



The impact of digital transformation on economic growth in Algeria: an econometric study

Nadjet LAKHDARI*

University of Ain Temouchent, Algeria.

nadjet.Lakhdari@univ-temouchent.edu.dz

Received: 30/04/2024

Accepted: 01/06/2024

Published: 19/06/2024

Abstract :

Digital transformation has become one of the contemporary global trends, which must be followed in order to speed up the completion of tasks and transactions, in order to save time and effort, reduce costs, and increase productivity. Where digitization accelerates development, helps economic growth, and enables better use of resources, many countries seek to invest in innovation and digital technologies, to build an integrated and comprehensive digital society and economy, improve the quality of life of citizens, strengthen the existing economic sector, and create Job opportunities, eradicating poverty for the sake of social and economic development, and in light of the crises and pandemics the world faces from time to time, many economies are forced to close partially or completely, here the focus is on remote work, digital communication, and the current study aims to measure The impact of digital transformation on economic growth in Algeria, through the use of the ARDL model. The results of the model confirmed the existence of a significant positive relationship between indicators of digital transformation and economic growth in Algeria.

Key Words: Digital transformation, Economic growth, OLS model, Algeria.

JEL Classification : O33 ; O47

* Corresponding author: Nadjet LAKHDARI. (*nadjet.Lakhdari@univ-temouchent.edu.dz*)

Introduction :

Given the rapid and continuous development in all cultural, economic, and scientific dimensions surrounding institutions, necessitating improvement in their productivity and services, and considering that the digital world has become intertwined with everything, it is imperative to leverage it for advancements in companies and institutions. Many countries have preceded us in this field, and we must strive to catch up with these advanced nations. This can only be achieved through awareness of the importance of digital transformation, focusing on digitization, removing obstacles, and overcoming challenges.

After the dominance of technology in reshaping contemporary concepts, there has been a shift from bureaucratic and slow-paced eras to digital ages characterized by rapid pace and performance automation. Despite challenges in implementing this transformation, there is acknowledgment of its economic



benefits, increased efficiency, facilitation in various sectors for the public, ease of global communication, and fostering healthy competition. Digital transformation is considered a key factor in promoting prosperity (Al-Salmi, 2013).

Presently, significant attention should be given to the new trend – the digital economy. The digital economy is directly related to the development of digital technologies, encompassing online services, electronic payments, and e-commerce. Key elements of the digital economy typically include e-commerce, online Algerian services, electronic payments, and online advertising. The digital economy serves as a new foundation for shaping and developing various sectors such as banking, retail, transportation, electricity, education, healthcare, and more (Amin, R., 2022).

Study Problem: The study problem revolves around elucidating the role of digital transformation in supporting the economy in Algeria. It requires an analysis of the current situation in Algeria regarding the implementation of digital transformation, the mechanisms for its implementation, and the challenges hindering its execution. From this, the following research questions emerge:

- To what extent has Algeria succeeded in implementing a digital transformation strategy?
- Is there a significant relationship between digital transformation and economic growth in Algeria?
- What challenges does Algeria face in implementing digital transformation mechanisms?

Research Objectives: The research aims to achieve several objectives, broadly seeking to study the adoption of digital transformation technologies in the researched sector and its impact on increasing workforce productivity. Specific objectives include:

- Studying the importance of digital transformation technologies in supporting economic growth.
- Clarifying the foundations of digital transformation in Algeria.
- Identifying the main obstacles affecting the implementation of digital transformation technologies in Algeria.

Significance of the Research: The significance of the research can be divided into two aspects:

- **Theoretical Aspect:** Digital transformation is rapidly growing globally and in Algeria, but there are shortcomings in its application. The research is crucial to describe the determinants of digital transformation and its impact on economic growth. It aims to fill the gap related to digital transformation technologies and their impact on supporting economic growth in Algeria. Identifying obstacles affecting the application of digital transformation technologies and their reflection on the Algerian economy is also essential.
- **Practical Aspect:** The research addresses one of the key modern directions to achieve development goals and keep pace with rapid contemporary



changes. The application of digital transformation technologies is essential for lifting economic growth in Algeria.

