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Analysis And Measurement Of The Impact Of Some Developmental Indicators (Employment In The Agricultural Sector, Investment Spending, Oil Exports) On The Growth Of Agricultural GDP In Iraq For The Period 2004-2022

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Abstract
This research looks at how Iraq's agricultural GDP grew between 2004 - 2022 in relation to three important indicators: oil exports, investment expenditure, and agricultural employment. The investigation measures the correlations between these variables and agricultural GDP growth using ARDL regression methods on a large dataset. The findings show a strong positive correlation between agricultural GDP growth and employment, indicating that expanding the workforce in this industry boosts production and productivity. Investment expenditure also has a significant beneficial impact, underscoring the role that money plays in advancing agricultural growth. On the other hand, even while oil exports boost the economy as a whole, their effect on the development of agricultural GDP is more nuanced, indicating possible difficulties with resource allocation. According to the report, financial investments in the agricultural sector boost agricultural development, which encourages more public and private funding for agricultural initiatives that boost output and upgrade infrastructure. Despite being a significant contributor to the national economy, oil earnings' effects on the agriculture sector need efficient management to guarantee that funds are distributed to help agriculture rather than only depending on them.The findings highlight the need of coordinating macroeconomic and agricultural policy in order to enhance agricultural performance and promote overall economic development. Establishing partnerships between the public and private sectors to support agricultural projects, creating training programs to improve the skills of agricultural workers, putting policies in place that encourage the employment of women and youth in agricultural activities, offering financial incentives to investors in the agricultural sector, allocating a portion of oil revenues to invest in agricultural infrastructure, and creating plans to allocate investments to projects that improve food security are some of the most crucial recommendations..

Keywords: *(agricultural GDP, employment in the agricultural sector, investment spending, oil exports)*

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I. Introduction

The agricultural sector is similar to the industrial sector in that it is one of the most important sources of economic growth and, therefore, has a significant impact on the Iraqi economy, both domestically and internationally (Mlaabdal, 2020). It not only has an important role in ensuring food security, specifically in the field of wheat and barley farming in Iraq, but it is also the primary source of funding for numerous commodities and raw materials in numerous industries. Because of its nature, it also promotes job creation, unlike the cultivation of commonly consumed staple crops over larger areas (Ijirshar, 2015). We discuss a variety of skilled and unskilled workers, not just one type, which has an effect on the diversity of income sources. Because of the significance of the sector in Iraq, policy makers should intervene with direct investments and focus on multiple factors that have a significant impact on the sector's contribution to the GDP of the country. This situation has dual positive effects on Iraq that would allow it to avoid the trap of oil revenue: first, it increases agricultural production, and second, it diversifies the country's income sources. To accomplish this objective, we will discuss the fundamental components of Iraq's agricultural performance (employment, capital expenditures), as well as the way in which oil revenues are funded and the degree to which they are utilized to support the agricultural sector, specifically considering that oil revenues have increased as a result of the increase in global oil prices (Mahmoud, 2024). These high earnings must be devoted to the agricultural sector, which is the sector most capable of taking in these funds in order to achieve our diversification goals. Reviewing these factors demonstrates the

extent of agricultural improvement, and thus finds ways to increase the overall contribution of agriculture to GDP (Nikonenko, 2022). The contribution of agriculture to the total has not increased to the level that can be expected, nor has it increased to a significant percentage. Other than the lack of investment in military projects, specifically regarding the absence of oil revenues in the 90s, and the failure to profit from the increase in oil prices following the political and economic transition in 2003, the greatest obstacle is the detrimental effect of war on productivity in various fields and the number of its participants.

Research problem

The agricultural sector suffers from low labor levels, which negatively impacts productivity. Despite the presence of substantial financial resources from oil revenues, investment spending in the agricultural sector remains below the required level.

The importance of the research

1) It enhances the understanding of economic dynamics in Iraq.
2) Policymakers are focusing on developing effective agricultural strategies.
3) Emphasize the need to diversify the economy and get rid of dependence on oil.

Research Hypothesis

The main premise of the study is that if significant government intervention is undertaken to concentrate performance on the three areas that have the most effects (high oil revenues, investment expenditure, and labour), agricultural productivity may be increased. Without determining the exact magnitude of their present influence on the amount of agricultural yield, this cannot be accomplished.

