

Public Investment Expenditures and Future Sustainability in Algeria: An Econometric Analysis Using the ARDL Approach

دور النفقات العمومية للتجهيز في تحقيق الاستدامة المستقبلية في الجزائر دراسة قياسية

باستخدام نموذج ARDL

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Abstract:

This study aims to highlight the role of public investment expenditures in achieving future sustainability in Algeria using the Autoregressive Distributed Lag (ARDL) model for the extended period (1990-2022).

The study found a long-term and short-term equilibrium relationship between the study variables. Additionally, the study demonstrated the positive impact of public investment expenditures in the long term. This can be explained by the fact that the government's continued investment in public investment expenditures positively affects future sustainability in both the long and short term, thereby creating job opportunities

keyword: Sustainability; Sustainable Development; sustainable future; Public Capital Expenditures; ARDL.

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1. Introduction :

In the midst of ongoing economic transformations, developing countries are striving to adopt numerous reforms to achieve development and overcome the challenges facing their economies by organizing and directing collective efforts between individuals and governmental bodies to enhance economic development and create a more stable economic environment. Additionally, they aim to meet the current needs of society while considering the needs of future generations and optimizing the use of available resources

As a result of the global developments in the field of sustainable development, Algeria seeks to achieve sustainability by undertaking various measures that require coordination and mutual cooperation among various stakeholders, including the government, to streamline its expenses. This involves investing in innovation, research and development, enhancing the competitive capabilities of institutions, focusing on continuous training of the human resources, and raising awareness about the importance of catching up with advanced countries. Based on the foregoing, the following problem statement can be formulated:

What is the impact of public expenditure on infrastructure on achieving future sustainability in Algeria?

1.1. Sub-questions:

To address the main problem, the following sub-questions are posed:

- Is there a positive impact of public equipment expenditures on future sustainability?
- Is there an inverse relationship between GDP and future sustainability?

- Is there a long-term impact of public equipment expenditures on future sustainability?

1.2. Significance of the Study:

The significance of the study lies in achieving sustainability in Algeria through improving and rationalizing public equipment expenditures, mitigating the negative impacts of economic activities, amidst rapid global changes, towards establishing a framework that ensures continuity and realization of future development.

1.3. Study Objectives:

This study aims to achieve several objectives, including:

- Providing a comprehensive framework for understanding future sustainability.
- Enhancing and rationalizing public equipment expenditures to achieve future sustainability.
- Government contribution to achieving sustainable development through spending on essential services and supporting economic projects.

2. Study Methodology:

The study adopts a descriptive approach to familiarize with the various theoretical aspects of the study, in addition to the analytical-statistical methodology using standard methods to estimate the impact of public equipment expenditures on future sustainability, relying on the Autoregressive Distributed Lag (ARDL) time series model, using Eviews10 software.

2.1. Previous Studies:

There are several researchers who have addressed the topic of our current study from various perspectives, which we review below:

- **A study by Meki Amaria and Attou Cherif (2018), titled:** "A Standard Study of the Impact of Government Spending on Economic Growth in Algeria during the Period 1970-2015 – A Standard Study Using the Common Integration Method and Error Correction Model". The study aimed to analyze the relationship between equipment expenditures, operating expenditures, tax revenues, and economic growth in Algeria. The study found a negative impact of equipment expenditures on GDP growth. Regarding error correction, it found a positive and significant impact of equipment expenditures and tax revenues, while there was a negative and insignificant impact of operating expenditures.
- **A study by Zakir Nasira, Abdul Rahim Leila, and Abid Ali (2021), titled:** "Implications of Rationalizing Public Expenditures on Improving Labor Market Performance Using the ARDL Model". The study aimed to improve economic performance and thereby support the labor market to create employment opportunities. The study found a positive impact of both expenditures and revenues contrary to what was achieved by the economic growth index and inflation.
- **A study by (Amri Sami, Bey Farid, 2021), titled :** "Sustainable development in Algeria through some indicators for the period 2008-2018," aimed to examine the reality of sustainable development in Algeria by addressing some economic indicators. The study found that Algeria still lags behind in achieving sustainable development goals due to facing numerous challenges.

What distinguishes the current study from previous ones is the role played by public expenditure on infrastructure in achieving future sustainability in Algeria. It's a pioneering study utilizing the Autoregressive Distributed Lag (ARDL) model for the extended period (1990-2022) to measure the extent of Algeria's efforts to activate the role of infrastructure spending as a fundamental pillar in achieving future sustainability, ensuring the fulfillment of the needs of future generations.

