

## VISION 2030 AND THE FUTURE OF AGRICULTURAL INVESTMENT IN EGYPT

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### ABSTRACT

This research analyzed the development, efficiency, and determinants of national and agricultural investment in Egypt over the period from 2005 to 2023. It focused on examining trends in public and private national investment, the contribution of agricultural investment to the national economy, and the key factors that influenced both the volume and efficiency of agricultural investment. The primary goals were to identify investment growth patterns, assess agricultural investment efficiency in terms of capital intensity and returns, and evaluate how various economic and agricultural variables affected investment levels. The study employed descriptive statistics to analyze investment trends over time and utilized regression analysis, including linear, multiple, and double-logarithmic models, to determine the factors that drove agricultural investment volume. The analysis was based on time-series data from official Egyptian economic sources covering 19 years (2005–2023). Key performance indicators such as the agricultural investment rate, return on investment, localization coefficient, and capital intensification factor were calculated to evaluate investment efficiency. Results indicated a strong and consistent growth trend in national investment, with total national investment increasing annually by approximately 12.5%. Public national investment grew at an average rate of 14.9% per year, while agricultural investment showed a robust average annual growth rate of 16.23%. Although agricultural investment's contribution to GDP remained modest, it steadily increased, highlighting the sector's growing economic importance. Regarding efficiency, agricultural investment demonstrated moderate profitability, with returns generally above one. However, the sector remained capital-intensive, as evidenced by capital intensification factors exceeding unity. The localization coefficient below one suggested spatial efficiency in investment distribution. A slight decline in returns over time pointed to potential challenges in project selection or economic conditions. Regression results revealed that agricultural labor, loans, and net agricultural income significantly and positively influenced investment levels. This study contributes to the literature by providing empirical evidence on the performance and constraints of agricultural investment in Egypt, offering policy insights to enhance investment efficiency and align agricultural growth with the goals of Vision 2030.

**Keywords:** Vision 2030, Agricultural Development, National Investment, Investment Efficiency, Agricultural Sector, Egypt.

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### INTRODUCTION

Although the share of agriculture in Egypt's Gross Domestic Product (GDP) has declined over recent decades from approximately 20% in the 1980s to less than 12% in recent years—the sector remains a cornerstone of the national economy. It plays a vital role in ensuring food security, supplying raw materials to other productive and service sectors, contributing to the balance of payments through agricultural exports, and employing approximately 34% of the labor force (MALR, 2023). In 2022, agricultural exports exceeded \$5

billion, reflecting the sector's contribution to foreign exchange earnings (CAPMAS, 2023). In this context, agricultural investment is considered a fundamental driver of sustainable economic and social development, as it promotes increased production, expands national economic capacity, supports job creation, and improves living standards (Eliw *et al.*, 2019a). Despite its strategic importance, Egypt's Agricultural Development Strategy (Vision 2030) has not sufficiently prioritized agricultural investment. Although aligned with national economic reform efforts and aimed at achieving a 4% annual growth rate in agricultural output, the strategy lacks clear implementation policies and mechanisms tailored to the

investment needs of the sector. As a result, agricultural investment has remained inadequate: in FY 2023/2024, investment in agriculture was only EGP 116.6 billion, representing just 7% of total national investment, while foreign direct investment in agriculture remains below 2% of total FDI inflows (CAPMAS, 2023; MPED, 2024). Local investment continues to be constrained by resource limitations and bureaucratic inefficiencies, further weakening the sector's development potential. Several obstacles continue to hinder the growth of agricultural investment (Eman and Abdel Fatah, 2016). These include fragmented institutional responsibilities, weak coordination among government agencies, complex investment procedures particularly in land reclamation—and a decline in public investment in agriculture. This, in turn, discourages private investment, especially in the absence of a clear and efficient policy framework (Nadia and Sanaa, 2013). Furthermore, the low financial returns on agricultural investments have deterred both domestic and foreign investors (Ismail, 2016; Eliw *et al.*, 2019c). The political and economic transformations that Egypt has undergone in the past decade have further strained the investment climate, with total investment as a percentage of GDP falling from 10.2% in 2011 to 7.81% in 2015 (Eliw *et al.*, 2019b). Despite government initiatives to stimulate investment through vertical and horizontal agricultural expansion, the sector continues to receive a disproportionately small share of total national investment (MPED, 2021). In the 2023/2024 fiscal year, investment in agriculture amounted to EGP 116.6 billion, representing only 7% of overall national investments (MPED, 2024). This underinvestment has constrained the sector's ability to meet domestic demand for essential commodities, increased dependence on imports, and contributed to declining investment efficiency and investor reluctance (Engy and Mai, 2023). In light of these persistent challenges, the central research problem addressed in this study is: Why has agricultural investment in Egypt remained insufficient and inefficient, despite its recognized significance for national economic development? This problem reflects the gap between policy intentions and practical outcomes, raising important questions about the effectiveness of agricultural investment strategies and the factors that shape investment decisions.

This research sought to analyze the current state of agricultural investment in Egypt, assessed its efficiency, and identified key determinants shaping investment decisions. It evaluated the performance of the agricultural sector in terms of its GDP contribution, tracked trends in national and agricultural investments, measured investment efficiency using relevant indicators, and explored the sector's influence on economic growth. The study also investigated the primary factors affecting agricultural investment and proposed policy

recommendations aimed at enhancing the role of the agricultural sector in Egypt's economic development.