Research Hypotheses: In order to provide appropriate answers to the research questions, the study seeks to test the following hypothesis:

There is a statistically significant relationship between the application of digital transformation technologies and supporting economic growth.

Study Limitations: The spatial boundaries of the research are limited to Algeria, and the temporal boundaries cover the period from 2010 to 2022.

Methodology and Study Approach: The study employs the standard model to estimate the impact of digital transformation on economic growth in Algeria using official data available on the World Bank website for the period from 2010 to 2022.

Study Plan: The study is divided into two sections, in addition to the introduction and results. The first section focuses on digital transformation, defining it, determining its challenges in Algeria, its impact on economic growth, and the second section addresses the standard model and its results, followed by conclusions and recommendations.

I. Digital Transformation A fundamental question arises:

What is digital transformation? Digital transformation is an ongoing process that utilizes technologies, data, and innovation, applying them to all aspects of society to simplify operations and improve people's lives. Digital transformation has economic and social impacts on individuals, businesses, and governments, reshaping production processes, redirecting manufacturing from physical goods to services, and globalizing the economy (Zhang, Jinzhu, et.al, 2022).

The strategic goal of e-government is to support and streamline governance for all parties - government, citizens, and businesses. Electronic governance uses information and communication technologies to connect the three parties, supporting operations and activities. Therefore, e-government goals align with the goals of good governance, which involves the exercise of economic, political, and administrative power to improve state affairs management at all levels, nationally and locally (Borzova, Anzhelika, et al., 2020).

1. Digital Transformation in Algeria

Algeria adopts a strategy to transform all existing government services and the societal environmental system into a completely data-driven digital ecosystem. This involves automating all governmental procedures and delivering them through a digital computational system without human intervention, aiming to provide government services faster and more efficiently. However, despite progress compared to 2022, the average internet speed of 10.82 megabits per second places Algeria at 148th globally. While our capabilities are undoubtedly vast and evident every day, our developmental rate remains considerably average compared to other countries with similar opportunities (Kazekami, S., 2020).

Digitization is the simplest current means available to us, allowing companies and strategic sectors to become more efficient, gain competitiveness,



and better meet the needs and expectations of citizens and consumers. In strategic sectors, digitization can offer several advantages, such as improving operational efficiency, accelerating information transfer, and enhancing collaboration and communication among employees and different departments within companies and between them. It can also lead to the development of new wealth formation methods and job opportunities by assisting companies in developing innovative products and services using technologies like data analysis and artificial intelligence (Portulans Institute, 2021).

Additionally, digitization can improve customer service quality by providing faster and more effective communication between companies and their customers, investing in new communication channels offered by social networks. Finally, it can increase competitiveness by allowing companies to differentiate themselves from their competitors and deliver more innovative products and services, particularly through investing in research and development.

According to figures from Gie Monétique, approximately 99% of payment transactions are conducted through mobile phones, benefiting the telecommunications sector on platforms affiliated with the Algerian Post and those used by fixed and mobile phone operators. Nevertheless, there are indications that this may change in the future. The Algerian government has implemented a series of measures to encourage the development of e-commerce and online payments, including providing tax incentives and supporting the establishment of e-commerce platforms based on Law 15-5, dated May 10, 2018 (Iarousse, 2021).

Moreover, Algerian consumers have increasingly adopted electronic payment technologies. According to a report by McKinsey & Company at the end of 2020, nearly 16% of retail transactions in Algeria were conducted online, partly due to the COVID-19 pandemic, which prompted consumers to resort to online shopping (Issa, Haitham, 2018).

Algeria has made significant progress in information and communication technology in recent years, possessing several advantages compared to other countries in the region. One of the main advantages is the advanced infrastructure for information and communication technology. Algeria has sophisticated infrastructure, offering a wide range of high-quality communication services and internet connectivity, making it an attractive country for investment in the information and communication technology sector. With a potential large market exceeding 46 million inhabitants, Algeria becomes an appealing market for any company. The country has a qualified workforce with many trained professionals and experienced individuals in both wired and wireless information and communication technology and digital technologies.

