ACHIEVING SUSTAINABLE DEVELOPMENT IN EGYPT: DOES PUBLIC INVESTMENT MATTER?

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ABSTRACT

The global transition to the Sustainable Development Goals (SDGs) has stimulated a holistic role of development planning to formulate national strategies and meet the global goals by 2030. Massive investment – particularly public investment – has crucially been regarded as a fundamental planning tool that reflects the strategies' priorities. In addition, this transition was conducive to expanding the usage of the indicators criterion to measure development: adjusted net saving (ANS) is regarded as a composite index to measure the degree of sustainable development (SD) of a country. Accordingly, as an ex-post evaluation, this work aims to empirically examine the role of allocated public investment, in different sectors, as explanatory variables in promoting the SD in Egypt throughout the period 1990–2019. In doing so, the autoregressive distributed lag model (ARDL) has been applied to test the co-integration relationship between SD and public investment. The research further employs the error correction model (ECM) to explore the short-run relationship. The empirical results revealed that while public investment in goods and social services sectors stimulated SD, it was not so for the transportation and storage sector. The short-run result ensures the same findings. Having this finding means that public investment in the transportation sector is not a supportive channel for SD achievement. Building on the empirical results, this research recommends re-allocating public investment in favour of the human capital and industrial sectors, considering them good channels to enhance the sustainability conditions in Egypt. Moreover, adopting a sustainable transportation strategy, considering clean and green energy, is a proactive measure to mitigate the side effect of the transportation projects. These findings shed light on the vital role that directing public investment toward specific channels can make in promoting the SD of a country.

Keywords: sustainable development, public investment, Egypt, planning, autoregressive distributed lag model (ARDL).

1 INTRODUCTION

In September 2015, 17 key objectives, 169 sub-goals and 229 linked indicators have been formed to address the well-being of individuals and communities. Countries worldwide have correspondingly committed to meeting the global goals by 2030: Sustainable development strategies (SDS) have been designed to support the transition to the new Agenda. By this shift, the level of development is no longer shorthanded to only one indicator such as the income level and, therefore, the usage of the indicators approach has been expanded to measure the achievement of the SDGs [1]–[3]. In this context, adjusted net saving (ANS) is regarded as an important indicator to measure the degree of the sustainable development (SD) of a country [4]. As a composite index, it has been recently tackled as a new lens on development, providing a more accurate measure of the SD through the information it gives on the environment and natural resources, besides the socio-economic front. What is more, it ensures that economic growth is on a sustainable path. ANS further measures the extent to which savings and investment rates of a country compensate for a resource depletion of physical and natural capital and pollution damages. Most importantly, it has been regarded as an adequate indicator regarding the national planning process, addressing the sustainability of the investment policies of a country. Thus, it helps policymakers take premature actions about correcting the country's path on sustainability [5]–[9].

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On the other side, to bring about economic, social, and environmental goals together, the role of development planning has become a must to allow countries to design and implement their SDS and the resultant plans. Enhancing this role can help governments adequately craft interventions that guarantee inclusive and SD [10]–[13]. Efficient investment allocation has been regarded as a pivotal channel in bringing about the structural transformation required for the SD [14]. Public investment, in particular, has been further regarded as a policy tool to promote sustainable and inclusive growth, eradicate poverty, and mitigate climate change. Besides, it has a potential role in overcoming the cyclical crises as a direct result of creating jobs and growth [15]. Importantly, prioritizing this public investment is required, as a prerequisite, to delivering these ambitious impacts [16].

Thus, the national strategy: Egypt Vision 2030 was launched in 2016 to deliver the SDGs by 2030 [17]. Accordingly, investment has almost doubled between the financial year (FY) 2015/2016 and 2020/2021, expanding by about 94%. Public-led massive investment has been specifically adopted to enhance balanced development and ensure the inclusiveness of all the society segments. It is notable from the data available that public investment has a rising trend during the same period with an average of about 54.7%, recording 73.7% in 2020/2021 compared with 42% in 2015/2016, as a percentage of the total investment. This rise was rooted mainly in the investment in electricity, transportation and storage, healthcare and education services, and non-extractive industrial sectors, which recorded on average 17.04%, 15.28%, 7.39%, and 6.7% respectively of the public investment, accounting for about 46.4%, during the period [18], [19].