## MATERIALS AND METHODS

The research used analytical method to achieve its objectives on using the descriptive economic analysis method, using simple statistical methods such as percentages and averages, and this is in describing the economic variables specific to the research. It also relied on the quantitative economic analysis method, where estimated time trend to study the development of the most important economic variables under study, in addition to estimating economic criteria to determine the efficiency of investment distribution in the agricultural sector which are the importance of the investment rate, return on investment, investment multiplier, Localization Coefficient, and Capital Intensity Ratio as following (Alston *et al.*, 1994).

Investment rate = Total Investment ÷ Gross Domestic Product

Return on Investment = GDP ÷ Total Investment

Investment multiplier = Change in GDP ÷ Change in investment

(Investment in a sector ÷ Total investment)

Localization Coefficient =  $\frac{\text{Investment in a sector}}{\text{Gross domestic product by sector} \div \text{Gross domestic product}}$

The following equation:

Total Investment Capital Intensity Factor =  $\frac{\text{Total Investment}}{\text{Number of Workers}}$

The research was used to identify the most important economic variables affecting Egyptian agricultural investment and standard models of multiple regression in its linear and double logarithmic forms. Both linear and log-log models were estimated to allow for comparison of functional forms. The linear model assumes additive relationships and is suitable when effects are expected to be constant across units. In contrast, the log-log model is preferred when relationships between variables are multiplicative or proportional, and when heteroscedasticity (variance increasing with size) is suspected. The elasticities derived from the log-log model offer intuitive economic interpretations, which are valuable in policy contexts.

Linear Multiple Regression Model:

$$YI = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_n X_n + \varepsilon$$

Where:

**YI:** Agricultural Investment (dependent variable EG Pounds)

$X_1, X_2, X_3, \dots, X_n$  = Independent economic variables (( $Y_i$ ) value of agricultural investment ( $X_1$ ), The value of agricultural imports ( $X_2$ ), the value of agricultural production inputs ( $X_3$ ), agricultural labor ( $X_4$ ), the inflation rate ( $X_5$ ), the interest rate on agricultural loans

( $X_6$ ), the value of agricultural loans ( $X_7$ ), and net agricultural income ( $X_8$ ),)

$\beta_0$ = Intercept (constant term)

$\beta_1, \beta_2, \beta_3, \dots, \beta_n$ = Regression coefficients showing the effect of each variable

$\varepsilon$ = Error term (unexplained variation)

**Double Logarithmic Regression Model (Log-Log Form):**

$$\ln(YI) = \beta_0 + \beta_1 \ln(X_1) + \beta_2 \ln(X_2) + \beta_3 \ln(X_3) + \dots + \beta_n \ln(X_n) + \varepsilon$$

Both the dependent and independent variables are transformed using the natural logarithm ( $\ln$ ).

The regression coefficients ( $\beta$ ) represent elasticities: the percentage change in agricultural investment resulting from a 1% change in the corresponding economic variable.

**Data Sources:** This research relies on secondary data collected from a range of official and internationally recognized sources. Key national sources include the Ministry of Agriculture and Land Reclamation (MALR) through its Economic Affairs Sector ([www.agri.gov.eg](http://www.agri.gov.eg)), the Central Agency for Public Mobilization and Statistics

(CAPMAS) ([www.capmas.gov.eg](http://www.capmas.gov.eg)), the Ministry of Planning and Economic Development ([www.mped.gov.eg](http://www.mped.gov.eg)), and the National Planning Institute ([www.npi.gov.eg](http://www.npi.gov.eg)). These institutions provided essential information on agricultural investment, sectoral output, national economic indicators, and development strategies.

**The Development of National Investment at Current Prices**

**The development of public national investment:** The value of general national investment ranged from a minimum of 49.42 billion pounds in 2005 to a maximum of 871.33 billion pounds in 2023, with an average of 306.57 billion pounds during 2005–2023. The estimated time trend (Equation 1) indicated that investment increased annually by about 45.69 billion pounds, equivalent to 14.9% of the average value. The determination coefficient ( $R^2 = 0.95$ ) revealed that 95% of the variation in investment was explained by time-related factors, while the F-statistic (93.54\*\*) confirmed the model’s strong fit to the data (Table 1)

**Table 1: National (Public - Private) and Agricultural Investment in Egypt at Current Prices (2005-2023)**

Year	Public National Investment		Private National Investment		Total National Investment Value (Billion EGP)	Agricultural Investment Value (Billion EGP)
	%	Value (Billion EGP)	%	Value (Billion EGP)		
2005	57.30	66.33	42.70	49.42	115.74	3.170
2006	62.64	97.30	37.36	58.04	155.34	2.800
2007	64.69	129.08	35.31	70.46	199.53	2.434
2008	48.43	95.48	51.57	101.66	197.14	2.850
2009	54.67	126.74	45.33	105.09	231.83	2.743
2010	61.85	141.68	38.15	87.39	229.07	2.878
2011	62.41	153.52	37.59	92.46	245.98	3.276
2012	60.31	145.71	39.69	95.90	241.61	2.673
2013	58.33	154.62	41.67	110.47	265.09	2.950
2014	55.71	185.92	44.29	147.79	333.71	4.146
2015	53.72	210.62	46.28	181.42	392.04	5.213
2016	41.50	213.46	58.50	300.85	514.31	5.039
2017	43.88	316.40	56.12	404.73	721.13	6.045
2018	39.60	334.62	60.40	510.47	845.09	32.396
2019	40.05	365.92	59.95	547.79	913.71	31.431
2020	39.56	380.62	60.44	581.42	962.04	28.739
2021	34.15	341.13	65.85	657.74	998.88	29.102
2022	36.29	484.38	63.71	850.35	1334.72	37.819
2023	33.38	436.54	66.62	871.33	1307.87	31.778
<b>Average</b>	<b>42.92</b>	<b>230.53</b>	<b>57.08</b>	<b>306.57</b>	<b>537.10</b>	<b>12.499</b>
	<b>Minimum</b>	<b>66.33</b>		<b>49.42</b>	<b>115.74</b>	<b>2.434</b>
	<b>Maximum</b>	<b>484.38</b>		<b>871.33</b>	<b>1334.72</b>	<b>37.819</b>

