

The Impact of E-Government on Rationalizing Government Expenditure in Algeria during the Period 2003 – 2023

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Received: 01-05-2025

Accepted: 21-09-2025

Published: 30-09-2025

Abstract:

This study aims to highlight the impact of e-government indicators on the rationalization of public spending in Algeria during the period from 2003 to 2023. The study focused on four main variables: the dependent variable is public spending, expressed as the ratio of final government consumption expenditure to GDP (DP), while the independent variables include telecommunications infrastructure (TII), human capital (HCI), and online services (OSI). The study employed a descriptive-analytical approach to achieve its objective and relied on a multiple linear regression model to test the relationship between the study variables using EvIEWS V.9 software. To achieve this goal, data were collected from official sources, such as reports from the United Nations Department of Economic and Social Affairs and the World Bank database.

The results revealed that the telecommunications infrastructure index (TII) had a positive and statistically significant effect on rationalizing public spending in Algeria during the studied period. Conversely, the human capital index (HCI) showed a significant negative effect on government expenditures, while the online service index (OSI) had no statistically significant effect. The study recommended increasing investment in telecommunications infrastructure due to its major role in rationalizing and enhancing the efficiency of public spending.

Keywords: E-government, Public spending, Indicators, Expenditure, Model.

Jel Classification Codes: H11, H83, O33.

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1. INTRODUCTION:

Amid rapid technological advancements, e-government has emerged as one of the main tools adopted by governments to enhance institutional performance and increase the efficiency of public services. The implementation of e-government is considered an effective means of rationalizing public expenditures, as technology contributes to improved efficiency and reduced operational and administrative costs. With the increasing reliance on technology in public administration, the importance of analyzing the impact of various e-government indicators on government spending has become more evident. In this context, it is crucial to examine different dimensions of e-government—such as the Telecommunications Infrastructure Index (TII), the Human Capital Index (HCI), and the Online Services Index (OSI)—to assess their role in rationalizing government expenditure, particularly in developing countries like Algeria, which seeks to enhance spending efficiency and promote sustainable development.

1.1. Research Problem:

Despite the progress Algeria has made in the field of e-government, the impact of these indicators on the rationalization of government expenditure remains insufficiently clear. The current literature lacks comprehensive studies that analyze the relationship between e-government and public spending in Algeria over the past two decades. Therefore, it is necessary to fill this research gap through an in-depth study of this relationship and to identify the influencing factors. Based on this, the main research question is formulated as follows:

What is the impact of e-government indicators on rationalizing government expenditure in Algeria during the period 2003–2023?

From this main question, the following sub-questions emerge:

- How does the Telecommunications Infrastructure Index (TII) affect government expenditure in Algeria?
- What role does the Human Capital Index (HCI) play in rationalizing government spending?
- Does the Online Services Index (OSI) contribute to reducing government costs and improving efficiency?

1.2. Research Hypotheses:

- There is a statistically significant positive relationship between the Telecommunications Infrastructure Index (TII) and the rationalization of government expenditure.
- The Human Capital Index (HCI) has a positive effect on government expenditure.
- The Online Services Index (OSI) has a significant effect on the rationalization of government expenditure.

1.3. Importance of the study:

This study is significant due to its contribution to understanding the relationship between e-government indicators and the rationalization of government expenditure in Algeria. It also provides scientific input that can help decision-makers better utilize e-government tools to reduce costs and improve the efficiency of public sector performance.

1.4. Objectives of the Study:

The study aims to:

- To analyze the impact of e-government indicators on government expenditure in Algeria;
- To highlight and assess the role of telecommunications infrastructure in improving the efficiency of public spending;
- To offer recommendations for decision-makers on how to strengthen the role of e-government in rationalizing public expenditure.

1.5. Methodology:

The study relies on a descriptive-analytical approach aimed at describing and analyzing the effect of e-government indicators on government expenditure. In addition, it employs a multiple linear regression model to test the relationship between the study variables using the Eviews V.9 software.

1.6. Scope of the Study:

The scope of the study is defined by the following:

a. Subject scope: The study focuses on analyzing the effect of e-government indicators—including telecommunications infrastructure, human capital, and online government services—on government expenditure, measured by the final consumption expenditure of the government as a percentage of GDP.

b. Time scope: The period from 2003 to 2023.

c. Geographical scope: The study is limited to the case of Algeria.

1.7. Data Sources:

Data were collected from official sources, including reports from the United Nations Department of Economic and Social Affairs for the independent variable dimensions, and the World Bank database for the dependent variable, to ensure the accuracy and comprehensiveness of the data used in the study. In addition, previous studies related to e-government and public expenditure were reviewed.

