B}_2 \neq \cdots \neq \hat{B}_K \neq 0$

Referring to the data of the above model, we find that the value of Fisher's statistic is 11.19%, which is greater than its tabular value (n-k=4). We accept the alternative hypothesis (H1). That is, there is a statistically significant relationship between the independent variables and the dependent variable. In the sense that there is GDP affected by changes in the means of e-payment.

3-2-4 Morale test parameters:

This test is based on two assumptions:

- There are no statistically significant differences between the variables (the null hypothesis H0)

- There are statistically significant differences between the variables (the alternative hypothesis H1).

Table (4): Significance of the Model

	T tab.	T stat.	Comment
Y (X_1)	1.943	4.31-	We accept the alternative hypothesis H1 and reject the null hypothesis H0
Y (X_2)		4.72	

Source: Prepared by the researchers based on the outputs of the Eviews 10 program

Through the previous results, we note that the calculated T value for both ATM withdrawal and payment through e-payment terminals is equal in absolute values (4.31), (4.72), respectively, greater than the tabular T value (1.943), ie, there is significant statistical significance to the model.

3-2-5 Correlation Matrix Analysis:

In order to measure the degree of correlation between the independent variables and the dependent variable on the one hand, and the independent variables between them on the other hand.

Table (5): Results of Correlation Analysis

View | Proc | Object | Print | Name | Freeze | Sample | Sheet | Stats | Spec

Correlation

	Y	TPE	ATM
Y	1.000000	0.386048	0.065638
TPE	0.386048	1.000000	0.938094
ATM	0.065638	0.938094	1.000000

Source: Prepared by the researchers based on the outputs of the Eviews 10 program

It is noted from Table (5) that the correlation coefficient between:

- Withdrawing through ATMs and paying through e-payment terminals indicates the existence of a positive relationship between the two variables, and that the amount of correlation between them was large as it was estimated at 93.81%;
- Withdrawal through the ATM and the GDP indicates a positive relationship between the two variables, and that the correlation between them was weak as it was estimated at 38.60%;
- Gross domestic product and payment through e-payment terminals indicate a positive relationship between the two variables, and that the correlation between them was very weak, estimated at 6.56%.

Conclusion:

Banks and economic financial institutions in general seek to improve their performance and maximize their profitability through the optimal use of available capabilities, including the adoption of modern technology, as well as keeping pace with all developments in the economy. In this article, we sought to highlight the nature of the relationship between e-payment methods and Algeria's GDP.

The most important results of the study:

Through the results of the multiple linear regression analysis obtained using the program, we reached the following conclusions:

- The model is of high quality because e-payment methods are able to explain about 89% of the changes that occur in the values of GDP;

- There is a statistically significant relationship between the independent variables (ATM, TPE) and the dependent variable (GDP). This was confirmed by the Fisher test with a value of 11.19%;
- There is significant statistical significance for the model because the calculated values for both variables (e-payment and withdrawal) are greater than their tabular value;
- There is a direct relationship between GDP and e-payment methods. As the GDP is directly related to the withdrawal through the ATM, at a value of 38.60%. As for payment through e-payment terminals, it is linked to the gross domestic product, with an amount of 6.56%.

Hypothesis testing:

After presenting and analyzing the results obtained, it became easy to judge the validity of the proposed hypotheses or not. Where all the tests studied were unanimous in accepting the alternative hypothesis and rejecting the null hypothesis. Therefore, the results obtained require proving the validity of the hypothesis, which states that there is a statistically significant effect of e-payment methods and GDP at the level of significance of 5%.

Recommendations

In light of the results obtained, the following recommendations are an absolute necessity in order to advance the Algerian electronic monetary system and enhance financial inclusion. It was necessary to:

- Doing its utmost to enhance financial inclusion and digitization by allocating more human and material resources to advance the sector, keep pace with the times, and benefit from the advantages of the digital economy like the rest of the world;
- Strengthening and developing the infrastructure of the monetary system by keeping pace with developments and updating the approved mechanisms and techniques;
- Activating laws and regulations that facilitate the incubation of financial technology in the banking sector;
- Modernizing the financial sector in line with market requirements by adopting strategies aimed at promoting digitization and financial inclusion as a whole.

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