**Source:** Ministry of Planning, Economic Development and International Cooperation, economic performance follow-up reports, national accounts chapter, public investments, successive issues.

**Development of Private National Investment:** Private national investment in Egypt was lowest in 2005 at about EGP 66.33 billion and peaked at EGP 484.38 billion in 2022, before slightly declining to EGP 436.54 billion in 2023. The average investment during 2005–2023 was approximately EGP 230.53 billion. The time trend (Equation 2) indicated a statistically significant annual

increase of about EGP 21.53 billion, representing 9.34% of the average value. The coefficient of determination ( $R^2 = 0.91$ ) revealed that 91% of the variation in private investment was explained by time-related factors, while the F-statistic (163.57\*\*) confirmed the robustness of the regression model (Table 1).

**Table 2: Time Trend Equations for National and Agricultural Investment in Egypt (2005–2023)**

Eq.	Statement	Model	F	R <sup>2</sup>	%
1	<b>Public National Investment Value (Billion EGP)</b>	$Y_i = 150.43 + 45.69 X_i$ (2.792)** (9.672)**	93.54**	0.95	14.9
2	<b>Private National Investment Value (Billion EGP)</b>	$Y_i = 15.238 + 21.53 X_i$ (0.794) (12.789)**	163.6**	0.91	9.34
3	<b>Total National Investment Value (Billion EGP)</b>	$Y_i = 134.19 + 67.229 X_i$ (1.923) (10.905)**	118.9**	0.87	12.5
4	<b>Agricultural Investment Value (Billion EGP)</b>	$Y_i = 7.790 + 2.029 X_i$ (2.109)* (6.264)**	39.24**	0.70	16.2

(\*) Significant at significance level (0.05), (\*\*) Significant at significance level (0.01)

**Where:**

**Y<sub>i</sub>:** estimated investment value in billion pounds.

**X<sub>i</sub>:** variable representing time in years.

**i:** 1,2, ....., 19.

Source: Computer results for the figures in Table 1.

**Development of Total National Investment:** A marked increase in total national investment in Egypt from 2005 to 2023 is shown in Table 1. The lowest value was recorded in 2005 at approximately EGP 115.74 billion, while the highest was in 2022 at about EGP 1334.72 billion, followed by a slight decline to EGP 1307.87 billion in 2023. The average investment during the study period was around EGP 537.10 billion. The estimated time trend (Equation 3) indicated a statistically significant annual increase of EGP 67.23 billion, representing about 12.5% of the average investment value. The determination coefficient ( $R^2 = 0.88$ ) showed that 88% of the variation in total investment was explained by time-related factors, while the F-statistic (118.9\*\*) confirmed the robustness and reliability of the regression model.

**Development of Agricultural Investment at Current Prices:** The fluctuations in agricultural investment in Egypt during 2005–2023 are given in Table 1. The lowest value was recorded in 2007 at approximately EGP 2.43 billion, while the peak reached EGP 37.82 billion in 2022, followed by a slight decline to EGP 31.78 billion in 2023. The average investment during the study period was about EGP 12.49 billion. The time trend (Equation 4) indicated a statistically significant annual increase of approximately EGP 2.03 billion, representing 16.23% of the average investment value. The determination coefficient ( $R^2 = 0.70$ ) showed that 70% of the variation in agricultural investment was explained by time-related

factors, while the F-statistic (39.24\*\*) confirmed the validity of the regression model.

#### **Agricultural Investment Contribution to GDP and National Investment in Egypt**

**Contribution of national investment to the gross domestic product:** The contribution of national investment to Egypt's GDP peaked at approximately 28.09% in 2007 and declined to its lowest level of about 13.56% in 2023 (Table 3). The average contribution during 2005–2023 was around 17%. The estimated time trend (Equation 5) indicated a statistically significant annual increase of 0.05%, equivalent to 0.31% of the average contribution. The coefficient of determination ( $R^2 = 0.61$ ) revealed that 61% of the variation in the contribution of national investment to GDP was explained by time-related factors, while the F-statistic (12.64\*\*) confirmed the model's validity (Table 4).

**Contribution of Agricultural Investment to Gross Domestic Product (GDP):** The contribution of agricultural investment to Egypt's GDP ranged from a low of about 0.15% in 2013 to a high of 0.71% in 2018, before declining to 0.33% in 2023 (Table 3). The average contribution over 2005–2023 was approximately 0.40%. The time trend (Equation 6) indicated a statistically significant annual increase of 0.004%, equivalent to around 1% of the average contribution. The determination coefficient ( $R^2 = 0.38$ ) revealed that 38% of the variation in agricultural investment's contribution

to GDP was explained by time-related factors, while the F-statistic (4.81\*\*) confirmed the model's validity (Table 4).