The objective of the research

In addition to analysing and quantifying the influence of these indicators on Iraq's agricultural GDP growth, this study offers evidence-based suggestions for enhancing agricultural productivity and advancing sustainable development. By tackling this problem, we want to provide perspectives that aid in the creation of efficient policies that maintain the agricultural industry and strengthen its position in the national economy.

Theoretical framework

The main developmental indicators affecting agricultural productivity
(Labor, investment spending, oil revenues)

The most important factors influencing agricultural production and raising its added values are the indices (employment, investment expenditure, and oil revenues), however their relative significance fluctuates. The overall economic and social and political climate of the nation, as well as other elements pertaining to the characteristics of the agriculture industry itself, all influence this. The following will address each variable's connection and the kind of influence it has on agricultural productivity:

First: Labor and its impact on agricultural productivity (Emran,2018)

Economic growth rates are significantly impacted by agricultural labour as it is one of the key and determining variables in productivity and efficiency. The contribution of agriculture to the GDP increases as the number of workers increases. Agricultural labour has an influence that goes beyond just raising production levels; it may also effectively help address the issue of unemployment and lessen its detrimental repercussions on a number of levels, including the social and economic ones. This significance stems from agriculture's important role in absorbing a lot of labour for the following reasons:

- The diversity of activities and the vast agricultural lands cultivated with various crops.
- The lack of need for a large number of skilled laborers since the majority of agricultural labor does not require specific skills, especially in developing countries.

The low wage levels for workers in this sector mean a decrease in agricultural costs and an increase in output volume.

The aforementioned points make it evident how important agricultural labour is to increasing productivity, how they influence one another, and how they raise national income for workers directly as well as for workers in other sectors, particularly the industrial sector, which depends on agriculture to meet its production needs and lessen its reliance on imports. This is on top of the potential for a significant number of agricultural workers to be transferred and directed towards employment in the industrial or other sectors. Because so many people labour in the different animal and plant activities, this has little effect on the magnitude of agricultural production. The rise in population and hence the decline in the marginal productivity of many workers caused this

change. Consequently, agricultural production is unaffected by the transition to the industrial sector and other sectors. In other words, two fundamental variables enable this change. Ali (2016))

- The spread of disguised unemployment in the agricultural sector
- The technological use affecting the number of workers and the dismissal of large numbers of them in some areas within the agricultural sector.

The above situation does not at all mean a delay in agricultural productivity; on the contrary, it highlights its developmental and effective role in various sectors of the global economy. Agriculture has a developmental, social, and economic role. Many countries that have made progress on various fronts and at different historical stages have achieved agricultural progress, which has significantly contributed to this advancement. For example, the agricultural revolution preceded the Industrial Revolution in Europe, forming a fundamental factor in the great success of the Industrial Revolution (Abd and others, 2019).

As we can see from the above, agriculture is crucial to the process of economic and social development. In fact, we can say that the first step towards attaining high developmental rates is to increase agricultural productivity, create jobs, lower poverty rates, and ensure food security through the production of a range of widely consumed crops, including grains, vegetables, and fruits, as well as animal products for large populations. Given these benefits, agriculture becomes extremely important if the right policies are put in place to guide it towards achieving significant objectives embodied in establishing a state of diversification.

The growing emphasis on agricultural output, which, when promoted locally, promotes the agriculture sector's ability to export, is unquestionably the first step towards an economic escape from the resource curse of natural resources. Consequently, this gives the economy a competitive edge in the international trade sector, which makes it an important factor in lowering massive imports and the risk of market flooding that the economy may encounter if it becomes more dependent on imported agricultural products to meet the rising demand, particularly given the rigidity of the nation's production system.

Secondly: - Investment spending and how it affects farm output

The sums allotted for creating agricultural infrastructure, such as enhancing irrigation systems and developing agricultural technology, are referred to as investment expenditure. According to economic research, more investment expenditure boosts the agriculture sector's ability to produce and aids it in overcoming both financial and environmental obstacles. Models of economic development indicate that agricultural investments raise productivity, which in turn raises GDP. In this sense, the nature of the link between public expenditure and GDP overall—rather than simply the agriculture sector—has been the subject of philosophical discussion. Although many schools of thinking agree that expenditure and production have a direct link, their causal trajectories diverge. For example, Keynes maintained that expenditure influences the amount of production, but Wagner highlighted that GDP increases public spending (Ghanawi, 2023)