Despite this, Egypt still struggles to ensure that “No One Leaving Behind”; all of the SDGs are confronting challenges as classified and reported by the UN (Fig. 1).

Figure 1: SDG challenges classification in Egypt [20].

2 LITERATURE REVIEW

Theoretically, a clear conception of planning phases offers different evaluation types and methods. The ex-post facto evaluation explores the linkages between plans and actual outcomes. Thereby, plans success and failures are traced to the degree to which actual outcomes conform to the plan goals and show the extent to which implementation instruments supported these goals [21]–[23]. Attention has been recently paid to distinguishing between evaluation outputs and outcomes [21], [23], [24]. As Laurian et al. [21] investigated, planning agencies and planners do not frequently provide sufficient effort to evaluate the outcomes, which could be noticed in the combined effects resulting from the planning system and other influences [25] or in the direct consequence of the planning results [26].

Empirically, Table 1 summarises the literature reviewed on the role of public investment in achieving development goals as evolved over time by classifying it according to different areas of impact: growth rates, economic structure, poverty and inequality, or achieving together the socio-economic goals (Table 1). Increasingly, sustainability-oriented planning has been regarded as providing a suitable basis for analysing and evaluating development planning through exploring the impacts, expected or actual, of different alternative scenarios: ultimately, which policies or investment allocations could be brought together into one package to capitalize on the co-benefits and avoid counterproductive results. System Dynamics can tackle these issues [27], [28]. The T21 model has been designed and evolved over two decades to help countries manage their planning process to meet the MDGs. The Integrated Model for Sustainable Development Goals strategies (iSDG) has been further formulated to cover all the 17 goals, including their indicators [29]. In spite of the multiple functions the model can provide, the study could not employ it because it should be customized firstly to the country as a prerequisite condition to be applied: the process which has not yet been made in Egypt so far. Finally, ANS has been extensively used to explore the determinants of the SD of a country.

Table 1: The role of planning in achieving development (literature review).

Focus of analysis	**Literature**
Explore the impact on economic growth and economic structure	[30]–[33]
Explore the impact on poverty and inequality	[34]–[37]
Explore the impact on the socio-economic goals	[38]
Analysing the process of the SD using system dynamics	[39]–[41]
Explore the determinants of the SD using ANS	[6], [13], [42], [43]

Watanabe [38] used a linear model in an earlier research applied to the Japanese economy (1949–1970). The finding showed that national planning only succeeded in assisting rapid growth, which was found to be crucial for development. To test the impact of public investment on economic growth in nine Latin American countries, Ramirez and Nazmi [31] used panel data regression for the period 1983–1993 and concluded that public and private investments are important to growth. The private capital formation and long-term growth, in particular, have been significantly and statistically affected by education and healthcare public investment.

In a more recent study applied to the Egyptian case, using a multi-level approach, Fan et al. [34] showed that Egypt's public expenditure is statistically significant and has positively impacted growth and equity. More specifically, the long-run investments – in education, R&D, infrastructure and other social spending – are vital channels for economic growth and equity goals. Additionally, prioritizing public spending can potentially contribute to growth and poverty reduction.

In exploring the impact of development planning on Indian economic structure during 1950–2010, Saikia [32] used the Engle–Granger cointegration test to determine the relative interrelationship between planning proxied by government plan expenditure and economic development proxied by GDP. A close relationship between this expenditure and GDP has been investigated. In addition, while plan expenditure increases lead to rising in the GDP, in reverse, the GDP rise leads to a reduction in the plan expenditure. In a similar place, Muritala and Taiwo [33] found a positive relationship between the real GDP and government spending in Nigeria, using OLS estimation during 1970–2008. Hooper et al. [36] used panel data technique at the US state-level throughout 1950–2010 to capture the differential effects of infrastructure spending on inequality through examining the empirical relationship between the long-term investment in infrastructure and inequality. A causal effect and negative

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correlation were found between higher education and highway spending growth to the Gini index through better access to job and education opportunities. More specifically, highway expenditure was effective in reducing inequality. Importantly, economic planning effects on the process of the SD have been estimated [37] and applied to Nigeria from 1986 to 2017. The specific goal was to explore how the planned public investment affects poverty levels and inequality. To this end, the study used co-integrating regression to conclude that planned investment in the economic services has significantly and positively impacted the poverty rate and Gini index. On the contrary, planned investment in community and social services has significantly and negatively affected the poverty rate and the Gini index.