**Table 3: Contribution of National and Agricultural Investment to GDP (2005–2023)**

Years	Contribution of gross national investment In gross national product (%)	Agricultural investment contribution In GDP (%)	Agricultural investment contribution In national investment (%)
2005	22.85	0.63	2.74
2006	26.73	0.48	1.80
2007	28.09	0.34	1.22
2008	23.05	0.33	1.45
2009	23.32	0.28	1.18
2010	19.91	0.25	1.26
2011	18.78	0.25	1.33
2012	14.10	0.16	1.11
2013	13.77	0.15	1.11
2014	15.13	0.19	1.24
2015	15.85	0.21	1.33
2016	19.23	0.19	0.98
2017	20.01	0.17	0.84
2018	18.52	0.71	3.83
2019	16.78	0.58	3.44
2020	16.36	0.49	2.99
2021	15.76	0.46	2.91
2022	17.90	0.51	2.83
2023	13.56	0.33	2.43
<b>Average</b>	17.00	0.40	2.33
<b>Minimum</b>	13.56	0.15	0.84
<b>Maximum</b>	28.09	0.71	3.83

Source: Ministry of Planning, Economic Development and International Cooperation, Economic Performance Monitoring Reports, National Accounts Chapter, Public Investments, consecutive issues.

**Contribution of Agricultural Investment to National Investment:** The contribution of agricultural investment to total national investment reached its lowest level of 0.84% in 2017 and peaked at 3.83% in 2018. By 2023, it had declined to 2.43%, with an average contribution of 2.33% over 2005–2023. Equation (7) showed a

statistically significant annual increase of 0.017%, accounting for about 0.73% of the average contribution. The coefficient of determination (R<sup>2</sup>) was 0.47, indicating that 47% of the variation was explained by time-related factors. The F-statistic (7.02, significant at 1%) confirmed the model's reliability (Table 4).

**Table 4: Time Trend Equations for Investment Contribution to GDP (2005–2023)**

Eq.	Statement	Model	F	R <sup>2</sup>
5	Contribution of national investment to GDP (%)	$Y_i = 27.917 - 1.580 X_i + 0.052 X_i^2$ (12.98)** (-3.192)** (2.181)**	12.64**	0.61
6	Contribution of agricultural investment to GDP (%)	$Y_i = 0.571 - 0.071 X_i + 0.004 X_i^2$ (5.124)** (-2.752)** (3.012)**	4.81**	0.38
7	Contribution of agricultural investment to national investment (%)	$Y_i = 2.234 - 0.248 X_i + 0.017 X_i^2$ (3.980)** (-1.922) (2.630)**	7.02**	0.47

(\*) Significant at significance level (0.05), (\*\*) Significant at significance level (0.01)

Where:

Y<sub>i</sub>: estimated percentage of investment contribution to GDP and national investment (%).

X<sub>i</sub>: a variable that represents time in years.

i: 1, 2, ....., 19.

Source: Computer results for the numbers in Table 3.

### Determinants of the Efficiency of Agricultural Investment in Egypt:

**Agricultural Investment Rate:** The agricultural investment rate reached its lowest point of approximately 1.41% in 2013, while it peaked at about 6.41% in 2018 (Table 5). Following this peak, the rate declined to around 2.95% in 2023. The overall average agricultural investment rate during the period from 2005 to 2023 was approximately 2.88%. The data further reveal that the agricultural investment rate remained above one throughout the study period, signaling inefficiency in agricultural investments. This inefficiency is largely attributed to the allocation of investments toward capital-intensive service projects with low returns. Equation (8) illustrates the general time trend of the agricultural investment rate during the study period. The results indicate a statistically significant annual increase of about 0.026%, representing approximately 0.9% of the average agricultural investment rate over the period. The coefficient of determination ( $R^2$ ) is approximately 0.35, meaning that around 35% of the variation in the agricultural investment rate can be explained by time-related factors. The calculated F-statistic of about 4.22 (significant at the 5% level) confirms the model's adequacy in representing the data (Table 6).

**Return on Agricultural Investment:** The return on agricultural investment peaked at 652.4 in 2013 and dropped to its lowest value of 140.9 in 2018, rising again to 303.5 by 2023 (Table 5). The average return over 2005–2023 was 357.11, consistently remaining above one, indicating investment efficiency driven by fluctuations in production costs, product prices, and increased production value per investment unit. Equation (9) showed a statistically significant annual decline of 4.435, equivalent to 1.24% of the average return. The  $R^2$  value of 0.52 indicated that 52% of the variation was explained by time-related factors, while the F-ratio of 8.63 ( $p < 0.01$ ) confirmed the model's adequacy (Table 6).

**Agricultural Investment Multiplier:** The agricultural investment multiplier reached its lowest point of about -6.48 in 2019 and its highest point of approximately 6.15 in 2021 (Table 5). The multiplier decreased to around -1.84 in 2023. The overall average growth rate of the agricultural investment multiplier was approximately -0.20 over the period 2005–2023. Despite these fluctuations, the data indicate that the agricultural investment multiplier generally remained above one during the study period, suggesting the efficiency of investments in the agricultural sector. Equation (10) presents the general time trend for the agricultural investment multiplier during 2005–2023. The results indicate a statistically insignificant annual increase in the multiplier (Table 6).