The Algerian government has adopted an ambitious developmental strategy to enhance the capabilities of information and communication technology in the country, encouraging innovation and investment in this field. Finally, Algeria is well-positioned to develop information and communication technology partnerships with neighboring countries, fostering technological cooperation in the



region that could stimulate economic development throughout the area (Amin, R., 2022).

Algeria must continue to invest intensively in information and communication technology. Our country possesses numerous assets in this field, such as a young and vibrant population, a large potential market, and a growing interest in digital technologies. However, to become a regional leader in this field, Algeria needs to invest heavily in communication infrastructure and online services, promote innovation and creativity, and enhance the use of information and communication technology in all sectors of the economy (Abu El Nasr, Medhat Mohammed, 2023).

2. Challenges Facing the Digital Environment in Algeria

There are numerous challenges that must be overcome to promote the use of information and communication technology throughout the Algerian society. Digital literacy levels and skills for using basic computers remain average to low in specific regions of the country, limiting the ability of institutions, companies, and citizens to effectively use these technologies.

E-commerce and online payments, whether through the internet or mobile phones, are crucial means of promotion. Regarding the use of Electronic Payment Terminals (TPE) and Virtual Payment Terminals (TVPs), which remote web merchants use, their usage is still extremely limited in Algeria. Companies accepting credit card payments tend to focus on major cities such as Algiers, Oran, and Constantine, while smaller businesses are less likely to offer electronic payment options (Shahata, M. M. A., 2020).

The phenomenon of skill migration is challenging to control in our country. Many computer engineers trained by Algerian universities and higher education institutions leave for foreign countries. This has become a significant brain drain issue. There are measures the government can take to mitigate its negative effects. Some of them include:

- Creating attractive job opportunities, such as establishing innovative and technological companies that offer well-paying jobs and exciting career prospects for graduates in computer science and other fields. This requires creating a favorable environment for entrepreneurship, investment, and innovation.
- Encouraging collaboration between universities and companies. They need to work together to develop training programs tailored to the needs of the job market, provide training courses and collaborative research projects for students, and foster collaboration between graduates and companies.
- Strengthening relationships with migrant graduates by implementing programs to maintain connections with those who have left the country. These programs may include professional networking, communication events, cooperative project grants, and more.



- Improving working and living conditions to attract and retain talent. This may include tax benefits for companies creating jobs in the country, affordable housing, good transportation, and healthcare infrastructure.
- Encouraging research and development in computer science, cybersecurity, artificial intelligence, and other emerging technologies. This can help create well-paying jobs and stimulate innovation.
- Enhancing digital infrastructure by investing in better digital infrastructure to improve communication, high-speed internet access, and access to digital tools for professionals.
- Creating a conducive environment for innovation and entrepreneurship, as well as job opportunities to retain skills in our country. This requires a comprehensive approach involving the government, companies, and higher education institutions.

3. The Impact of Digital Transformation on Economic Growth in Algeria

Digitizing the economy can offer numerous benefits to all sectors, especially those classified as strategic, such as energy, health, transportation, and defense. It is important to implement an effective digital strategy that considers the specificities of each sector without dispersion and focuses on specific goals (OECD, 2021).

To achieve these goals, there must be a cohesive movement with the exchange of human and material resources to maximize the benefits of digitization, which is more necessary than ever. This includes retaining our young talents who are potential emigrants.

The recent government initiatives to accelerate digital transformation in the economy, particularly by stimulating key sectors such as finance, health, agriculture, and education to promote innovation and digital literacy, are crucial initiatives. The initial impact of digitization has been observed in various economic sectors as follows (Mikalef, P., & Gupta, M., 2021):

3.1. Financial Sector: The financial sector has made significant progress with the introduction of new digital financial services and the adoption of their uses and tools. Online payments increased by 95%, generating revenues exceeding 16 billion Algerian dinars in 2022, a 3200% increase compared to the pre-COVID period. The use of Point of Sale (POS) terminals doubled to 47,500 installed nationwide, with transactions exceeding 21 billion Algerian dinars, a 71% increase pre-COVID. Mobile payments within banks, available to customers of a few banks, were officially launched in November 2022, with over 7 million transactions and revenues exceeding 6.5 billion Algerian dinars in just four months of 2022.