As for applying the System Dynamics technique, Pedercini and Barney [39] applied the model to Ghana and found that increasing public investment is crucial to boosting employment and production and increasing per capita income. In Hidayatno et al. [40], the interrelationships between the three pillars of sustainability have been explored in Jakarta. Results showed that the increase in service production has the highest impact on the rapid economic development and growth, followed by the industrial production. Regarding the SD indicators assessment in Nepal, Gautam [41] explored alternative scenarios about environmental balance, sustainability, quality of life, access to the market, environmental degradation and human well-being. The initial simulation output shows that quality of life expands exponentially after 20 years in the modelling period.

To explore the determinants of the SD using ANS, Pardi et al. [6] employed the Johansen test and VECM between 1971 and 2011 in Malaysia. The empirical results showed long-run and short-run relationships between the selected independent variables with the ANS. Similarly, Kaimuri and Kosimbei [42] applied ARDL to test the long-run and short-run relationships between SD and the variables that were expected to impact the SD in Kenya during 1991–2014. The estimation showed that household per capita consumption, unemployment and energy efficiency negatively affected the SD. In a similar vein Pardi [43], exports of manufactured goods and natural resources were found to be the most significant determinants for the SD. Furthermore, Koirala and Pradhan [44], in their research, applied to twelve Asian countries during the period 1990–2014, concluded that while GDP per capita and financial development positively affect SD, inflation and natural resources rent negatively affect SD.

Building on reviewing this literature, this research is considered an ex-post-facto and a kind of evaluation outcome for the role of public investment, as a national planning policy, in achieving SD in Egypt. In addition, it could be noticed that the impact of public investment on achieving SD using ANS that addresses the SD as a multifaceted connotation has not been addressed in the previous literature, which creates the research gap that the study aims to bridge. Bridging this gap will add to the literature on the role of development planning in achieving SD in Egypt.

3 QUESTIONS, HYPOTHESES AND OBJECTIVES

The ultimate purpose of the study is to explore the extent to which public investment in Egypt has been conducive to promoting SD and identify whether or not the current channels for this investment are appropriate to deliver on Egypt's ambitious development. Thus, the study seeks to answer the following two questions: Does public investment have an impact on the SD in Egypt? Are the current channels of this investment appropriate for delivering on Egypt's ambitious development? Therefore, the study ***aims to*** empirically examine public investment in goods, productive, and social sectors influence on SD over the period 1990–2019, which has never previously been applied to the Egyptian case. The study, therefore, tests a key ***hypothesis***: there is a significant long-run relationship between SD, proxied by

ANS, as a dependent variable, and the allocated public investment in the dominated sectors, as explanatory variables, in Egypt during the period 1990–2019.

4 METHOD

In order to test the study's hypothesis and answer the previously mentioned questions, the ARDL will be employed. In contrast to previous co-integration models, such as Johansen and Engle–Granger, ARDL tests the relationship between time series of different orders (0 or/and 1). The model could further interpret the long and short-run relationships, yielding precise results, particularly with short time series [45]–[46]. Since the ARDL technique shifts from a general to a specific approach, it can tackle several econometric problems that could not be avoided using the traditional co-integration approach (i.e. serial correlation and endogeneity) [47]. According to Engle and Granger [48], and Charemza and Deadman [49], the existence of an error correction mechanism (ECM) requires the time series to be co-integrated. The research proposes the following estimation model:

$$\Delta sd_t = \alpha_0 + \alpha_1 sd_{t-1} + \alpha_2 elc_{t-1} + \alpha_3 ind_{t-1} + \alpha_4 tra_{t-1} + \alpha_5 ss_{t-1} + \sum_{j=1}^{p} \gamma_1 \ \Delta sd_{t-1} + \sum_{j=1}^{k_1} \gamma_2 \ \Delta elc_{t-j} + \sum_{j=1}^{k_2} \gamma_3 \ \Delta ind_{t-j} + \sum_{j=1}^{k_3} \gamma_4 \ \Delta tra_{t-j} + \sum_{j=1}^{k_4} \gamma_5 \ \Delta ss_{t-j} + \varepsilon_t. \quad (1)$$