1.8. Literature Review:

E-government constitutes a central pillar in rationalizing government expenditure, with numerous studies addressing the relationship between e-government indicators and spending. In this context, the study by **(Rahaj, Gambour, Kurdi, & Almansouri, 2021)** analyzed Saudi Arabia's experience in implementing e-government, noting that the primary objective was to reduce costs, improve services, and increase efficiency. The study highlighted challenges faced by the Saudi government, such as high operational costs and low service quality when relying on manual systems. It confirmed that the transition to e-government accelerated service delivery, emphasizing Vision 2030's goal of improving the E-Government Development Index (EGDI) compared to other Gulf countries.

In a related vein, the study by **(Mohammad, Alabdallat, Abu Rumman, Jawabreh, & Ali, 2023)** examined the impact of e-government applications on reducing administrative

burdens in public service delivery, with a focus on the Department of Lands and Survey. The study concluded that e-government enhances transparency and speed in service delivery, recommending continuous updates to electronic applications and staff training to keep pace with technological advancements.

On the other hand, **(Johansen, 2023)** investigated the impact of e-government on the economy, focusing on the rapid developments in governments' use of information and communication technologies (ICTs) over recent decades. The researcher noted that governments—especially in developed countries such as the EU, the United States, the UK, and Japan—have given significant attention to strengthening their digital presence and establishing continuous communication with citizens, allowing for ongoing feedback loops that enable policymakers to improve the quality of public policies. The study also emphasized that developing countries like India, Brazil, and China have begun implementing various e-government initiatives at both local and central levels, aiming to provide public services comparable to those available in developed nations. Despite the relative novelty of the field, the researcher stressed the importance of assessing the effectiveness of these programs in impacting the economy and optimizing public resource use.

The study by **(Lazor, Yunyk, Zubar, Dzeveliuk, & Dzeveliuk, 2024)** analyzed the impact of e-governance on reducing public service delivery time in developed countries. It used correlation analysis between the EGDI and average service delivery time, revealing a 25% decrease in delivery time due to digital technologies. The study further confirmed a strong relationship between electronic services and citizen engagement.

In a deeper analysis, **(Chen & Li, 2024)** explored the impact of e-government on productive capacities using global data. Their findings indicated that e-government contributes to reducing both the time and procedural costs for individuals and businesses, thus enhancing production efficiency without increasing the financial burden on governments.

In the context of studies exploring the impact of e-government on spending efficiency and public administration, **(Temba, 2025)** conducted an analytical study at the local government level in the Kinondoni and Ubungu municipalities of Tanzania. The aim was to assess the contribution of e-government to enhancing public service efficiency and improving transparency in decision-making. The study was grounded in Innovation Diffusion Theory and Principal-Agent Theory, and it yielded significant quantitative results, showing that digital transformation led to faster services, fewer errors, and increased citizen participation in governance. The performance efficiency regression coefficient was 0.762, while the transparency index scored 0.735, both with high statistical significance ($p < .001$), indicating the positive impact of e-government on administrative and organizational aspects.

What distinguishes the current study from previous ones is its combination of a long-term quantitative analysis (2003–2023) using a multiple linear regression model and its reliance on official UN reports and World Bank data. Furthermore, it focuses on Algeria—a relatively underexplored case compared to other countries. The study also uniquely disaggregates the impact of each e-government indicator on public expenditure, which can contribute to designing more precise digital policy interventions.

2. Theoretical Framework of the Study:

2.1. The Concept and Dimensions of E-Government

E-government refers to the use of Information and Communication Technologies (ICT) to improve the delivery of government services, increase transparency, and enhance the efficiency of public spending (**United Nations, 2022, p 15**). E-government encompasses three main dimensions.

A. Telecommunications Infrastructure (TII):

This represents the technological foundation necessary to operate electronic services, such as internet and communication networks. This dimension reflects the availability of digital infrastructure, including the number of internet users and mobile and fixed-line subscriptions (**World Bank, 2023**).

B. Human Capital (HCI):

This refers to the digital skills of employees and citizens that enable them to interact with electronic services (**OECD, 2021, p 30**).

C. Online Services (OSI):

This includes government services delivered electronically, such as platforms for submitting applications. This dimension measures the availability and quality of services provided online (**Al-Hujran, Al-Debei, Chatfield, & Migdadi, 2015, p 192**).

2.2. Rationalization of Government Expenditure:

Rationalizing government expenditure reflects the efficient use of public resources to achieve developmental goals at the lowest possible cost (IMF, 2020). It can be measured by the ratio of final government consumption expenditures to GDP, where a lower ratio indicates higher efficiency (**Gallego-Álvarez, Rodríguez-Domínguez, & García-Sánchez, 2010, p 425**).

Rationalizing public spending means the optimal use of public financial resources to achieve the highest possible economic efficiency and social equity, while reducing waste and misallocation in spending. This requires strengthening mechanisms of planning, oversight, and governance in managing public expenditure.