**Localization Coefficient:** The localization coefficient for agricultural investment reached its lowest value of approximately 0.08 in 2016 and 2017, while it peaked at around 0.35 in 2018 (Table 5). Furthermore, the settlement coefficient for agricultural investment exhibited a declining trend, reaching approximately 0.22 in 2023. The overall average of the settlement coefficient for agricultural investment during the period 2005–2023 was approximately 0.16 (Table 5). The data suggest that the settlement coefficient remained below one throughout the study period, which reflects the efficiency of agricultural investments. Equation (11) illustrates the general time trend for the development of the settlement coefficient during the specified period. The findings indicate that the localization coefficient increased annually by a statistically significant rate of approximately 0.001, representing about 0.625 of the overall average of the settlement coefficients during the study period. The coefficient of determination ( $R^2$ ), which is approximately 0.512, reveals that nearly 51% of the variation in the settlement coefficient, can be attributed to factors associated with the time variable. Additionally, the computed F-ratio, estimated at approximately 8.38\*\*, confirms the adequacy of the model in capturing the nature of the data (Table 6).

**Table 5: Development of Determinants of Agricultural Investment Efficiency in Egypt over the Period (2005-2023)**

Year	coefficient of localisation	Agricultural investment multiplier	Return on investment Agricultural (%)	Investment rate (%)	Condensation coefficient (thousand pounds/worker)
2005	0.18	1.00	159.78	4.21	11.40
2006	0.13	-1.26	207.57	3.42	5.97
2007	0.09	-1.70	291.90	2.43	5.14
2008	0.11	-1.19	300.16	2.52	5.61
2009	0.09	-4.35	362.36	2.03	5.75
2010	0.09	3.20	399.77	1.79	6.09
2011	0.09	1.00	399.89	1.72	6.82
2012	0.10	-1.67	640.98	1.42	5.77
2013	0.10	1.19	652.39	1.41	6.41

2014	0.11	0.36	531.97	1.72	9.18
2015	0.12	0.47	474.41	1.87	11.97
2016	0.08	-2.44	530.72	1.58	11.38
2017	0.08	1.74	596.00	1.51	13.36
2018	0.35	0.06	140.87	6.41	70.06
2019	0.31	-6.48	173.20	5.25	67.39
2020	0.26	-0.93	204.59	4.18	63.26
2021	0.24	6.15	217.74	3.82	65.66
2022	0.25	0.59	197.18	4.41	83.59
2023	0.22	-1.84	303.54	2.95	66.84
<b>Average</b>	0.16	-0.20	357.11	2.88	27.45
<b>Minimum</b>	0.08	-6.48	140.87	1.41	5.14
<b>Maximum</b>	0.35	6.15	652.39	6.41	83.59

Source: Collected and calculated from the data in Tables (1, 3)

**Table 6: Time Trend Equations for Determinants of Agricultural Investment Efficiency in Egypt (2005–2023)**

Eq.	Statement		F	R <sup>2</sup>
8	Agricultural Investment Rate	$Y_i = 3.770 - 0.421 X_i + 0.026 X_i^2$ (3.894)** (-1.891) (2.359)**	4.217**	0.35
9	Return on Agricultural Investment	$Y_i = 76.049 + 85.754 X_i - 4.435 X_i^2$ (0.790) (3.867)** (4.117)**	8.631**	0.52
10	Agricultural Investment Multiplier	$Y_i = 0.240 - 0.014 X_i + 0.001 X_i^2$ (0.108) (-0.028) (0.057)	0.009	0.001
11	Agricultural Investment Localization Coefficient	$Y_i = 0.145 - 0.014 X_i + 0.001 X_i^2$ (2.952)** (-1.218) (2.109)*	8,381**	0.51
12	Agricultural Capital Intensification Coefficient	$Y_i = 13.10 - 4.011 X_i + 0.419 X_i^2$ (1.342) (-1.785) (3.837)**	40.99**	0.84

(\*) Significant at the 0.05 level of significance, (\*\*) Significant at a significance level of (0.01)

Where:

$Y_i$  = Estimated percentage of determinants of agricultural investment efficiency in Egypt

$X_i$  = Variable representing time in years.

$i = 1, 2, \dots, 19$ .

Source: Computer results for the figures in Table No. (5).

**Agricultural Capital Intensification Factor:** The agricultural capital intensification coefficient reached its minimum value of approximately 5.14 in 2007, while it attained its maximum value of about 83.59 in 2022. Subsequently, the coefficient decreased to approximately 66.84 in 2023. The overall average value of the agricultural capital intensification coefficient during the period (2005–2023) was approximately 27.45 (Table 5). The data further reveal that the coefficient remained greater than one throughout the study period, indicating that the agricultural sector is capital-intensive. Equation (12) illustrates the general temporal trend in the development of the agricultural capital intensification coefficient during the aforementioned period. The results show a statistically significant annual increase of approximately 0.42, representing about 1.53 times the overall average coefficient during the study period. The coefficient of determination ( $R^2$ ), estimated at approximately 0.84, suggests that around 84% of the variation in the agricultural capital intensification coefficient can be attributed to factors associated with the

passage of time. Moreover, the calculated F-ratio, approximately 40.99\*\*, confirms the strong suitability of the employed model to the observed data (Table 6).