This is where the dependent variable (SD) denotes sustainable development proxied by ANS (% of GNI). The explanatory variables expected to have an influence on SD in Egypt for the period 1990–2019 are carefully selected in light of the availability of public investment data to bridge the existing gap in the literature. (elc) denotes public investments in the electricity sector (% of GDP). (ind) and (tra) denote public investments in the industry sector and transportation and storage sectors, respectively, at constant prices, in million local currency. (SS) denotes public investments in the healthcare and education sectors (% of total public investments). $\boldsymbol{p}$ indicates the number of lagged periods for the regressand. ($\boldsymbol{k_1}$– $\boldsymbol{k_4}$) denote the number of lagged periods for the regressors. $\boldsymbol{\alpha_s}, \boldsymbol{\gamma_s}$ denote the long-run and short-run coefficients, respectively.

The data for public investments and GDP obtained from the Ministry of Planning and Economic Development [19], [50], has been deflated by the GDP deflator obtained from World Bank [51]. ANS data was obtained from the World Bank [51]. The logarithm has been applied to the data of ind and tra variables to ensure the normal distribution of these data. In this respect, using the logarithm achieving a lot of benefits, of which reducing the impact of big values [52].

4.1 Preliminary steps

Since ensuring the normal distribution of data is a pre-requisite before running the estimation. Table 2 shows that the probability values of Jarque–Bera statistic for all variables are more than the 5% significance level, supporting the statistically use of the data.

After verifying the normal distribution of data, the paper seeks to test the stationarity of time series as a prerequisite before using the ARDL model. For this purpose, the study employed the augmented Dickey–Fuller (ADF) test to verify that all variables are integrated of order [I(0) or I(1) or I(0 and 1)]. As indicated in Table 3, the time series for the variables elc and tra are integrated of order zero [I(0)], since the critical values are less than the absolute values of the calculated values of the ADF test at the 5% significance level, supporting the rejection of the null hypothesis that the time series have a unit root. Meanwhile, at the same

Table 2: Descriptive statistics. *(Source: Eviews 12 Output.)*

	Mean	Median	Max.	Mini.	Std. Dev.	Skew.	Kurtosis	Jarque–Bera	Prob.
SD	7.8148	7.3081	19.7526	1.3467	4.5655	0.9701	3.7212	5.3564	0.0686
ELC	1.6216	1.4126	3.2400	0.5966	0.8343	0.7749	2.3537	3.5247	0.1716
IND	9.5076	9.4984	10.6159	8.5090	0.6079	0.1590	2.2320	0.8636	0.6493
TRA	10.5434	10.5357	11.0211	9.9811	0.2585	–0.0075	2.6709	0.1356	0.9344
SS	10.0054	8.90201	14.8201	5.8987	2.8052	0.2874	1.8200	2.1536	0.3406

significance level, the other three time series (sd, ind, and ss) are not stationary, as their critical values are greater than the absolute values of the calculated ADF test values. As a result, we cannot reject the null hypothesis of the existence of a unit root. However, after taking the firs difference, these time series became stationary or integrated of the first order I(1), where the critical values at the 1% and 5% significance levels are less than the absolute values of the calculated ADF test values. Consequently, we can reject the null hypothesis at the first difference and therefore run the ARDL model to test the long-run relationship between the variables.

Table 3: The results of ADF test. *(Source: Eviews 12 Output.)*

Variables	I (0)		I (1)		Sig. level
	Calculated values of ADF test	P-value	Calculated values of ADF test	P-value	
sd	–2.8546	0.0641	–5.3743	0.0002	1%
elc	–3.3247	0.0232	–	–	5%
ind	–2.9260	0.0550	–4.2084	0.0028	1%
tra	–3.6167	0.0119	–	–	5%
ss	–1.4915	0.5231	–3.0468	0.0453	5%

4.2 Testing the long-run relationship using the ARDL

In this section, the study employs the co-integration approach “ARDL and ECM” to analyse the SD function. The paper can do so using the following three steps.

The first step considers the determination of the optimal lag length. As shown in Table 4, the optimal lag is one period.