2.3. The Impact of E-Government Projects on Efficiency and Public Value:

2.3.1. General Introduction:

E-government projects are strategic tools aimed at improving government service delivery by utilizing digital technologies. These projects range from simple websites offering information to complex systems that enable interaction between citizens and government agencies, as well as among governmental institutions themselves.

2.3.2. Measuring Public Value:

To measure the public value of these projects, criteria such as increased efficiency, ease of access, transparency, and the effort invested in providing online services must be considered.

2.3.3. Efficiency and Cost Savings:

One of the key drivers of public value in e-government projects is achieving efficiency and reducing costs. For example, the Online Business Registration System (OBRs) in Belize reduced the time required to register a business from 10–15 days to just 24 hours, enhancing transparency and accessibility.

2.3.4. Improving Access to Services:

E-government projects help improve citizen access to government services, particularly for those facing geographical or mobility barriers. In Guyana, for instance, an effective e-government system was developed to digitize government services, thereby reaching rural communities.

2.3.5. Enhancing Transparency and Accountability:

E-government projects foster transparency and accountability by making government processes and data accessible online. For example, the commercial registry system in Anguilla provides multiple functions such as business incorporation, trade name registration, and public access to company information, in addition to facilitating information exchange with international law enforcement agencies.

2.3.6. Improving Public Service Delivery:

Through the implementation of e-government projects, governments have made public service delivery more efficient, cost-effective, and responsive to citizen needs. In Rwanda, for instance, a one-stop center was established for business registration, making the process free and faster—reducing procedures from nine to four and processing time from 16 days to just five.

2.3.7. Reducing Development Efforts and Costs:

E-government projects and technological advancements have transformed how governments interact with citizens and deliver services. A rising trend in this field is the use of low-code platforms that enable rapid creation of solutions, processes, and services, with minimal or no need for traditional programming. This helps address the shortage of IT professionals.

2.3.8. Leveraging Technology to Improve Services:

When properly implemented, e-government projects provide several public value benefits for governments, citizens, and businesses. They contribute to increased efficiency and cost savings, improved service accessibility, enhanced transparency and accountability, encouraged citizen engagement, and better public service delivery. Additionally, these projects

can have a significant impact on achieving the United Nations Sustainable Development Goals, such as promoting sustained and inclusive economic growth (Goal 8), building resilient infrastructure and promoting inclusive and sustainable industrialization and innovation (Goal 9), and reducing inequality within and among countries (Goal 10) (NRD Companies, 2025).

3. Empirical Framework (Econometric Study):

3.1. Analysis of the Evolution of E-Government Indicators and Government Expenditure in Algeria During the Study Period:

The data for the independent variable and its three components were obtained from the reports of the United Nations Department of Economic and Social Affairs, which publishes a biennial survey covering e-government development across 193 member states. In order to conduct the econometric study and construct a continuous time series, support from econometric experts was sought to address the issue of missing annual data. Two solutions were proposed: the first involved duplicating the value of the previous year for the missing year (e.g., using the 2005 value for 2006, and the 2007 value for 2008); the second solution consisted of calculating the average of the values for year N and year N+2 to estimate the missing value for year N+1. The second solution was adopted in this study due to the relatively stable and gradual development of the independent variable's dimensions over time.

It is worth noting that each component of the E-Government Development Index (EGDI) ranges between 0 and 1, as previously explained in the theoretical framework. Data for the dependent variable—government expenditure, measured by the ratio of final government consumption expenditure to GDP—were obtained from the World Bank database published on its official website for the studied period from 2003 to 2023.

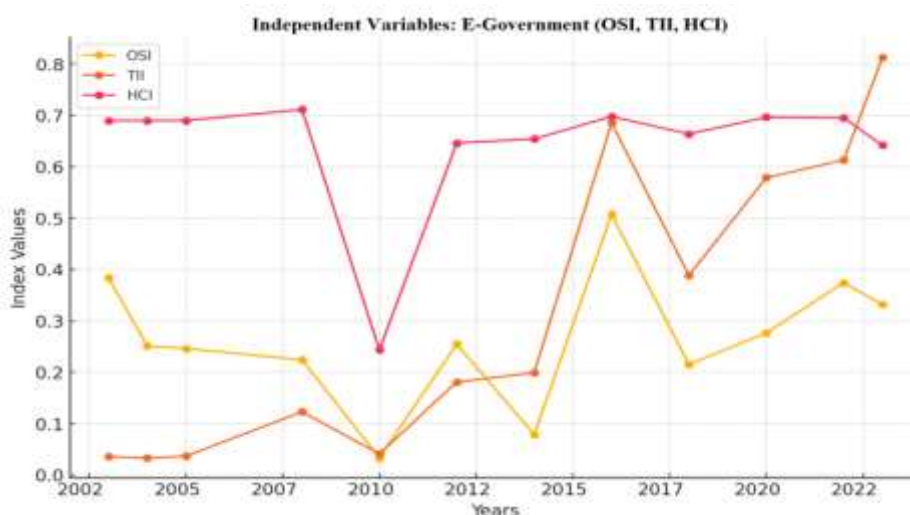
3.1.1. Analysis of the Evolution of E-Government Indicators in Algeria During the Period 2003–2023:

This section presents the evolution of e-government indicators in Algeria between 2003 and 2023, with a focus on three key components that reflect the growth of this vital sector: the Online Services Index (OSI), the Telecommunications Infrastructure Index (TII), and the Human Capital Index (HCI). These indicators represent the extent of Algeria's progress in promoting e-government and achieving digital transformation, which is a fundamental element for economic and social development in the modern era. The analysis will provide a clear view of the progression of these indicators over time, contributing to an understanding of the efforts made to enhance the role of e-government in the country.

Table 1. E-Government Development Indicators (EGDI)

Years	OSI	TII	HCI
2003	0,384	0,036	0,69
2004	0,251	0,033	0,69
2005	0.2462	0.0365	0,69
2008	0.2241	0.1230	0.7114
2010	0.0335	0.0412	0.2435
2012	0.2549	0.1812	0.6463
2014	0,0787	0,1989	0,6543
2016	0,5072	0,6855	0,6978
2018	0,2153	0,3889	0,664
2020	0,2765	0,5787	0,664
2022	0,3743	0,6133	0,6956
2024	0,332	0,8129	0,6418

Source: (Department of Economic and Social Affairs, 2003- 2024)

Figure.1. Evolution of EGDI Indicators During the Study Period

Source: (Department of Economic and Social Affairs, 2003- 2024)

The results from both Table (01) and Figure (01) indicate that Algeria has witnessed significant progress in e-government indicators during the period 2003–2023, covering three main dimensions: the Online Service Index (OSI), the Telecommunications Infrastructure Index (TII), and the Human Capital Index (HCI). Initially, the OSI declined from 0.384 in 2003 to its lowest point of 0.0335 in 2010, before gradually improving to reach 0.3743 in 2022, reflecting efforts made to develop digital government services. The TII experienced substantial growth, rising from 0.036 in 2003 to 0.8129 in 2024, indicating major investments in enhancing digital networks. Regarding the HCI, it remained relatively stable, starting at around 0.69 at the beginning of the period and increasing to 0.7114 in 2008, with slight fluctuations afterward. This index reflects developments in education and human skills, which support the digital transformation process. Overall, these indicators show that Algeria has made significant strides in promoting e-government; however, certain aspects, such as

improving online services, still require further development to achieve a comprehensive digital transformation.

3.1.2. Analysis of the Evolution of Government Expenditure Measured by the Ratio of Final Government Consumption Expenditure to Gross Domestic Product during the Period 2003–2023:

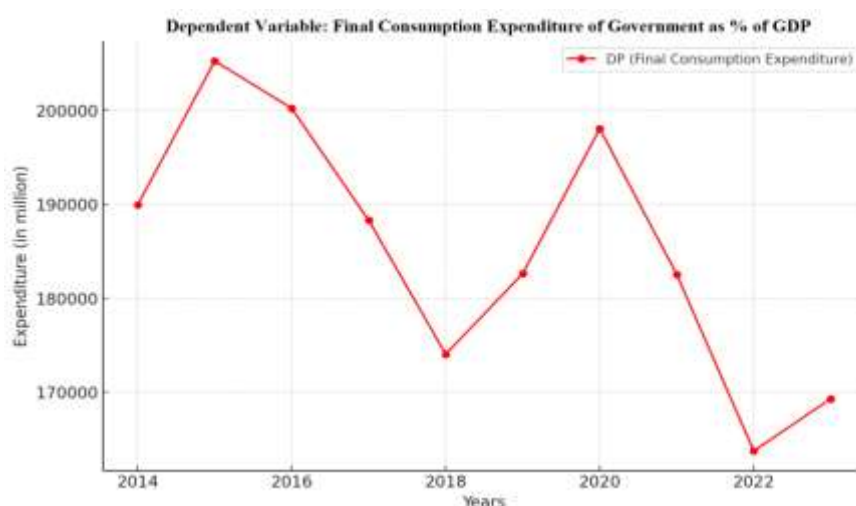
This analysis aims to illustrate the evolution of government expenditure, measured by the ratio of final government consumption expenditure to Gross Domestic Product (GDP), during the period from 2003 to 2023.

Table 2. The Ratio of DP During the Study Period

Years	DP	Years	DP
2003	15,1191	2014	18,9933
2004	13,9669	2015	20,5245
2005	12,4254	2016	20,0218
2006	11,9514	2017	18,8290
2007	12,3882	2018	17,4037
2008	13,7658	2019	18,2610
2009	16,3716	2020	19,8032
2010	16,9633	2021	18,2527
2011	20,1129	2022	16,3741
2012	19,7503	2023	16,9290
2013	18,5351	2024	

Source: (The World Bank Group, 2024)

Figure.2. Evolution of the DP Ratio During the Study Period



Source: (The World Bank Group, 2024)

Both Table (02) and Figure (02) illustrate the ratio of final government consumption expenditure (DP) to Gross Domestic Product in Algeria during the period from 2003 to 2023. It is observed that the DP ratio experienced notable fluctuations throughout the study period.