The Baridimob application by Algeria Post was downloaded more than 1.8 million times. The number of operations carried out through this application in 2022 reached nearly 23.8 million, compared to 9.4 million in 2021 and only one million in 2020.



3.2. Healthcare Sector: The healthcare sector also benefits from digitization, with the implementation of remote consultation and telemedicine systems to improve access to healthcare for rural and isolated populations.

3.3. Agricultural Sector: The agriculture sector has also benefited from digitization, utilizing technologies such as drones and automated irrigation systems. Precision farming has been promoted to enhance productivity and crop quality.

3.4. Education Sector: Digitization in Algerian education has led to the development of new online learning curricula, improving access to education for rural populations and people with disabilities. The distribution of technological tools such as tablets to schools is commendable. However, to ensure the success of this approach, the quality of content is crucial. Promoting its development should be an absolute priority for the care, development, and widespread implementation of the digitization process in the Algerian education system.

II. Legislative Framework A study is currently underway to reform the Currency and Credit Law in the People's National Assembly (APN). This text should take into account the changes that have occurred in the Algerian system, including permits for investment banks, digital or new banks, payment service providers (PSPs), independent brokers, and the opening of exchange offices, among other innovative measures to help modernize the country's financial system. (Collins, C., et al., 2021).

This reform should allow the creation of a new competitive ecosystem for all Algerian companies and startups. Additionally, the Prime Minister's announcement in December 2022 about the adoption of the Central Bank Digital Currency (CBDC), the Algerian Digital Dinar, has boosted digital finance. However, there are still many challenges to overcome for broader adoption and more efficient use of existing technologies in these sectors. This requires concerted efforts by the government and the private sector to increase investments in basic infrastructure and benefit from it, democratize access through competition, develop digital skills, and promote the adoption of digital technologies across all segments of society (Kazekami, S., 2020).

III. Collaboration in Information and Communication Technology Among African Countries

Collaboration with African countries in the field of Information and Communication Technology (ICT) is promising and can be rapid and highly beneficial for all stakeholders. African governments recognize the importance of collaboration to enhance ICT capacity on the continent and stimulate economic development (Issa, H., 2018).

Many African countries have signed cooperation agreements to exchange knowledge and experience in ICT and to encourage trade and investment with Algeria. There are also various initiatives to promote collaboration in ICT among



African countries, such as joint training programs, collaborative research and development projects, and partnerships between the public and private sectors (Walter, A., 2013).

Through skill exchange, our country can share its expertise in higher education, software development, cybersecurity, or network management with other African countries. In return, they can share their specific expertise in ICT and digital technologies with Algeria. This can enhance the skills of professionals and students in Africa and create links between communities in different countries, as was the case in the past when Algerian universities were the first choice for students from newly independent African countries (Licka, P., & Gautschi, P., 2017).

African countries can also share their data in areas such as health, education, agriculture, or energy. This can help better understand the challenges facing different African countries and find collaborative solutions by African or international institutions (Abu El-Nasr, M. M., 2023).

There are many initiatives aimed at promoting digital collaboration between African countries and Algeria. Some of them include:

- **United Nations Development Programme (UNDP):** Collaborating with African governments to enhance ICT capacity for economic and social development.
- **Alliance for the Internet in Africa:** Aiming to develop ICT infrastructure in Africa and promote the use of these technologies for development.
- **African Union's Information Society Strategy:** Aiming to enhance collaboration between African countries in ICT and promote the use of digital technologies.
- **Digital Development Initiative for Africa:** Launched by the African Union, this initiative aims to develop digital skills in Africa and increase the use of ICT for economic and social development.
- **Fiber Optic Link Program between Algiers and Abuja:** Aimed at enhancing economic and technological relations between Algeria and Nigeria. Fiber optics provide higher bandwidth and greater reliability for communication compared to more traditional technologies.