**A Standard Estimate of the Most Important Factors Influencing the Volume of Agricultural Investments in Egypt:** The standard estimation aims to determine the relationship between the size of agricultural investments ( $Y_i$ ) (as a dependent variable) and various economic variables, such as the value of agricultural exports ( $X_1$ ), the value of agricultural imports ( $X_2$ ), and the value of production requirements agricultural ( $X_3$ ), agricultural labor ( $X_4$ ), inflation rate ( $X_5$ ), interest rate on agricultural loans ( $X_6$ ), value of agricultural loans ( $X_7$ ), value of agricultural production ( $X_8$ ), and net agricultural income ( $X_9$ ) as independent variables during the period (2005–2023). This analysis helps in setting effective agricultural policies that support sustainable investment in the agricultural sector, and identifying the most influential factors, which helps in drawing appropriate economic strategies to support agricultural development.

**Multilinear Regression of Agricultural Investment and Economic Variables**

**The relationship between the volume of agricultural investment as a dependent variable and the various independent variables in their linear form:** Equation No. (13) illustrated the results of the statistical measurement between the volume of agricultural investment (Y<sub>i</sub>) as the dependent variable and the value of agricultural exports (X<sub>1</sub>) The value of agricultural imports (X<sub>2</sub>), the value of agricultural production inputs (X<sub>3</sub>), agricultural labor (X<sub>4</sub>), the inflation rate (X<sub>5</sub>), the interest rate on agricultural loans (X<sub>6</sub>), the value of agricultural loans (X<sub>7</sub>), and net agricultural income (X<sub>8</sub>), as independent variables during the period (2005-2023).

$$Y_i = 14.692 + 0.193 X_1 - 0.044 X_2 + 0.135 X_3 + 1.819 X_4 - 0.474 X_5 + 1.007 X_6 + 0.101 X_7 + 0.089 X_8 \dots\dots (13)$$

(5.714)\*\* (7.956)\*\* (7.890)\*\* (6.391)\*\* (4.536)\*\* (8.444)\*\* (8.241)\*\* (-6.135)\*\* (7.295)\*\*

F = (19.89)\*\* R<sup>2</sup> Adjust = 0.89

(\*\*) = significant at 1%, (\*) = significant at 5%

**Where:**

- Y<sub>i</sub> = Value of agricultural investment volume.
- X<sub>1</sub> = Value of agricultural exports.
- X<sub>2</sub> = Value of agricultural imports.
- X<sub>3</sub> = Value of agricultural production inputs.
- X<sub>4</sub> = Value of agricultural labor.
- X<sub>5</sub> = Inflation rate.
- X<sub>6</sub> = Interest rate on agricultural loans.
- X<sub>7</sub> = Value of agricultural loans.
- X<sub>8</sub> = Value of net agricultural income.
- i = 1, 2, 3,.....19

The obtained estimates indicate that there is a statistically significant relationship between the value of agricultural investment, the value of agricultural exports, the value of agricultural production requirements, agricultural labor, the interest rate on agricultural loans, the value of agricultural loans, and net agricultural income, as an increase of about 10% leads to an increase in agricultural investment by 0.193%, 0.135%, 1.819%, 1.01%, 0.101%, 0.09% respectively, and in the case of an increase in the value of agricultural imports, With an inflation rate of 10%, the value of agricultural investment decreases by approximately 0.044% and 0.474%, respectively. The (R<sup>2</sup> Adjust) value of approximately 0.894 indicates that approximately 89% of the changes in the value of agricultural investment are due to changes in the variables studied in the model. The calculated F ratio of approximately 19.89\*\* indicates the extent to which the model used matches the nature of the data being measured.

**Stepwise Linear Regression of Agricultural Investment Determinants:** Equation No. (14) showed the results of the statistical measurement between the

value of agricultural investment (Y<sub>i</sub>) as a dependent variable, and the value of agricultural exports (X<sub>1</sub>), the value of agricultural imports (X<sub>2</sub>), the value of agricultural production requirements (X<sub>3</sub>), agricultural labor (X<sub>4</sub>), the inflation rate (X<sub>5</sub>), and the interest rate on agricultural loans (X<sub>6</sub>) The value of agricultural loans (X<sub>7</sub>) and net agricultural income (X<sub>8</sub>) are the independent variables during the period (2005-2023).

$$Y_i = 70.722 + 10.809 X_4 + 0.059 X_1 \dots\dots (14)$$

(3.967)\*\* (4.266)\*\* (3.405)\*\*

F = (79.28)\*\* R<sup>2</sup> Adjust = 0.90

(\*\*) Significant at 1%, (\*) Significant at 5%

**Where:**

- Y<sub>i</sub> = Value of agricultural investment volume.
- X<sub>1</sub> = Value of agricultural exports.
- X<sub>4</sub> = Value of agricultural labor.
- i = 1, 2, 3,.....19

The obtained estimates indicate a statistically significant direct relationship between the value of investment, agricultural labor, and the value of agricultural exports. A 10% increase in these variables leads to an increase in the value of agricultural investment by 10.809% and 0.059%, respectively. The (R<sup>2</sup> Adjust) value, which is approximately 0.90, indicates that approximately 90% of the changes in the value of agricultural investment are due to changes in the variables studied in the model the calculated F-ratio, which amounts to approximately (79.28)\*\* , indicates the extent to which the model used matches the nature of the data being measured.