The ratio declined significantly between 2003 and 2007, reaching its lowest level in 2006 at 11.9514%. Subsequently, government spending began to rise gradually, recording its highest level in 2011 at 20.1129%. A relative increase in government expenditure was also noted during the economic crises of 2009 and 2015, which may reflect the government's tendency to increase spending to stimulate economic growth during periods of recession. However, towards the end of the period, particularly in 2022 and 2023, expenditure declined again to lower levels, with the ratio standing at 16.3741% in 2022 and 16.9290% in 2023. This may indicate the adoption of expenditure rationalization policies or improved efficiency in the use of public resources, likely influenced by the impact of the COVID-19 crisis and the Russia-Ukraine conflict on the country's economic conditions.

3.2. Highlighting and Testing the Relationship Between E-Government Indicators and the Rationalization of Government Expenditure in Algeria:

In order to highlight the impact and role of e-government indicators in rationalizing government expenditure in Algeria during the study period 2003–2023, we will test the effect among the study variables using a multiple linear regression model. The model includes testing the impact and relationship of the independent variables—namely the Online Service Index (OSI), the Telecommunications Infrastructure Index (TII), and the Human Capital Index (HCI)—on the dependent variable, which is the ratio of final government consumption expenditure to GDP (DP), representing government spending during the period from 2003 to 2023.

A. Descriptive Variables:

The aim of the descriptive analysis of the variables is to study the statistical properties of the time series under investigation, including the calculation of the mean, median, and mode. It also includes testing the normal distribution of these variables through the statistics of skewness, kurtosis, and the Jarque-Bera probability, as presented in the following table:

Table 3. Descriptive Statistics of the Study Variables

Statistics	<i>DP</i>	<i>OSI</i>	<i>HCI</i>	<i>TII</i>
Mean	16.98772	25.45381	64.02286	30.24952
Median	17.40371	24.62000	68.09000	19.89000
Maximum	20.52447	50.72000	71.14000	71.31000
Minimum	11.95145	3.350000	24.35000	3.300000
Standard Deviation	2.750772	10.98949	11.39347	24.51100
Skewness	-0.540912	0.087638	-2.501296	0.355108
Kurtosis	2.039278	3.101829	8.425441	1.560673
Jarque-Bera Statistic	1.831663	0.035955	47.65367	2.254059
Probability (p-value)	0.400184	0.982183	0.000000	0.323994
Sum of Observations	356.7422	534.5300	1344.480	635.2400
Sum of Squared Deviations	151.3349	2415.376	2596.222	12015.78
Number of Observations	21	21	21	21

Source: Prepared by the researchers based on the outputs of Eviews 9 software

Table (03) presents some descriptive statistics for the study variables. The variable DP recorded the lowest mean among all the study variables, with an average of 16.987 and a standard deviation of 2.750. In contrast, the HCI variable had the highest mean value of 64.022, with a standard deviation of 11.393. The variables TII and OSI had mean values of 30.249 and 25.453, respectively, with corresponding standard deviations of 24.511 and 10.989.

Regarding the normality tests, the p-values from the Jarque-Bera test showed that the independent variables follow a normal distribution, as their p-values are greater than 0.05—except for the Human Capital Index (HCI), which does not follow a normal distribution due to its p-value being less than 0.05.

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots + \beta_k X_{ki} + U_i \quad (1)$$

B. Model Estimation:

The Multiple Linear Regression Model is a regression of the dependent variable (Y) on several independent variables ($X_1, X_2, \dots, X_k$). This model is known as the Multiple Linear Regression Model.

It is based on the assumption of a linear relationship between the dependent variable (Y_i) and a set of independent variables ($X_1, X_2, \dots, X_k$) along with a random error term (U_i). This relationship, for n observations and k independent variables, is expressed in the following form:

For the multiple linear regression model, the following assumptions must be satisfied:

a. Zero conditional mean of the error vector

$$E(u_i) = 0$$

$$E[U] = E \begin{pmatrix} U_1 \\ U_2 \\ \vdots \\ U_n \end{pmatrix} = \begin{pmatrix} E(U_1) \\ E(U_2) \\ \vdots \\ E(U_n) \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ \vdots \\ 0 \end{pmatrix}$$

b. Homoskedasticity and no serial correlation

$$\text{Var}(u_i) = E(u_i^2) = \delta^2$$

$$\text{Cov}(u_i, u_j) = E(u_i u_j) = 0, \quad i \neq j$$

c. No perfect multicollinearity and sufficient sample size

There must be no exact linear relationship among the independent variables, and the number of observations must exceed the number of parameters to be estimated. In other words, if X has rank $K+1$, then

$$\text{rank}(X) = K + 1 < n$$

d. Normally distributed errors

The error term is assumed to follow a normal distribution with mean zero and variance δ^2 :

$$u_i \sim \mathcal{N}(0, \delta^2)$$

Table 4. Multiple Linear Regression Results for the Study Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	20.68959	3.030091	6.828043	0.0000
OSI	-0.047101	0.072366	-0.650868	0.5238
TII	0.083944	0.026711	3.142657	0.0059
HCI	-0.078757	0.027014	-2.915435	0.0046
R-squared	0.419425	Mean dependent var		16.98772
Adjusted R-squared	0.316971	S.D. dependent var		2.750772
S.E. of regression	2.273392	Akaike info criterion		4.650066
Sum squared resid	87.86125	Schwarz criterion		4.849023
Log likelihood	-44.82569	Hannan-Quinn criter.		4.693245
F-statistic	4.093774	Durbin-Watson stat		0.595818
Prob(F-statistic)	0.023367			

Source: Prepared by the researchers based on the outputs of Eviews 9 software

Table 4 presents the results of the Ordinary Least Squares (OLS) regression analysis of the impact of the independent variables—Online Service Index (OSI), Telecommunications Infrastructure Index (TII), and Human Capital Index (HCI)—on the dependent variable, the ratio of final government consumption expenditure to GDP (DP), over the period 2003–2023. The constant term (C) implies that the estimated value of DP when all independent variables equal zero is 20.68959, which is highly significant ($p = 0.0000$). The OSI coefficient is negative (-0.047101) but not statistically significant ($p = 0.5238$), indicating that its effect on DP is not distinguishable from zero and thus not important in the model. In contrast, the TII coefficient is positive (0.083944) and statistically significant ($p = 0.0059$), implying that an improvement in telecommunications infrastructure is associated with an increase in DP, a meaningful effect that supports the hypothesis that advances in communications technology help improve government spending. The HCI coefficient is negative (-0.078757) and statistically significant ($p = 0.0046$), suggesting that an increase in human capital may be associated with a reduction in DP—perhaps reflecting potential pressures on government expenditure as human capital rises—which warrants deeper interpretation in the local context.

The R-squared indicates that 41.9 % of the variation in DP can be explained by the independent variables in the model, pointing to a moderate explanatory power. The F-statistic (4.093774 , $p = 0.023367$) shows that the model as a whole is statistically significant, meaning the independent variables jointly affect DP. The Durbin–Watson statistic of 0.595818 suggests the presence of positive autocorrelation in the residuals, which may indicate a violation of the error-independence assumption that should be addressed.

Overall, the analysis shows that TII has a positive and significant effect on DP, while HCI has a negative effect; other variables not included in the model should also be considered.

The estimated multiple linear regression equation is:

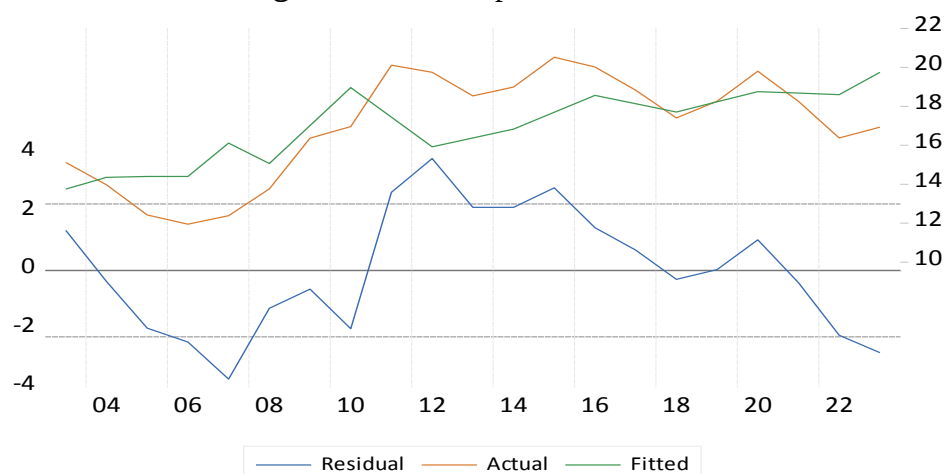
$$DP = 20.689 - 0.047OSI + 0.083TII - 0.078HCI$$

3.3. Diagnostic Tests:

The robustness of the study's results is verified through several diagnostic tests, including: plotting the residuals, the normality test, the serial autocorrelation Lagrange Multiplier (LM) test, the homoscedasticity test, as well as tests for the stability of the model's parameters.