Table 4: Determining the optimal lag length. *(Source: Eviews 12 Output.)*

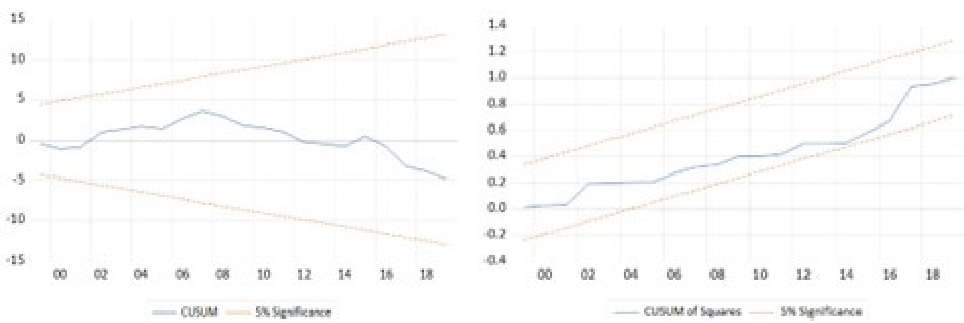
Lag	LR	FPE	AIC	SC	HQ
0	NA	0.273349	12.89223	13.13012	12.96495
1	128.7863*	0.004836*	8.824019	10.25138*	9.260377*
2	33.02435	0.004996	8.667124*	11.28395	9.467115

The second step aims at using the bounds test to verify whether the long-run relationship between variables exists or not. Pesaran et al. [45] identified three distinct cases by comparing the calculated value of the F-statistic with the critical upper and lower bounds at the 5% significance level. (a) If the calculated value of the F-statistic is higher than the critical upper bound, we can reject the null hypothesis of no long-run relationship. (b) If the calculated value of the F-statistic is less than the critical lower bound, we cannot reject the null hypothesis. (c) If the calculated value of the F-statistic falls between the critical lower and upper bounds, we cannot reject or accept the null hypothesis. As stated in Table 5, F-tests seem robust since the calculated value of the F-statistic is 4.76 and exceeds the critical upper bound at significance levels. Consequently, we can reject the null hypothesis (H0: α 1 = α 2 = α 3 = α 4 = α 5 = 0) of no long-run relationship and alternatively accept the alternative hypothesis of the existence of a long-run relationship (H1: α 1 $\neq$ α 2 $\neq$ α 3 $\neq$ α 4 $\neq$ α 5 $\neq$ 0).

Table 5: Bounds test results. *(Source: Eviews 12 Output.)*

The F statistic value	Critical bounds values (restricted constant and no trend)		
	Significance	I(0)	I(1)
4.76	1%	3.29	4.37
	5%	2.56	3.49
	10%	2.2	3.09

The third step seeks to test the model stability over the sample period. In order to do so, the paper uses the two tests "CUSUM and CUSUM of Squares" suggested by Pesaran and Shin [53], [54]. Fig. 2 shows that the cumulative sum and the cumulative of squares values remained between the critical bounds at the significance level of 5%. This result suggests that the models' estimated coefficients are stable over time, and the residual variance is as well.



(a) (b)

Figure 2: Plots of CUSUM and CUSUM of squares. *(Source: Eviews 12 Output.)*

4.3 Long-run estimation results

As shown in Table 6, R^2 is 0.87, revealing that the model explains 87% variation in SD in Egypt. Besides, the probability of the F-statistic is 0.000000, supporting the statistical significance of the ARDL results.

As shown in Table 7, shows that ind, elc, tra, and ss are statistically significant. While the coefficients of ind, elc, and ss are positive, implying that the SD in Egypt is positively affected by public investments in the industry (ind), electricity (elc), and education and health (ss) sectors. The coefficient of tra is negative, indicating that the public investments in transportation and storage have a negative impact on the SD in Egypt.