**Double Log Regression of Agricultural Investment and Key Variables:** Equation (15) showed the results of the statistical measurement between the value of agricultural investment (LnY<sub>i</sub>) as the dependent variable, the value of agricultural exports (LnX<sub>1</sub>), and the value of agricultural imports (LnX<sub>2</sub>) the value of agricultural production inputs (LnX<sub>3</sub>), agricultural labor (LnX<sub>4</sub>), inflation rate (LnX<sub>5</sub>), interest rate on agricultural loans (LnX<sub>6</sub>), value of agricultural loans (LnX<sub>7</sub>), and net agricultural income (LnX<sub>8</sub>) were used as independent variables in the double logarithmic model over the period (2005-2023).

$$LnY_i = 6.244 + 0.282 LnX_1 - 0.336 LnX_2 + 1.931 LnX_3 + 3.430 LnX_4 - 0.113 LnX_5 + 0.655 LnX_6 + 0.501 LnX_7 + 2.324 LnX_8 \dots\dots (15)$$

(7.591)\* (5.356)\*\* (-6.835)\*(4.106)\*\* (3.161)\* (-8.584)\*\* (7.138)\* (5.345)\*\* (8.831)\*\*

F = (38.41)\*\* R<sup>2</sup> Adjust = 0.94

(\*\*) Significant at 1%, (\*) Significant at 5%

**Where:**

- LnY<sub>i</sub> = Value of agricultural investment.

- LnX<sub>1</sub> = Value of agricultural exports.
- LnX<sub>2</sub> = Value of agricultural imports.
- LnX<sub>3</sub> = Value of agricultural production inputs.
- LnX<sub>4</sub> = Value of agricultural labor.
- LnX<sub>5</sub> = Value of the inflation rate.
- LnX<sub>6</sub> = Value of the interest rate on agricultural loans.
- LnX<sub>7</sub> = Value of the value of agricultural loans.
- LnX<sub>8</sub> = Value of net agricultural income.
- i = 3, 2, 1, ..... 19.

The obtained estimates indicate that there is a statistically significant relationship between the value of agricultural investment, the value of agricultural exports, the value of agricultural production requirements, agricultural labor, the interest rate on agricultural loans, the value of agricultural loans, and net agricultural income, as an increase of about 10% leads to an increase in agricultural investment by 0.282%, 1.931%, 3.430%, 0.655%, 0.501%, and 2.324%, in order. The (R<sup>2</sup>Adjus) value of approximately 0.94 indicates that approximately 94% of the changes in the value of agricultural investment are due to changes in the variables studied in the model. The calculated F ratio of approximately 38.41\*\* also indicates the extent to which the model used matches the nature of the data being measured.

**Stepwise Linear Regression of Agricultural Investment and Key Variables:** Equation No. (16) showed the results of the statistical measurement between the value of agricultural investment (LnY<sub>i</sub>) as a dependent variable, and the value of agricultural exports (LnX<sub>1</sub>), the value of agricultural imports (LnX<sub>2</sub>), the value of agricultural production requirements (LnX<sub>3</sub>), agricultural labor (LnX<sub>4</sub>), the inflation rate (LnX<sub>5</sub>), and the interest rate on agricultural loans (LnX<sub>6</sub>), The value of agricultural loans (LnX<sub>7</sub>) and net agricultural income (LnX<sub>8</sub>) were used as independent variables in the double logarithmic model using stepwise regression over the period (2000-2023).

$$\text{LnY}_i = 8.342 + 5.618 \text{LnX}_4 + 0.522 \text{LnX}_2 + 0.664 \text{LnX}_6 \dots\dots (16)$$

(5.095)**	(8.465)**
(5.807)**	(2.889)**

$$F = (115.5)** \quad R^2 \text{Adjus} = 0.95$$

(\*\*) Significant at 1%, (\*) Significant at 5%

Where:

- LnY<sub>i</sub> = Value of agricultural investment.
- LnX<sub>2</sub> = Value of agricultural imports.
- LnX<sub>4</sub> = Value of agricultural labor.
- LnX<sub>6</sub> = Value of interest rates on agricultural loans.
- i = 1, 2, 3, .....19

The obtained estimates indicate a statistically significant relationship between the value of agricultural investment, agricultural labor, and the value of agricultural imports The interest rate on agricultural loans, as an increase of about 10%, leads to an increase in

agricultural investment by 5.618%, 0.522%, 0.664%, in order.

The value of (R<sup>2</sup>Adjus) of about 0.95 indicates that about 95% of the changes occurring in the value of agricultural investment are due to the change in the variables studied in the model. The calculated (F) ratio of about (115.5) \*\* also indicates the extent to which the model used matches the nature of the data being measured.