2. Literature on future sustainability.

In this section, we will delve into the literature related to the concept of sustainability and methods of achieving it in Algeria:

2-1- Concepts of sustainability.

Given the absence of a globally agreed-upon definition for the term "sustainability" as it is a relatively modern concept in thought, derived from the English term sustainability, it is necessary first to provide a definition for the term sustainability:

Meaning of sustainability: It entails ensuring that consumption does not decrease over time and achieving public benefit. It is also defined as: the continuity of natural resources for present and future generations while preserving their characteristics. (Saidou Ali, 2022, p. 03)

- **Sustainability is defined** as the ability to provide for the needs of future generations at a level equal to or greater than what has been provided for current generations.

- **Sustainability has also been defined** as development that meets the needs and essential requirements of present generations while ensuring the fulfillment of future generations' basic needs. (Ben Taieb, 2020, p. 195)

From the foregoing, a comprehensive definition of sustainability can be provided as ensuring the provision of essential

resources for current generations and meeting their present needs without negatively impacting the ability to provide for the requirements of future generations.

2.1.2 Methods for Achieving Future Sustainability in Algeria.

We will present the main ways to achieve future sustainability in Algeria to ensure improving living standards, increasing employment opportunities, and creating social justice, which we summarize as follows:

- **Enhancing partnership between the public and private sectors, both local and foreign:** This is a fundamental step to boost investment opportunities in essential infrastructure. Such partnerships can pose a challenge for the private sector, creating uncertainty regarding future supply and demand, pricing, and asset-related risks. International pioneering experiences in this field have shown the necessity of establishing initial requirements for the success of these partnerships between the sectors, including:
 - Enacting necessary legislation and laws to ensure transparency and competition, along with conducting feasibility studies to select projects subject to partnership.
 - Establishing institutional frameworks to monitor these types of partnerships and contracts, and providing them with qualified human resources with the necessary technical, financial, and legal expertise to propose these projects to investors.
 - Increasing public awareness of the importance of partnering with the private sector in financing, developing, and operating such projects. (Nawaf, 2024, p. 62)
- **Enhancing the quality of education to promote sustainability:** Government spending on social sectors, particularly education, contributes to achieving sustainable development by aiming to enhance the human capital as a

fundamental factor in production and economic development. Education plays a vital role in improving the efficiency of this factor through the accumulation of human capital. It contributes to the production of knowledge and modern technologies that promote economic development and accelerate the transition to sustainable production and consumption patterns. Education disseminates knowledge and develops individual skills, thereby contributing to changing behavior and values towards establishing standards of sustainable development and achieving a balance between current and future needs. (Mohamed & Mariam , 2018, p. 13)

- **Public expenditure on research and development:** It is one of the important matters that meets public interest needs such as a clean environment. It is an effective means to stimulate innovation and adapt green technology-funded research and development to local contexts, in addition to its importance for transitioning to a green economy. Public sector involvement may also lead to direct substitution of private financing that would have occurred anyway in the absence of public funding. Shifting research and development and science and technology towards innovation can be achieved through collaboration with the private sector, technology transfer networks, and financing startups and venture capital. (Hellssa & Bashar, 2020, p. 04)

3. Theoretical grounding of public procurement expenses :

We will present some theoretical concepts regarding public procurement expenses and their regulations: Definition of procurement expenses: They are those investment-related expenses that result in an increase in gross domestic product (GDP), and consequently, wealth growth. They are referred to by several terms

such as procurement expenses, procurement budget, or investment budget. (Fatima Zahra & Mohammed , 2015, p. 10)

As known, they are expenses associated with major public facilities and works, through which the state aims to accumulate capital for the development of its economy and the construction of its infrastructure. These expenses are allocated according to an annual development plan. (Kamel & Ali , 2021, p. 151)

Therefore, procurement expenses can be defined as expenditure for the purpose of purchasing or restructuring the assets and resources necessary for operating businesses or production. These expenses typically include the purchase of equipment, machinery, raw materials, as well as major projects such as updating infrastructure and technology. The aim is to improve production and service efficiency, thereby achieving profitability and sustainable growth for the organization or the economy.

3.1-Controls of public procurement expenses:

There is a set of controls governing public expenditures that must be observed and not exceeded in order to achieve the planned objectives. Three controls can be addressed: the utility control, the economy control, and finally the authorization control.

Utility control in public procurement expenses: These expenses must aim to achieve the greatest possible benefit, by the state intervening in spending in a specific area to ensure the achievement of the public interest, meaning unjustified spending is avoided.