Table 6: Long-run estimations. *(Source: Eviews 12 Output.)*

Variable	Coefficient	Std. error	t-Statistic	Prob.
SD(–1)	0.3316	0.1393	2.3797	0.0269
IND	0.9016	1.0217	0.8824	0.3875
IND (–1)	2.1958	1.1189	1.9624	0.0631
ELC	2.2624	0.7511	3.0120	0.0066
TRA	–7.5583	2.4835	–3.0433	0.0062
TRA (–1)	3.0064	2.1510	1.3976	0.1768
SS	0.5495	0.1876	2.9279	0.0080
C	14.6479	17.5915	0.8326	0.4144
R^2	0.8737	Mean dependent var		7.6977
Adjusted R^2	0.8316	SD dependent var		4.6002
S. E. of regression	1.8874	Akaike info criterion		4.3372
Sum squared resid	74.8104	Schwarz criterion		4.7144
Log likelihood	–54.8903	Hannan–Quinn criteria		4.4553
F-statistic	20.7620	Durbin–Watson stat		1.4339
Prob (F-statistic)	0.000000			

Table 7: Long-run estimations. *(Source: Eviews 12 Output.)*

Variables	Coefficient	Standard error	t-statistic	p-value
IND	4.6347	1.4054	3.2978	0.0034
ELC	3.3853	0.8483	3.9902	0.0007
TRA	–6.8110	2.8545	–2.3860	0.0265
SS	0.8223	0.2181	3.7702	0.0011

4.4 Short-run estimation results

Considering testing the short-run relationship between the economic planning, proxied by public investments in dominated sectors, and sustainable development in Egypt for the period (1990–2019), the paper used the Error Correction Model (ECM). As stated in Table 8, the error correction term (ECT) is significant with a coefficient of –0.66 which implies that 66% of the imbalances of sustainable development in Egypt in one year will be adjusted in the next year. Besides, the variable tra is significant with a negative coefficient which implies that the public investment in the transportation and storage sectors discourages sustainable development in Egypt in the short-run. Furthermore, the results show that R^2 is 0.60, indicating that the model explains 60% variation in sustainable development in Egypt in the short-run.

4.5 Long-run and short-run elasticities

As shown in Table 9, in the long-run, elc, ind, and ss have a positive impact on SD. Increasing public investment in the electricity sector (elc), industry sector (ind), and social services sectors “health and education” (ss) by 1%, for each, lead to an increase in sustainable

Table 8: Short-run results. *(Source: Eviews 12 Output.)*

Variable	Coefficient	Std. error	t-statistic	Prob.
D(IND)	0.9016	0.7833	1.1509	0.2627
D(TRA)	–7.5583	1.8596	–4.0644	0.0006
ECT(–1)	–0.6683	0.1123	–5.9479	0.0000
R^2	0.6005	Mean dependent var		–0.2134
Adjusted R^2	0.5698	SD dependent var		2.5863
SE of regression	1.6962	Akaike info criterion		3.9924
Sum squared resid	74.8104	Schwarz criterion		4.1338
Log likelihood	–54.8903	Hannan–Quinn criteria		4.0367
Durbin–Watson stat	1.4339			

development (SD) in Egypt by 3.38%, 1.34% and 0.822%, respectively. Meanwhile, tra has a greater and negative impact on SD; as an increase of 1% in the public investments in the transportation and storage sectors (tra), led to a decrease in SD in Egypt by 11.309 percentage points. In the short-run, only the public investments in the transportation and storage sectors (tra) have a negative impact on SD in Egypt.

Table 9: Long-run and short-run impact coefficients. *(Source: Author's calculations based on Table 8 and Table 7.)*

Variables	Long-run elasticities	Variables	Short-run elasticities
IND	= –(0.9016/–0.6683) = 1.349	D(TRA)	-7.558
ELC	= –(2.2624/–0.6683) = 3.385		
TRA	= –(–7.5583/–0.6683) = –11.309		
SS	= –(0.5495/–0.6683) = 0.822		

4.6 Assessing model quality and stability

As indicated in Table 10, the F-statistic's probability value of the Breusch–Godfrey (LM) test is insignificant at all levels of significance. Hence, we cannot reject the null hypothesis of no serial correlation between the estimated models' residuals. Besides that, the F-statistic's probability of the Breusch–Pagan–Godfrey test for heteroscedasticity is insignificant at all levels of significance. As a result, we cannot reject the null hypothesis of homoscedasticity of the estimated model residuals.