Collaboration in ICT among African countries and Algeria can lead to mutual benefits, fostering economic and social development across the continent.

IV. Previous Studies

There exists a collection of Arabic and foreign studies that delve into digital transformation techniques and their impact on economic growth:

(Study, 2022 Zhang Jinzhu) : This study aims to establish a comprehensive evaluation index system and applied a data regression model to analyze the impact of digital economy on the economic growth of countries along the "Belt and Road" before COVID-19 in a trial manner. Subsequently, the Global Trade Analysis Project (GTAP) model was used to examine the impact of COVID-19 on digital industries and trade patterns. The results indicate a significant positive impact of



the digital economy on economic growth. The key mechanism of this impact lies in promoting industrial structure development, total employment, and labor restructuring. Moreover, COVID-19 generally increased demand for digital industries, with the demand-side impact being much greater than the supply-side impact.

(Study, 2022 Inhye Yoo, Chan-Goo Yi) : This study aimed to identify factors influencing the acceleration of digital economic innovation. It also analyzed the impact of economic innovation on social systems. A method of literature review was used to analyze the results of existing studies on digital transformation and economic growth. The results suggest that various motivations lead to economic innovation at different times. Our analyses reveal that digital economic innovation leads to changes in industrial structure, enhances productivity, and reduces costs in the production sector. The study demonstrates that the impact of economic innovation on technology and societal domains interacts with economic innovation. This study contributes to the literature by providing a comprehensive framework on how economic innovation, social systems, and technology evolve within the vast framework of social systems.

(Study, and others, 2019 Okhrimenko, Igor) : The research discusses the major trends in the transformation of the social and economic system. It has been shown that digitization not only affects the state economy but also influences social relationships. Global digitization has been proven to reduce the digital divide among different population groups. This study identified key digital differences at the international and national levels. It demonstrated that free access to the internet can be considered a factor that increases a country's dependence on global trends.

(Study, 2020 Shahata) : The study analyzed the reflections of implementing digital transformation mechanisms in various dimensions on electronic government applications, focusing on the requirements of governance standards for digital transformation processes, challenges of application in Arab societies in general, and Algeria in particular. It explored the nature and essence of accounting and accountability rules that ensure its success. The study's results indicate that the success of digital transformation, as one of the innovations in information technology, relies on four fundamental dimensions (using technologies to achieve the strategic role of government institutions and support their future vision, changes in value creation, structural changes, and the availability of financial aspects).

(Study, and others, 2017 Miodrag Komarčević) : The study affirmed that the new industrial revolution will bring about many positive changes. However, the introduction of the "smart factory" and the digitization of the industry as a whole, or its individual sectors, will inevitably lead to changes in the labor market and working methods, as well as a transformation of the nature of work and employment. At the same time, social polarization and marginalization, as well as business networks and the "flexibility" of work, weaken social organizations, especially labor unions. After identifying the semantic and cognitive characteristics of key terms and concepts, the study demonstrated the social effects of digital



transformation, with special attention to understanding the situation and social status of workers in emerging and future conditions, in addition to envisioning accompanying phenomena and secondary products brought about by digital transformation.

V. Data and Standard Model:

This section addresses estimating the impact of digital transformation on economic growth in Algeria using a time-series methodology for quarterly data from 2010 to 2022. Estimation was performed using a Vector Error Correction Model. The independent variables used in this estimation are based on those found in previous similar studies, as illustrated in the following table :

Table 1: Definition of Variables and their Sources.