Economy control in public procurement expenses: This is one of the most important conditions that must be met during spending to avoid extravagance and preserve public funds, in other words, rationalizing expenses, meaning using the minimum expense possible.

Authorization control in public procurement expenses: It means that expenses are subject to authorization from the legislative authority. (Jamila & Abdelkader , 2019, p. 59)

3.2- The practical aspect of the study :

Based on the practical aspect, we will assess the impact of public procurement expenses on achieving future sustainability in Algeria during the period from 1990 to 2022, using the Autoregressive Distributed Lag (ARDL) model. The logarithm was used to linearize the relationship and eliminate measurement errors and problems. Therefore, a series of tests were conducted to confirm the properties of the time series and their compatibility with the adopted model, and then to test their stability, followed by the test of common integration of the boundary test Bound, and in estimating the relationship between the study variables in both the long and short terms.

4. Building the study model:

In order to achieve the aim of the study, we will estimate the relationship between public procurement expenses and achieving sustainability and extract the nature of the relationship using the ARDL model. Therefore, the study model is as follows:

$$LnFCEG = \alpha + \beta_1 LNEIQU_{t-1} + \beta_2 LNPIB_{t-1} + \varepsilon_t$$

Where:

FCEG :Final government development expenditures.

EIQU : Public procurement expenses.

PIB :Gross National Product.

ε_t : Represents the threshold.

4.1- Estimation of time series stability:

For studying any time series, we need to identify certain characteristics distinguishing whether the series is stationary or not. Here, we find several tests to study the nature of the time series of

variables. Based on this, we relied on two key tests, namely the Augmented Dickey-Fuller (ADF) test. The results of the tests indicated the possibility of applying the ARDL model for its ability to study time series with different integration levels $I(0)$ and $I(1)$, where the Augmented Dickey-Fuller test is based on two assumptions:

$$H_0 : 1 \neq \phi_j$$

$$H_1 : |\phi_j| < 1$$

Therefore, the statistical decision is as follows:

- If the $t_t < t_c$ p-value is greater than 5%, we accept the hypothesis: the series is unstable and contains a unit root.
- If the $t_t > t_c$ p-value is less than or equal to 5%, we accept the hypothesis: the series is stable and does not contain a unit root.

Table 1: Augmented Dickey-Fuller (ADF) Unit Root Test

Regressor		Dickey-Fuller (ADF)						Integra
variables		1st Differen ce (None)	1st differen ce (Trend and Intercep t)	st 1 differen ce (Intercep t)	Level (None)	Level (Trend and Intercept)	Level (Interce pt)	
FC EG	Tt	- 1.9527	-3.5628	- 2.9604	- 1,9516	-3,5577	-2.9571	I(1)
	Tc	- 2.3720	-4.6827	- 4.6750	5.9738	-1,3764	-1.6712	
	Pro b	0.0194	0.0038	0.0007	1.0000	0,8487	0.4358	
EQ UI	Tt	- 1.9520	-3.5683	- 2.9604	- 1,9516	-3,5577	-2.9571	I(1)
	Tc	- 4.2946	-5.1352	- 5.0327	2,6508	-1,8277	-2.3469	

	Pro b	0.0001	0.0012	0.0003	0,9972	0,6675	0.1643	
PIB	Tt	- 1.9520	-3.5628	- 2.9604	- 1,9516	-3,5577	-2,957	I(1)
	Tc	- 4.7612	-5.1352	- 5.2366	1,4587	-1,9554	-0.3286	
	Pro b	0.0000	0.0012	0.0002	0,9611	0,6675	0.9097	

Source: Compiled by researchers based on outputs from EViews10 software program.

Based on the results obtained from the table above, it is evident that the series contain a unit root at the level level, indicating their instability. This leads us to accept the null hypothesis (the series is unstable and contains a unit root) and reject the alternative hypothesis (the series is stable and does not contain a unit root) at a significance level of 5%. Furthermore, the results indicate the stability of the series at the first difference level, hence accepting the alternative hypothesis that the series is stable at order I(1) and integrated of the same degree.

4.2- Joint Integration Using Bounds Test:

After confirming the stationarity, we proceed to select the appropriate test for our study, which is represented by the Bound Test for Cointegration. This test utilizes the Autoregressive Distributed Lag (ARDL) model, providing more accurate results especially for small samples, as our study includes a sample of 33 observations.