3.3.1. Plotting the Residuals:

Figure.3. Residual plot of the model

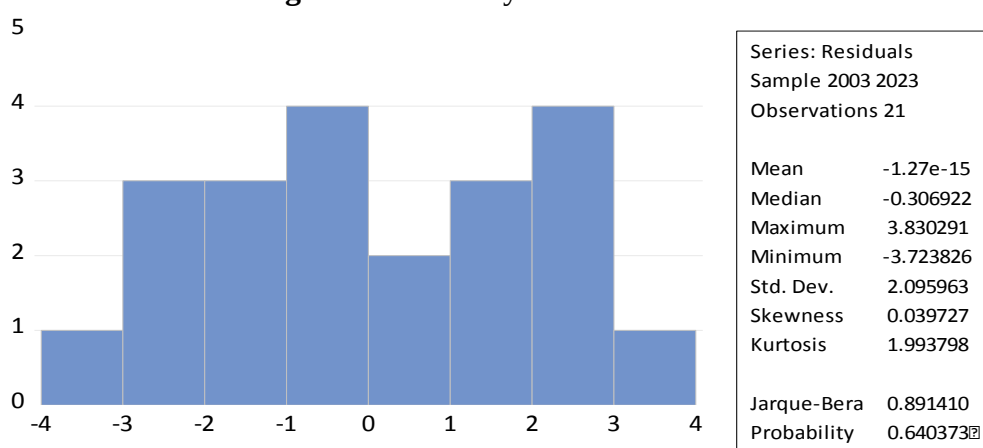


Source: Eviews 9 outputs

Plotting residuals against actual values can be important because it may signal problems in the estimated regression equation. For example, repeatedly seeing residual points fall outside the dashed lines indicates the presence of serial autocorrelation.

3.3.2. Normality Test

Figure.4. Normality test for the model



Source: Eviews 9 outputs

The results of the residual normality test using the Jarque-Bera statistic indicate that the residuals follow a normal distribution. The value of the Jarque-Bera statistic was 0.8914 with a probability value of 0.6403. Since this probability value is greater than 0.05, the null hypothesis stating that the residuals are normally distributed cannot be rejected. This indicates

that the assumptions related to the distribution of residuals in the model are satisfied, which enhances the reliability of the results derived from the model used in the analysis.

3.3.2. Autocorrelation Test (LM Test):

Table 5. Results of the Autocorrelation Test for the Residuals

Breusch-Godfrey Serial Correlation LM test			
F-statistic	2.612426	Pob. F(2,15)	0.0820
Obs*R-squared	13.57609	Prob. Chi-Square(2)	0.0593

Source: Prepared by the researchers based on the outputs of Eviews 9 software

The Breusch-Godfrey test indicates the absence of autocorrelation in the model's residuals. The p-value of the test based on the F-statistic (Prob. F(2,15)) is 0.0820, which is higher than the conventional significance level of 0.05. This means that the null hypothesis, which states that there is no autocorrelation in the residuals, cannot be rejected. This result is further supported by the Chi-Square statistic, which had a p-value of 0.0593, also exceeding the 0.05 threshold.

Based on these results, it can be concluded that the model does not suffer from autocorrelation in the residuals, which enhances the reliability of the parameter estimates in the model.

3.3.3. Homoscedasticity Test:

Table 6. Results of the Homoscedasticity Test

Heteroskedasticity Test: White			
F-statistic	0.135289	Prob. F(3,17)	0.9376
Obs*R-squared	0.489675	Prob. Chi-Square(3)	0.9212
Scaled explained SS	0.159454	Prob. Chi-Square(3)	0.9839

Source: Prepared by the researchers based on the outputs of Eviews 9 software

We observe that both the F-test and the Chi-square test show that the p-value is greater than 0.05, which means that the null hypothesis cannot be rejected. In other words, the error model exhibits the property of homoscedasticity.