It becomes clear from the above that despite differing opinions, they collectively emphasize the importance of spending and its impact on the value of agricultural output. Therefore, activating aggregate demand must be the primary foundation for increasing agricultural productivity and reducing reliance on external sources, making the agricultural sector an effective and positively impactful sector. This aims to focus on aspects that represent the foundation of any agricultural policy seeking to achieve positive effects. Any agricultural policy that does not aim to achieve the highest possible utilization of production elements is an uneconomic policy and does not apply an important principle of public spending, which is the economy in public expenditures and their productivity (here, economy means avoiding waste and extravagance and focusing on the productivity of public spending). The correct agricultural investment spending, based on scientifically directed methods, should focus on the following aspects:

- Reclamation of agricultural lands
- Providing water resources for irrigating large areas and maintaining irrigation and drainage networks.
- Combating desertification
- The necessity of providing agricultural mechanization
- Pest control

In other words, the spending should be comprehensive agricultural spending that initially identifies the main obstacles, which at the same time represent the important and essential aspects that should be enhanced in terms of investment spending in the agricultural sector. This sector is considered one of the best in terms of productivity and attracting profitable investments that yield positive effects when investment spending is increased across its various aspects for the following reasons (Fawzi, 2017):

1) The significant gap between supply and demand for many crops, forcing the country to import them.
2) The fertility of the soil and its high productivity potential, when properly cared for in a healthy manner and with scientific methods, which reflects in achieving increased yields over long periods.
3) Population density and increased demand.

4) The trend of countries towards agricultural crops as alternatives for many products, such as extracting ethanol from sugarcane and extracting biodiesel from oilseeds, among other products.

It is clear from the above that the importance of investment spending on the agricultural sector and its sustainable impacts not only on agriculture but also on other sectors of the national economy. It is the primary source of organic raw materials used in medicines and alternative products (as mentioned above). Investment spending in the agricultural field is not limited to increasing allocations directed towards the agricultural sector in the general budget.

Beyond just raising agricultural spending in the general budget, governments should concentrate on energising the private sector's involvement in agricultural investment. Finding investment possibilities and assisting them with a range of incentives that draw in both domestic and global investors would help accomplish this. Crucially, this investment should be backed by legislation that shields the investor from different types of abuse, therefore creating all-encompassing investment plans.

Salutations One of the main cornerstones of the Iraqi economy both at home and abroad is the agricultural sector, which works in tandem with the industrial sector to drive growth. It is the main source of finance for many commodities and raw materials for many companies because of its nature, which distinguishes it from cultivating large regions of fundamental crops with broad consumption. In addition, it helps create jobs and is crucial to maintaining food security, especially in Iraq's wheat and barley production. We are referring to both skilled and unskilled labour, not just one kind of labour.

The analytical aspects of the study The Iraqi standard's description.

This section describes the monetary association between the dependent and independent variables, as well as the common method of time series analysis, which is based on the testing of the time series for roots and the presence of a serially associated variable. The results can be used to derive the analytical method and to estimate the mathematical model. The model can be evaluated and interpreted as being standard and cost-effective, and the necessary tests can be conducted to verify the quality of the model (AnsariČ, 1987).

Table (3) Standard Model Description

Variable name	code	Variable type
employment in the agricultural sector	X1	independent
investment spending	X2	independent
oil exports	X3	independent
Agricultural production growth rate	Y	dependent

Source: by research.

The results of the ADF test for the first level of testing (0) and the first difference of testing (1).