Table 2: Summary of Bounds Test Results

Null Hypothesis: No levels
F-Bounds Testrelationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	18.8741	10%	2.63	3.35
k	2	5%	3.1	3.87
		2.5%	3.55	4.38
		1%	4.13	5

Source: Outputs from EViews10 software program

Through the results shown in the table above, we notice that the Error Correction Model (ECM) at the first lag $\text{CointEq}(-1)^* = -0.325429$ has a negative and statistically significant value. This explains the presence of a short-term equilibrium relationship, meaning the error correction rate is estimated at 32% in the model, and the error probability value is very small ($\text{Prob}=0.0000$) with statistical significance, indicating the presence of a long-term equilibrium relationship.

Therefore, the results indicate a positive and statistically significant relationship ($\text{Prob}=0.0008$) between the investment growth rate $D(\text{LNEIQU}) = 0.053921$ and the dependent variable (LNFCEG). However, it seems that the rate $D(\text{LNPIB}) = -0.037994$, indicating a weak inverse relationship between Gross Domestic Product and the dependent variable (LNFCEG), and it is not statistically significant ($\text{Prob}=0.2233$), suggesting a lack of confirmed relationship between them.

4.3- Diagnostic Tests to Assess Model Validity:

To ensure the validity of the model, we need to conduct four main diagnostic tests to verify that the model is free from autocorrelation, serial correlation, heteroscedasticity, and that the distribution is normal. Based on these tests, the suitability of the

model used to estimate and measure the estimated parameters in both the long and short terms can be judged, as outlined below:

- Results of Diagnostic Tests

Table 3: Autocorrelation Test of Errors (LM-Stat)

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.0370	Prob. F(2,19)	0.3737
Obs*R-squared	2.9525	Prob. Chi-Square(2)	0.2285

Test Equation:

Dependent Variable: RESID

Method: ARDL

Date: 03/21/24 Time: 03:08

Sample: 1993 2022

Included observations: 30

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNFCEG(-1)	0.0122	0.0549	0.2223	0.8264
LNEIQU	0.0028	0.0198	0.1413	0.8891
LNEIQU(-1)	0.0004	0.0216	0.0187	0.9853
LNEIQU(-2)	-0.0013	0.0180	-0.0761	0.9401
LNPIB	-0.0159	0.0422	-0.3760	0.7111
LNPIB(-1)	0.0081	0.0560	0.1461	0.8853
LNPIB(-2)	-0.0003	0.0514	-0.0059	0.9953
LNPIB(-3)	-0.0022	0.0325	-0.0696	0.9452
C	-0.0706	1.0605	-0.0666	0.9476
RESID(-1)	-0.3552	0.2466	-1.4400	0.1661
RESID(-2)	-0.0789	0.2714	-0.2909	0.7742
R-squared	0.0984	Mean dependent var	-3.5500	
Adjusted R-squared	-0.3760	S.D. dependent var	0.0174	
S.E. of regression	0.0205	Akaike info criterion	-4.6583	
Sum squared resid	0.0080	Schwarz criterion	-4.1445	
Log likelihood	80.874	Hannan-Quinn criter.	-4.4939	
F-statistic	0.2074	Durbin-Watson stat	1.9936	
Prob(F-statistic)	0.9927			

Source: Outputs from EViews10 software program

Table 4: Heteroscedasticity Test

Heteroskedasticity Test: ARCH

F-statistic	0.0190	Prob. F(1,27)	0.8913
Obs*R-squared	0.0204	Prob. Chi-Square(1)	0.8864

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 03/18/24 Time: 00:25

Sample (adjusted): 1994 2022

Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.0003	9.3200	3.3607	0.0023
RESID^2(-1)	-0.0263	0.1906	-0.1379	0.8913
R-squared	0.0007	Mean dependent var		0.0003
Adjusted R-squared	-0.0363	S.D. dependent var		0.0003
S.E. of regression	0.0003	Akaike info criterion		-12.7541
Sum squared resid	4.2800	Schwarz criterion		-12.6598
Log likelihood	186.9355	Hannan-Quinn criter.		-12.7246
F-statistic	0.0190	Durbin-Watson stat		1.8950
Prob(F-statistic)	0.8913			

Source: Outputs from EViews10 software program

Table5: Stationarity Test

Ramsey RESET Test

Equation: UNTITLED

Specification: LNFCEG LNFCEG(-1) LNEIQU LNEIQU(-1)

LNEIQU(-2)