Source	Description	Variable
World Bank data	The Gross Domestic Product (GDP) in Algeria	Y
World Bank data	Number of ATMs per 100,000 adults(بالغ100000)	X₁
World Bank data	Total number of mobile phone subscribers	X₂
World Bank data	Number of landline phone subscribers	X₃
World Bank data	Inflation rate	X₄
World Bank data	Percentage of the population using the Internet	X₅

Source: By author

1.The statistical description of variables is indicative of verifying the quality and behavior of the variables. This test is useful in describing the mutual relationships between variables, as well as the validity of the data using measures such as the mean, median, and standard deviation.

Table 2: Statistical Description of Variables.

	Y	X₁	X₂	X₃	X₄	X₅
Mean	0.284615	8.094308	42891852	3877237.	5.038462	41.96923
Median	1.200000	8.570000	45425533	3404709.	4.500000	43.00000
Maximum	1.800000	9.530000	47589212	5408355.	9.300000	74.60000
Minimum	-6.700000	5.920000	32780165	2922731.	2.000000	13.00000
Std. Dev.	2.310067	1.428169	4935628.	869313.1	2.343266	21.27155
Skewness	-2.311020	-0.516686	-0.885970	0.501644	0.568101	0.082097
Kurtosis	7.619974	1.556956	2.401332	1.738061	2.225769	1.711357
Observations	13	13	13	13	13	13

Source: By author



2.The correlation matrix also serves as a widely used test to examine the mutual relationships between variables, determining the degree of correlation. The following table illustrates the correlation matrix for the variables under study.

Table 3: Correlation Matrix for Variables.

	Y	X ₁	X ₂	X ₃	X ₄	X ₅
Y	1.000000					

X ₁	-0.417669	1.000000				
	0.1556	-----				
X ₂	-0.290648	0.948852	1.000000			
	0.3354	0.0000	-----			
X ₃	-0.400970	0.814228	0.726229	1.000000		
	0.1745	0.0007	0.0049	-----		
X ₄	0.443641	0.029673	0.129693	0.248093	1.000000	
	0.1289	0.9233	0.6728	0.4138	-----	
X ₅	-0.384873	0.926076	0.875051	0.951342	0.177209	1.000000
	0.1941	0.0000	0.0001	0.0000	0.5625	-----

Source: By author

3.Testing the stationarity of time series using both the ADF-test and PP-test. The following table indicates that all variables are non-stationary in both tests at the level, while they become stationary at the first difference at 1% and 5% significance levels.

Table 4: Unit Root Test for Model Variables.

Variables	ADF- test	
	level	Difference
Y	-2.6283	-3.4559*
X ₁	-1.4659	-2.5345*
X ₂	- 0.504	-5.1960***
X ₃	-1.3693	-3.8265**
X ₄	-2.7972	-2.9110***
X ₅	0.4923	-3.8333**

Source: By author

Notes: "t" represents the time trend, while "c" represents the constant. (*) and (**) indicate that the variable is stationary at 1% or 5%, respectively. The number following the critical values represents the lag order.



Causality testing using the Granger test was applied to the model variables, and the results are presented in the following table. It is evident that all variables collectively influence the individual's economic growth rate at a 1% significance level.

Table 5: Causality Test for Model Growth.

Null Hypothesis:	Obs	F-Statistic	Prob.
ATM does not Granger Cause GDP	11	5.17675	0.0494
GDP does not Granger Cause ATM		0.03747	0.9635
CIRCULARMOB does not Granger Cause GDP	11	1.98694	0.2177
GDP does not Granger Cause CIRCULARMOB		0.01914	0.9811
FIXEDLINE does not Granger Cause GDP	11	9.54571	0.0137
GDP does not Granger Cause FIXEDLINE		0.27304	0.7700
INFLATION does not Granger Cause GDP	11	0.28298	0.7631
GDP does not Granger Cause INFLATION		0.06039	0.9420
INTERUSER does not Granger Cause GDP	11	1.36558	0.3245
GDP does not Granger Cause INTERUSER		0.09875	0.9074

Source: By author

Cointegration techniques were employed to test the presence of a long-term relationship among integrated variables, where the variables are non-stationary at the level. The Engle and Granger (1987) test for cointegration is utilized to examine the common integration, relying on the examination of the residual regression performed using the variables. The following table illustrates the results of the cointegration test.