Table 10: Testing serial correlation and heteroskedasticity. *(Source: Eviews 12 Output.)*

Breusch–Godfrey (LM Test)	F statistic	1.5987	Prob.	0.2206
	Obs* R^2	2.1466	Prob.	0.1429
Breusch–Pagan–Godfrey	F statistic	0.2391	Prob.	0.9703
	Obs* R^2	2.1413	Prob.	0.9516

According to Fig. 3, the Jarque–Bera statistic is 1.004 with a probability of 0.60, indicating the insignificance at the 1%, 5%, and 10% significance levels, supporting the acceptance of the null hypothesis. Thus, the residuals are normally distributed.

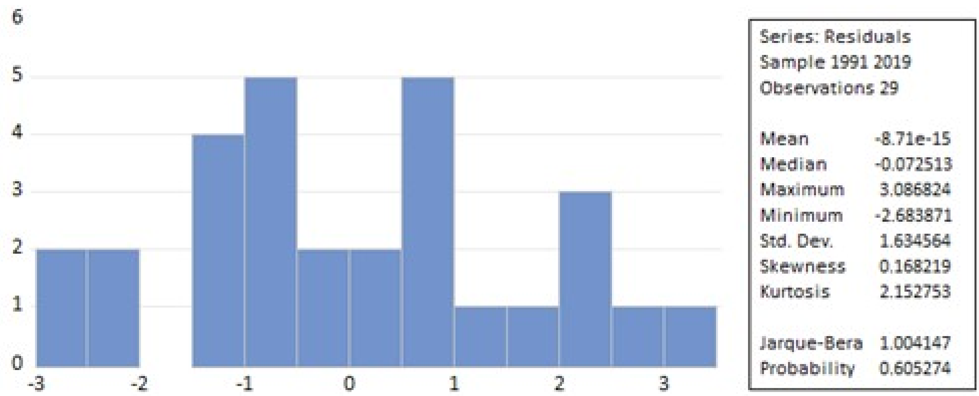


Figure 3: Jarque–Bera test for normal distribution of the residuals. *(Source: Eviews 12 Output.)*

5 CONCLUSION

This work addressed the literature gap by testing the long-run and short-run relationships between SD, as a dependent variable, and the public investments in the dominated sectors, as explanatory variables in Egypt during the period 1990–2019. The long-run results showed that while public investment in goods sectors "electricity and industry" and social services sectors "healthcare and education services" positively affected SD. On the contrary, SD has been negatively affected by public investment in productive sectors "transportation and storage sector". Furthermore, the short-run estimation showed that the public investment in the transportation and storage sector had a negative impact on SD. These results are consistent with the short-run and long-run elasticities; where public investment in transportation and storage sectors had a negative impact on SD in both the long-run and short-run, exceeding those positive impacts of electricity, industry, and healthcare and education services. These results shed light on the crucial role the public investments in goods and social services sectors can play in achieving SD in Egypt.

In this context, it is crucial to say that despite the fact that the Egyptian public investment allocated in the transportation sector (tra) is comparatively high; accounting on average for about 15.3% of total public investment during the period FY 2015/2016–FY 2020/2021 [19], [20]. The empirical results showed a negative impact of investment in this sector on the SD, which means that allocated investment in this sector undermines the achievement of the SD. This result might be explained by the fact that most of these projects do not rely heavily on green energy, and thereby negatively affect the environmental aspect. This result supports existing literature: where ecological destruction, CO2 emissions and climate change have been regarded as negatively affecting the three pillars of sustainability [55], [56].

On the other side, education has been regarded as a pivotal channel in improving social justice, alleviating poverty [57], enhancing health [58], and environmental conditions, and bringing about sustained growth [59]. In addition, the industry is extensively tackled as the main driver for prosperity and wellbeing [60]. Importantly, it positively impacts the three aspects of sustainable development [61].

According to this, the research recommends reallocating public investment in favour of the human capital and industrial sectors: considering them good channels to enhance the sustainability conditions in Egypt and could further help the Egyptian government implement the second phase of the "Reform Programme", which aims to promote the country's competitiveness.

Finally, the research recommends adopting a sustainable transportation strategy, considering clean and green energy, as a proactive measure to mitigate the side effect of the transportation projects and positively contribute to delivering the SDGs in Egypt.

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