## DISCUSSION

The current research demonstrates a clear and sustained upward trajectory in both public and private national investment in Egypt, with agricultural investment forming a vital component of this broader capital formation process. The year-on-year increases underscore a persistent commitment to improving productive capacity and infrastructure, although growth patterns exhibit periodic fluctuations due to macroeconomic adjustments, liquidity constraints, and policy shifts. These findings align with Eliw *et al.* (2019b), who emphasized the relative efficiency of agricultural investment and its role in economic development, and with Kamel *et al.* (2023), who highlighted agricultural investment as a driver of economic growth through its backward and forward linkages, supporting rural income and supply-side capacity. The current study also supports Salem and Taha (2020) in acknowledging the positive contribution of agricultural investment to GDP despite global and domestic economic challenges. However, while total investment has increased, efficiency indicators such as annual return rates (ARR) show a moderate but slightly declining trend, suggesting diminishing returns and high capital intensiveness, which may be linked to projects with longer gestation periods, suboptimal scale utilization, or delayed technological adoption. This observation partially concurs with Hussein (2018), who highlighted inefficiencies in the agricultural labor market, including skill mismatches and limited mechanization that impede the effective translation of capital into output gains. Key determinants of agricultural investment—such as labor availability, credit access, and agricultural loans—reinforce Salem *et al.* (2020), who stressed the importance of financial resources and labor in promoting investment. Yet, inflation and macroeconomic instability exert negative influences on investment volumes. In contrast to Mohamed *et al.* (2021), who reported a more optimistic view of returns and efficiency, the current study notes a slight decline in ARR, highlighting challenges in sustaining long-term efficiency. Furthermore, while Kamel *et al.* (2023) regarded agricultural investment as a major GDP driver, this study provides a more nuanced perspective, suggesting that without complementary institutional reforms and

technological adoption, agricultural investment alone cannot transform the economy. These discrepancies may result from differences in methodologies, data periods, or economic conditions. Consequently, policy measures should shift focus from sheer capital accumulation to efficiency-driven investments, prioritizing human capital development, innovation, technology diffusion, improved financial structures, and risk mitigation tools. Additionally, it is crucial to manage capital intensification through better asset utilization, adaptive mechanization, and sustainable practices, while integrating environmental considerations such as water-use efficiency and soil health to ensure long-term productivity. The findings underscore the need for balanced, sustainability-oriented policies to convert quantitative investment growth into qualitative, resilient, and inclusive economic development, aligning Egypt's agricultural sector with global competitiveness and long-term economic stability.

**Conclusions:** This study provides a comprehensive analysis of the trends, efficiency, and determinants of agricultural investment in Egypt from 2005 to 2023. While both public and private national investments have grown significantly during this period, agricultural investment—though increasing—still represents a small and declining share of total investment and GDP. The findings confirm that agricultural investment has experienced moderate returns and high capital intensification, with notable inefficiencies in certain years. Key determinants influencing agricultural investment include agricultural labor, net agricultural income, access to credit, and interest rates, while inflation and import dependency have negative effects. Although the overall investment trend is upward, structural challenges such as limited policy clarity, weak coordination, and low localization of investment continue to hinder efficiency and impact. Therefore, addressing these issues through targeted policies, strategic planning, and institutional reform is essential to enhance the role of agriculture in Egypt's Vision 2030 and ensure sustainable economic development.

**Recommendations:** Based on the study's findings, the following recommendations are proposed to improve the volume and efficiency of agricultural investment in Egypt and align it with Vision 2030 goals:

**(1) Reassess and Increase the Volume of Agricultural Investment:** The current share of agriculture in total national investment—averaging only 2.33%—is disproportionately low compared to its role in employment and food security. Egypt should follow the example of countries like Morocco and Vietnam, where targeted public investment in agriculture has successfully stimulated private investment and raised sector productivity. Increasing public funding, particularly for

infrastructure, irrigation, and rural development, is essential to attract both local and foreign investors.

**(2) Develop a Strategic Agricultural Investment Map:** A comprehensive, data-driven investment map should be created, identifying high-potential zones based on agro-climatic conditions, crop competitiveness, water availability, and access to markets. This map should be linked to Egypt's broader spatial development strategies and publicize bankable project pipelines, similar to initiatives in Ethiopia and Rwanda, which have attracted international agribusiness partnerships.

**(3) Critically Reform and Streamline Investment Policies:** Existing investment policies suffer from bureaucratic delays, fragmented institutional responsibilities, and lack of coordination—especially in land allocation and project licensing. Egypt needs a one-stop-shop system for agricultural investment approval and monitoring, with clear governance frameworks and accountability measures. Legal frameworks for land tenure security, contract enforcement, and investor protection should be updated to build confidence among private investors.

**Align Financing Mechanisms with Investment Needs:** Investment financing remains limited and inefficient. The state should expand access to affordable agricultural credit by reforming rural banking structures and offering targeted interest rate subsidies for strategic crops and agro-industries. The success of India's priority sector lending model and Kenya's agri-fintech programs illustrates how tailored credit delivery can expand productive investment. Additionally, tax incentives for agribusinesses investing in technology, storage, and export infrastructure should be considered.

**(5) Maximize Returns through Value Chain Development:** Investment efforts must shift from raw production toward integrated value chains, emphasizing post-harvest processing, logistics, and export-oriented production. Public-private partnerships (PPPs) can help in building cold chains, packaging units, and regional export hubs. Egypt could emulate the "Farm-to-Market" model used in Tunisia and the "Agro-Industrial Park" approach in Nigeria, both of which boosted export competitiveness and rural employment.

**(6) Promote Consumption and Export of Agricultural Products:** Launch national programs to increase domestic consumption of locally produced, nutritious food products, while expanding agricultural export promotion strategies to new and underutilized markets. Leveraging trade agreements (e.g., COMESA, AFCFTA) and aligning production with international quality standards can help position Egyptian agriculture more competitively on the global stage.

**(7) Improve Monitoring and Evaluation Systems:** Establish a centralized agricultural investment monitoring unit to track project implementation, evaluate performance, and address inefficiencies. Lessons can be drawn from Brazil's agricultural investment observatory, which provides real-time data for policymakers and investors.

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