LNPIB LNPIB(-1) LNPIB(-2) LNPIB(-3) C

Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.039077	20	0.3112
F-statistic	1.079680	(1, 20)	0.3112

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.000454	1	0.000454
Restricted SSR	0.008873	21	0.000423
Unrestricted SSR	0.008419	20	0.000421

Unrestricted Test Equation:

Dependent Variable: LNFCEG

Method: ARDL

Date: 03/21/24 Time: 03:05

Sample: 1993 2022

Included observations: 30

Maximum dependent lags: 4 (Automatic selection)

Model selection method: Akaike info criterion (AIC)

Dynamic regressors (4 lags, automatic):

Fixed regressors: C

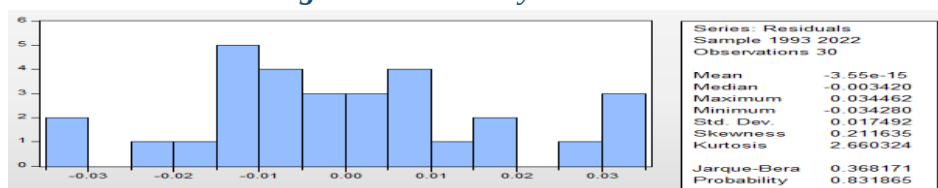
Variable	Coefficien t	Std. Error	t-Statistic	Prob.*
LNFCEG(-1)	-3.3030	3.8284	-0.8627	0.3985
LNEIQU	-0.2532	0.2962	-0.8548	0.4028
LNEIQU(-1)	0.0504	0.0616	0.8180	0.4230
LNEIQU(-2)	-0.3185	0.3716	-0.8570	0.4015
LNPIB	0.1986	0.2307	0.8611	0.3994
LNPIB(-1)	0.0284	0.0586	0.4854	0.6326
LNPIB(-2)	0.3374	0.3942	0.8559	0.4021
LNPIB(-3)	-0.3880	0.4472	-0.8677	0.3958
C	39.3278	31.600	1.2445	0.2277
FITTED^2	0.1218	0.1172	1.0390	0.3112

R-squared	0.9972	Mean dependent var	23.9801
Adjusted R-squared	0.9959	S.D. dependent var	0.3223
S.E. of regression	0.02051	Akaike info criterion	-4.6739
Sum squared resid	0.0084	Schwarz criterion	-4.2068
Log likelihood	80.1094	Hannan-Quinn criter.	-4.5245
F-statistic	793.0189	Durbin-Watson stat	2.4629
Prob(F-statistic)	0.0000		

*Note: p-values and any subsequent tests do not account for model selection.

Source: Outputs from EViews10 software program

Figure 1: Normality Test



Source: Outputs from EViews10 software program

From the Autocorrelation test, conducted via the Godfrey-Breusch (BG) test known as the LM-Stat, it is observed from the table that the statistical probability LM-Stat = 0.2285 is greater than 5%, thus accepting the null hypothesis, indicating that the model is free from autocorrelation.

Regarding the Heteroskedasticity Test, the statistical probability Obs*R-squared = 0.8864 is greater than 5%, thus accepting the null hypothesis, indicating the absence of heteroskedasticity. The presence of this correlation would inflate the error magnitude, raising doubts about the model's accuracy.

Regarding the Normality Test, conducted to ensure the model follows a normal distribution, the Jarque-Bera test statistic (JB) = 0.368171 and the statistical probability (Probability) = 0.8318 are both greater than 5%, indicating non-significance and

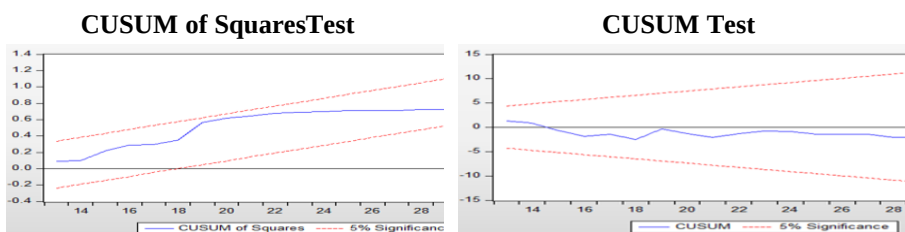
accepting the null hypothesis that the residuals follow a normal distribution.

As for the Ramsey RESET Test, it indicates no model misspecification issue or equation validity problem, with a non-significant probability value (Prob) = 0.3112. Thus, there's no model misspecification issue present.