UNIT ROOT TESTING TABLE (PP)					
	At Level				
		Y	X1	X2	X3
With Constant	t-Statistic	-0.2581	0.2880	-1.7070	-2.0881
	Prob.	***0.9216***	***0.9745***	***0.4195***	***0.2504***
		n0	n0	n0	n0
With Constant & Trend	t-Statistic	-2.6587	-1.8609	-1.4614	-2.5990
	Prob.	***0.2585***	***0.6543***	***0.8249***	***0.2829***
		n0	n0	n0	n0
Without Constant & Trend	t-Statistic	1.6481	1.9638	-0.8695	0.0552
	Prob.	***0.9736***	***0.9865***	***0.3326***	***0.6942***
		n0	n0	n0	n0
	At First Difference				
		d(Y)	d(X1)	d(X2)	d(X3)
With Constant	t-Statistic	-6.3253	-6.5415	-5.8369	-6.0261
	Prob.	***0.0000***	***0.0000***	***0.0000***	***0.0000***
		***	***	***	***
With Constant & Trend	t-Statistic	-6.3225	-6.6638	-6.7708	-5.9356
	Prob.	***0.0000***	***0.0000***	***0.0000***	***0.0001***
		***	***	***	***
Without Constant & Trend	t-Statistic	-5.9161	-5.9408	-5.9293	-5.9280
	Prob.	***0.0000***	***0.0000***	***0.0000***	***0.0000***
		***	***	***	***
UNIT ROOT TEST TABLE (ADF)					
	At Level				
		Y	X1	X2	X3
With Constant	t-Statistic	-0.3245	0.2880	-1.7070	-1.9810
	Prob.	***0.9115***	***0.9745***	***0.4195***	***0.2936***
		n0	n0	n0	n0

	t-Statistic	-4.2680	-1.8785	-1.5128	-2.5990
	Prob.	***0.0096***	***0.6454***	***0.8070***	***0.2829***
With Constant & Trend		***	n0	n0	n0
	t-Statistic	1.5354	1.7244	-0.8952	-0.0831
Without Constant &	***Prob.***	***0.9669***	***0.9775***	***0.3217***	***0.6484***
Trend		n0	n0	n0	n0
	At First Difference				
		d(Y)	d(X1)	d(X2)	d(X3)
	t-Statistic	-6.3256	-6.5469	-5.8310	-5.9444
	Prob.	***0.0000***	***0.0000***	***0.0000***	***0.0000***
With Constant		***	***	***	***
	t-Statistic	-6.3225	-6.7018	-6.0280	-5.8698
	Prob.	***0.0000***	***0.0000***	***0.0001***	***0.0001***
With Constant & Trend		***	***	***	***
	t-Statistic	-5.9161	-1.6625	-5.9161	-5.9161
Without Constant &	***Prob.***	***0.0000***	***0.0905***	***0.0000***	***0.0000***
Trend		***	*	***	***
Note: (*) significant at 10%; (**) significant at 5%; (***) significant (1%) and (not) not significant					

The results of the time series stationarity test show that all variables are stationary at the first difference when analyzing ADF and PP.

Date: 10/18/24 Time: 20:45					
Sample (adjusted): 2006 2022					
Included observations: 17 after adjustments					
Trend assumption: Quadratic deterministic trend					
Series: Y X1 X2 X3					
Delay interval (first order difference): 1 to 1					
Unlimited Cointegration Rank Test (Trace)					
Hypothesized		Trace	0.05		
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**	
None *	0.942387	87.51044	55.24578	0.0000	
At most 1 *	0.750654	38.99220	35.01090	0.0178	
At most 2	0.488881	15.38067	18.39771	0.1258	
At most 3 *	0.208315	3.971055	3.841466	0.0463	
The trace test demonstrates that the two equations for cointegration are significant at the 0.05 level.					
* This implies that the null hypothesis is denied at the 0.05 level.					
** MacKinnon-Haug-Michelis (1999) probability					
Unrestricted Cointegration Rank Test (Largest Eigenvalue)					
Hypothesized		Max-Eigen	0.05		
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**	
None *	0.942387	48.51824	30.81507	0.0001	
At most 1	0.750654	23.61153	24.25202	0.0606	
At most 2	0.488881	11.40961	17.14769	0.2807	
At most 3 *	0.208315	3.971055	3.841466	0.0463	
The maximum eigenvalue test shows a cointegrating equation at the 0.05 level					
* It means that the hypothesis is rejected at the 0.05 level.					

The results of the Max-Eigen test in the aforementioned table indicate that the values associated with the maximum likelihood (48.51824, 23.61153, 57.95751, 40.51352) are greater than the values associated with the critical significance level of 5% (up to 3 - up to 1 - none -). This implies that, at the level of significance of 5%, the alternative hypothesis that there are three common integral equations is recognized, and the null hypothesis that there is no common integral vector is disregarded. This suggests the presence of a long-term equilibrium that involves multiple ways. Since the calculated value of the maximum likelihood rate is less than the critical value at a 5% probability level, there is no universal equation of the integral type at (up to 2).