3.3.4. Parameter Stability Tests of the Model

Figure.5. Results of the CUSUM of Squares Test

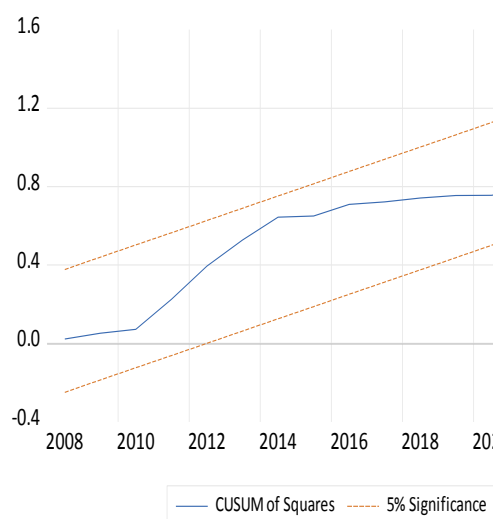
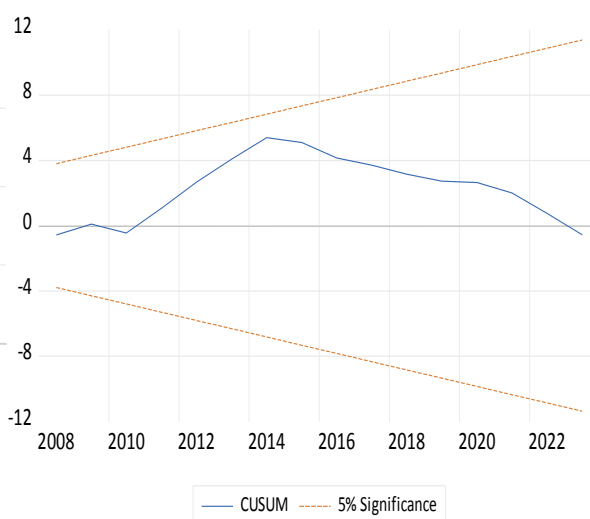


Figure.6. Results of the CUSUM Test



Source: Eviews 9 outputs

The CUSUM and CUSUM-squared curves fall within the bounds of the critical value region, indicating that the model parameters are stable.

Through estimating the statistical model and conducting the necessary diagnostic tests to ensure its validity, we can conclude that the results of the statistical analysis indicate varying effects of e-government indicators on the rationalization of government expenditure in Algeria during the period 2003–2023.

The results of the multiple linear regression revealed that the Telecommunications Infrastructure Index (TII) had a positive and statistically significant impact on final government consumption expenditure, suggesting that strengthening telecommunications infrastructure contributed to enhancing the efficiency of public spending.

In contrast, the Human Capital Index (HCI) showed a statistically significant negative effect on expenditure, implying that increased spending on human capital may place pressure on government finances.

As for the Online Services Index (OSI), it showed no statistically significant effect on government expenditure, indicating that this dimension of e-government did not play a substantial role in improving spending efficiency during the study period.

Overall, the model reflects a moderate impact of e-government indicators on the rationalization of public expenditure, highlighting the need for deeper analysis of other influencing factors to further improve spending efficiency in the future.

4. Conclusion:

The study concluded that e-government plays a significant role in rationalizing government expenditure; however, this role varies depending on its different dimensions. While the telecommunications infrastructure (TII) showed a clear positive impact on expenditure efficiency, the online service index (OSI) had no significant effect. Although human capital (HCI) demonstrated a negative effect on spending, this may reflect a need to improve human resource management in order to strike a balance between enhancing human capabilities and expenditure efficiency. These findings highlight the importance of adopting a comprehensive approach to improving e-government as a means to enhance the efficiency of government spending in Algeria in the coming years.

4.1.Key Findings:

In light of the above, the study reached a set of findings summarized as follows:

- The analysis shows that Algeria has made notable progress in e-government indicators, particularly in telecommunications infrastructure (TII), which witnessed significant growth and contributed to improving the efficiency of public spending. However, certain areas, such as the online service index (OSI), still require further development.
- The ratio of final government consumption expenditure to GDP (DP) experienced fluctuations during the 2003–2023 period, recording its lowest level in 2006 (11.95%) and its highest in 2011 (20.11%), reflecting the impact of economic conditions and government policies during that period.
- The analysis results revealed that the telecommunications infrastructure index (TII) has a positive and statistically significant impact on rationalizing government spending in Algeria during the 2003–2023 period. Accordingly, the first hypothesis — which states that there is a statistically significant positive relationship between TII and government expenditure rationalization — is confirmed.
- The human capital index (HCI) had a statistically significant negative impact on government spending, indicating challenges in managing human capital to achieve expenditure efficiency. Consequently, the second hypothesis — that HCI has a positive effect on government expenditure — is rejected.
- The online service index (OSI) had no significant effect on government expenditure, which may suggest the limited role of this dimension in achieving the desired efficiency. Therefore, the third hypothesis — which posits a significant effect of OSI on government spending rationalization — is also rejected.
- The model reflects the varying impact of e-government indicators on expenditure, explaining 41.9% of the changes in government spending.
- The statistical model used in the study to analyze the impact between the independent variables and the dependent variable is characterized by stability and robustness, and its results can be considered reliable.

4.2. Recommendations:

In light of the conclusions reached, several recommendations can be proposed to help rationalize Algeria's final government consumption expenditure through the development of e-government indicators:

- The need to enhance investment in telecommunications infrastructure due to its significant role in rationalizing and improving government expenditure efficiency.
- Reviewing human capital management policies to achieve a balance between enhancing skills and competencies and rationalizing spending.
- Reevaluating the development of government e-services (OSI) to ensure a greater role in improving public spending efficiency.
- Adopting policies aimed at integrating modern technology into all aspects of government administration to achieve greater transparency and financial efficiency.

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