Table 6: Cointegration Test Results.

<i>Dependent</i>	<i>tau-statistic</i>	<i>Prob.*</i>	<i>z-statistic</i>	<i>Prob.*</i>
GDP	-4.948357	0.1946	-75.24829	0.0000
X1	-2.810652	0.8320	-9.532386	0.8921
X2	-4.023903	0.4128	-11.80546	0.6252
X3	-4.176721	0.3757	-37.91957	0.0000
X4	-3.501086	0.5943	-12.79506	0.4922
X5	-4.613098	0.2624	-48.36012	0.0000

Source: By author

Based on the previous results of cointegration, it is evident that the variables exhibit a long-term relationship. Therefore, the model can be estimated using the least squares method. The following table presents the results of the model estimation, indicating the following:

- The model demonstrates a high explanatory power of 91%. Additionally, the statistical significance of the F-test confirms the model's validity for



prediction. The Durbin-Watson statistic has a value of 1.9, affirming the absence of autocorrelation among the model variables.

- The final form of the economic growth equation and digital transformation indicators in Algeria is as follows:

$$Y_{nt} = -15835.25 + (-1779.242 X_1) + 0.000769 X_2 + 0.004557 X_3 + 176.7079 X_4 + -70.73 X_5$$

Table 7: Results of Least Squares Model Estimation.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ATM	-1779.242	1391.340	-1.278797	0.2417
CIRCULARMOB	0.000769	0.000360	2.137827	0.0699
FIXEDLINE	0.004557	0.002386	1.909869	0.0978
INFLATION	176.7079	223.4201	0.790922	0.4549
INTERUSER	-70.73499	138.3531	-0.511264	0.6249
C	-15835.25	13114.34	-1.207476	0.2665
R-squared	0.911083	Mean dependent var	18343.90	R-squared
Adjusted R-squared	0.847571	S.D. dependent var	3751.918	Adjusted R-squared
S.E. of regression	1464.828	Akaike info criterion	17.72090	S.E. of regression
Sum squared resid	15020053	Schwarz criterion	17.98165	Sum squared resid
Log likelihood	-109.1859	Hannan-Quinn criter.	17.66731	Log likelihood
F-statistic	14.34506	Durbin-Watson stat	1.915686	F-statistic
Prob(F-statistic)	0.001461			

Source: By author

- The relationship between the number of ATMs and Algerian Gross Domestic Product (GDP) is non-significant, confirming the ineffectiveness of the number of ATMs in supporting the Algerian GDP.
- The number of internet users via mobile phones shows a significant positive relationship with GDP in the short term.
- The number of landline phone users exhibits a significant negative relationship with GDP.
- Fixed internet users have a non-significant relationship with GDP.



From the results of the standard model, we can answer the research questions: Algeria has struggled to implement a digital transformation strategy, as indicated by the standard model results showing a significant impact of some variables and a non-significant impact of others on economic growth.

Conclusion :

After obtaining a clear understanding of the digital information landscape in Algeria, the aggregated answers reveal that GDP is influenced by the use of mobile and landline phone payment services, while the utilization of ATMs is not well-exploited.

This transformation is accompanied by cultural challenges and obstacles resulting from its non-inclusion at all levels. Discussing digitization implies understanding and anticipating the impact of the process on all strategic, human, organizational, cultural, and technological dimensions of the economy.

Based on the findings, the study suggests the following recommendations:

- **Enhance awareness of digital transformation:** The Algerian government should enhance awareness of the importance of digital transformation in supporting welfare and economic growth. This can be achieved through organizing workshops and training courses for employees and administrators to learn how to use available digital technologies.
- **Develop digital capabilities:** It is crucial to provide necessary training and qualification for employees and administrators to enhance their digital capabilities and skills in using digital technologies. Specialized training programs can be offered to promote environmental awareness and social responsibility among employees.
- **Encourage environmental innovation:** Employees and administrators should be encouraged to propose and implement creative solutions and innovations that contribute to the development and implementation of digitization projects in various departments.
- **Legal and regulatory guidance:** The government and relevant legislative bodies should adopt and implement legal and regulatory directives that encourage and support digital transformation. These directives should include legislation and policies that promote environmental sustainability and provide financial and technical support for the development of digital infrastructure and the implementation of digital transformation projects in institutions.
- **Disseminate results and knowledge exchange:** Research results and successful experiences related to the role of digital transformation in supporting economic activity should be disseminated through conferences, seminars, platforms, and scientific journals, contributing to raising awareness.
- **Support future research:** Encourage further research in this field, exploring more digital technologies and analyzing their potential impact on driving



development forward. This will contribute to a better understanding of the digital transformation landscape and its implications for economic growth

Bibliographic References :

- Abu El-Nasr, M. M. (2023). Digital Transformation and E-Government: Reality and Aspiration. Arab Journal of Informatics and Information Security, Arab Organization for Education, Science and Culture, Algeria, 4(11), 45-70.
- Ali Al-Salami, "E-Government Forum for Excellence and Competition," Jeddah, Saudi Arabia, 2013.
- Amin, R. (2022). Le marketing face à l'évolution du comportement du consommateur. Retrieved from journaldunet: <https://www.journaldunet.com/ebusiness/crm-marketing/1176493-le-marketing-face-a-l-evolution-du-comportement-du-consommateur/>
- Borzova, A., Дорыхова, E., Shalygina, N., & Selyukov, M. (2020). Digital Transformation of the Economy: Problems and Trends of Development.
- Collins, C., Dennehy, D., Conboy, K., & Mikalef, P. (2021). Artificial intelligence in information systems research: A systematic literature review and research agenda. International Journal of Information Management, 60, 102383.
- Daniel, C. O. (2019). "Effects of Incentives on Employees Productivity." International Journal of Business Marketing and Management, 4(1), 41–48.
- Issa, H. (2018). "The Determinants of Labour Productivity." Tishreen University Journal for Research and Scientific Studies Economic and Legal Sciences Series, 40(6), 27-41.
- Kazekami, S. (2020). Mechanisms to improve labor productivity by performing telework. Telecommunications Policy, 44(2).
- Larousse. (2021). Définitions: start-up - Dictionnaire de français Larousse. Retrieved from <https://www.larousse.fr/dictionnaires/francais/start-up/74493> 3.
- Licka, P., & Gautschi, P. (2017). Survey the digital future of higher education –what does it look like and how can it be shaped?. Berlin: Germany.
- Mikalef, P., & Gupta, M. (2021). Artificial Intelligence Capability: Conceptualization, measurement calibration, and empirical study on its impact on organizational creativity and firm performance. Information & Management. <https://doi.org/10.1016/j.im.2021.10343420>.
- OECD. (2021). Measurement. Retrieved from Organisation for Economic Co-operation and Development: <https://www.oecd.org/going-digital/topics/measurement/>
- Portulans Institute. (2021). Key results of NRI 2020. Retrieved from Portulans Institute: <https://networkreadinessindex.org/nri-2020-analysis/#key-results>
- Shhata, M. M. A. (2020). "Impacts of Activating Digital Transformation Mechanisms in Light of Financial Inclusion Initiatives on the Applications of



E-Government in the Arab Republic of Algeria." *Journal of Contemporary Business Studies*, Kafr El-Sheikh University, Faculty of Commerce, No. 9.

- Siachou, E., Vrontis, D., & Trichina, E. (2021). Can traditional organizations be digitally transformed by themselves? The moderating role of absorptive capacity and strategic interdependence. *Journal of Business Research*, 124, 408-421.
- Zhang, J., Zhao, W., Cheng, B., Li, A., Wang, Y., Yang, N., Tian, Y. (2022). The Impact of Digital Economy on Economic Growth and Development Strategies in the post-COVID-19 Era: Evidence From Countries Along the "Belt and Road". *Frontiers in Public Health*, 10. DOI=10.3389/fpubh.2022.856142.