Dependent variable: Y
Method: ARDL
Date: October 18th, 2004 Time: 9pm
Sample (modified): 2006S1 2022S2
Observations included: 34 revised
The maximum relevant lag: 4 (automatically selected)
Model selection methods: The Akaike Information Criterion (AIC)
Dynamic regressors (4 lags, automatic): X1 X2 X3
Rigid regressors: C
Number of evaluated models: 500
Selected Model: ARDL(1, 1, 0, 4)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Y(-1)	0.572623	0.135402	4.229050	0.0003
X1	0.000426	9.95E-05	4.280366	0.0003
X1(-1)	-0.000169	0.000121	-1.403362	0.1733
X2	8.26E-05	0.000108	0.763478	0.4526
X3	0.028145	0.054535	0.516097	0.6105
X3(-1)	-0.063126	0.060281	-1.047201	0.3054
X3(-2)	0.033097	0.069352	0.477233	0.6375
X3(-3)	-0.063649	0.063676	-0.999567	0.3275
X3(-4)	-0.089152	0.052765	-1.689616	0.1041
C	25823.18	7830.659	3.297702	0.0030
R-squared	0.952822	Mean dependent var		74239.62
Adjusted R-squared	0.935130	S.D. dependent var		18526.35
S.E. of regression	4718.594	Akaike info criterion		19.99634
Sum squared resid	5.34E+08	Schwarz criterion		20.44527
Log likelihood	-329.9377	Hannan-Quinn criter.		20.14944
F-statistic	53.85644	Durbin-Watson stat		1.765185
Prob(F-statistic)	0.000000			
* Note: all subsequent tests, p values included, do not account for the model.				
selection.				

The determination coefficient is 0.95, which means that 95% of the changes in the dependent variable (average growth rate of agriculture) are caused by the variables in the model, while 5% of the changes are attributed to random variables. The effects of the independent variables on the dependent variable and their lead time are listed in the table below. Additionally, the results demonstrate that the overall importance of the model is measured by the Fstatistic, which is significant at the 1% level. This implies that the independent variables in the model have a significant association with the dependent variable and the model as a whole has a significant role in estimating short and long term parameters. The D-W value is 1.765, and the LM test will be employed later to exhibit the issue of autocorrelation in greater detail.

The equation of a plane is				
Case 2: Constant constraints and no significant change				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1	0.000600	8.41E-05	7.140974	0.0000
X2	0.000193	0.000251	0.770350	0.4486
X3	-0.361939	0.192655	-1.878688	0.0725
C	60422.43	7436.494	8.125123	0.0000
EC = Y - (0.0006*X1 + 0.0002*X2 -0.3619*X3 + 60422.4319)				

The findings of the analysis indicate that oil revenues have a greater impact on agricultural production than investment. Despite the significant effects of unemployment on the agricultural sector, it increases the volume of agricultural production. Since the agricultural sector is associated with good employment opportunities, it is affected by unemployment, and a high rate of unemployment suggests that there are many unemployed individuals. This occasionally causes reverse migration patterns and labor shortages in agriculture, both of which have a negative effect on production. The quantity of agricultural laborers may be reduced as urban farmers seek more profitable occupations. From a financial perspective, this is because technology is being adopted in every sector. Developing infrastructure like roads and irrigation systems can enhance market access and increase profits, while investments in agricultural technology can increase yields and efficiency. Regarding oil money, these funds can be devoted to funding agricultural initiatives and increasing production. Additionally, high oil prices can enhance the effectiveness of agricultural support programs, which would promote the growth of the industry further.

F-Bounds Test		The null hypothesis: No direct relationship between the horizontal and the vertical axis.		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	2.505610	10%	2.37	3.2
k	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

The F value is 2.50, which is significant at the 10% level. When the joint integral test is based on the model limit test, its importance is demonstrated at a significant level and its value is greater than the table's F value, this establishes or challenges the long-term association between the dependent variable and the explanatory variables. The limit test has a maximum and minimum value, and the calculated F probability is at the 10% level of significance. The alternative hypothesis, which advocates that there is a long-term relationship between a set of explanatory variables and the dependent variable (agricultural production growth), and that there is a common integral relationship between the variables in the model (there is a feedback relationship between the variables in both directions, therefore, accept the feedback relationship between the variables and reject the null hypothesis that there is no long-term relationship between the independent and dependent variables.