Finally, the Structural Stability Test of the model is conducted through the CUSUM Test, which assesses the cumulative sum of residuals behavior, and the CUSUM of Squares Test, which examines the cumulative sum of squared residuals. These tests are proposed to detect any structural changes in the model. (Brown, Durbin, & Evans, 1975, pp. 149-192) It is essential to verify that the model is stable. Thus, the statistical probability F-statistic = 0.3112 is greater than 5%, indicating the acceptance of the null hypothesis, which suggests the model's stability.

This can also be confirmed through the Structural Stability Test, as illustrated in the following figure:

Figure 2: Results of the Structural Stability Test (CUSUM Test and CUSUM of Squares Test)



Source: Outputs from EViews10 software program

It is evident from Figure (III,01) that the graph lies within the bounds, indicating the stability of the study model throughout the study period.

Estimation of the Autoregressive Distributed Lag (ARDL) equation:

$$LNFCEG = (0.3427 * LNEIQU - 0.1208 * LNPIB + 20.0080)$$

4.4- Discussion of Model Estimation:

The results have demonstrated significant coefficients, indicating:

- There is a positive impact of public investment expenditures in the long run, where its coefficient is estimated at 0.3427. Thus, a 1% increase in investment expenditures contributes to a sustainable development increase of 0.3427%. This increase signifies that the Algerian government's continued spending on public investments positively influences sustainable development in the long term, thereby fostering job creation.
- National Gross Domestic Product (GDP) has a negative impact on achieving sustainable development, with a coefficient of (0.1208-). This indicates that a 1% increase in GDP leads to a decrease in sustainable development by (0.1208-)%%. The reason might be attributed to the government's lack of emphasis on engaging the private sector in supporting sustainable development and the delayed focus on renewable energies, which emerged in 2014 with the economic diversification plan. Additionally, unsustainable growth leads to the disproportionate depletion of natural resources, negatively affecting future sustainability. Therefore, it is imperative for the

government to strike a balance in economic growth to ensure long-term sustainable development.

5. Summary:

Algeria, like many other countries, aims to achieve sustainable growth, considering various social, legal, and economic aspects. This is achieved through strategies focusing on environmental resource management, sustainable development, investment in education and training, and improving government spending to raise income levels and enhance living standards. Developing skilled workforce supports innovation and sustainable development. Additionally, enhancing public-private partnerships plays a vital role in infrastructure investment, requiring transparent legislation and laws promoting fair competition and contract reliability. Sovereign wealth funds directing funding towards green projects positively contribute to addressing environmental challenges by providing substantial financial resources, supporting projects contributing to sustainable development. The study's key findings include:

- Time series stability tests, employing the Dickey-Fuller test, showed series stability at the first difference.
- The study confirmed a positive long-term impact of public investment expenditures, with a coefficient of 0.3427. A 1% increase in public investment contributes to a 0.3427% rise in sustainable development, affirming the hypothesis that "there is a positive impact of public investment expenditures on future sustainability.
- National GDP negatively impacts sustainable development, with a coefficient of (0.1208-). A 1% increase in GDP results in

a (0.1208-)% decrease in sustainable development, highlighting the need for the government to balance economic growth for long-term sustainable development.

- This confirms the hypothesis that "there is an inverse relationship between GDP and future sustainability."
- Bounds Test results in the long run showed cointegration between study variables, indicating a long-term equilibrium relationship between public investment expenditures and future sustainability.
- Error Correction Model (ECM) results demonstrated a negative error correction term, $\text{CointEq}(-1)^* = -0.3254$, with statistical significance ($\text{Prob} = 0.0000$), confirming a long-term relationship between public investment expenditures and future sustainability.
- Short-term ECM results indicated a significant positive relationship ($\text{Prob} = 0.0008$) between investment growth rate and the dependent variable, while the coefficient for GDP was not statistically significant ($\text{Prob} = 0.2233$), suggesting no confirmed relationship between them.

Recommendations:

Based on the presentation and analysis of the results, the following key recommendations can be drawn:

- There is a need to continue issuing comprehensive laws and regulations to encourage investments, with a focus on increasing investments in renewable energy and environmental protection.
- Efforts should be made to enhance public-private partnerships to finance investment projects.

- There is a necessity to increase spending on education, research, and development alongside improving their quality and enhancing individual skills.
- Support for research and development in green technology is crucial to create new opportunities for innovation and develop sustainable solutions to the challenges facing Algeria.
- Developing the skills of the workforce is essential to ensure the availability of necessary competencies to lead the transition to a sustainable economy.
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