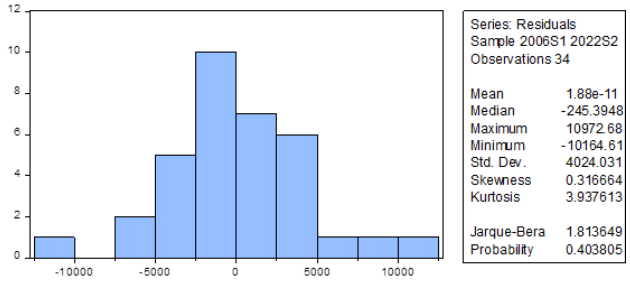
ARDL error correction regression				
Dependent variable: D(Y)				
Selected model: ARDL(1, 1, 0, 4)				
Case 2: Constant constriction and no progression				
Date: 10/18/24 Time: 9:02 PM				
Sample: 2004S1 2022S2				
observations included: 34				
ECM Regression				
Case 2: Constant and stationary				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(X1)	0.000426	7.89E-05	5.398660	0.0000
D(X3)	0.028145	0.043422	0.648192	0.5230
D(X3(-1))	0.119704	0.047348	2.528187	0.0185
D(X3(-2))	0.152801	0.047268	3.232682	0.0035
D(X3(-3))	0.089152	0.044209	2.016602	0.0551
CointEq(-1)*	-0.427377	0.111788	-3.823095	0.0008
R-squared	0.738604	Mean dependent var		2223.232
Adjusted R-squared	0.691927	S.D. dependent var		7870.678
S.E. of regression	4368.569	Akaike info criterion		19.76104
Sum squared resid	5.34E+08	Schwarz criterion		20.03040
Log likelihood	-329.9377	Hannan-Quinn criter.		19.85290
Durbin-Watson stat	1.765185			
* The p-value is not compatible with the t-cut distribution..				

At a 1% significance level, the error correction limit (CointEq (-1)) is (-0.42), which is a negative number. This implies that there is a long-term association between the variables, that is, Y causes X. It will take (1÷0.42=2.38) (2.38*12=28.57) or approximately 28.57 months for the position of the estimated model to be corrected to the long-term equilibrium state. This is because it fulfills the necessary and sufficient conditions, which means that 58% of the short term errors or imbalances can be corrected in over a year to reach a long-term equilibrium.

Heteroskedasticity Test: ARCH			
F-statistic	2.365804	Prob. F(2,29)	0.1117
Obs*R-squared	4.488712	Prob. Chi-Square(2)	0.1060

Breusch-Godfrey Serial Correlation LM Test :			
F-statistic	0.556389	Prob. F(1,23)	0.4633
Obs*R-squared	0.803062	Prob. Chi-Square(1)	0.3702

The model was evaluated for variance using the Breusch-Godfrey serial correlation LM test, as can be seen in the table above, the calculated F value was 0.55 and the associated p value was 0.46, both of which were greater than the .05 level of significance (0.05). Also, the results of the variance equality test showed that the chi-square value of 0.80 was greater than the error probability of its significance threshold (0.37). As a result, we concur with the null hypothesis that the uniformity of variance is not an issue.



II. Conclusions

High unemployment in this sector negatively affects productivity and reduces efficiency, leading to a decline in agricultural output.

Labor shortages can lead to deterioration of agricultural operations and a shift away from modern practices.

Investment in agricultural technology and infrastructure enhances productivity and increases the quantity and quality of crops. Sustainable investments help develop farmers' capabilities and provide new job opportunities.

Oil revenues can finance agricultural projects and infrastructure improvements, which enhances the growth of the agricultural sector.

Over-reliance on oil revenues can lead to fluctuations in agricultural policies, which affects sustainability.

III. Recommendations

To encourage investment in the agricultural sector, governments should encourage investments in agricultural research and development, and provide incentives to investors in this field, provide training and qualification programs for agricultural workers to improve skills and increase production efficiency, seek to diversify the country's sources of income to reduce dependence on oil revenues, which contributes to the sustainability of agricultural development, develop comprehensive agricultural policies that support farmers and help them adapt to economic and environmental changes, encourage public-private partnerships to support innovation and increase investments in agriculture, which can enhance agricultural output growth and achieve sustainability in the agricultural sector.

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