The Factors Affecting Investment of the Agricultural Land in Iraq for the Period 1990-2017

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Abstract

The research is focused on the investment in the Iraqi agricultural infrastructure. The problem to be studied in this research is that the agricultural sector in Iraq is strictly suffering from the lower productivity because of the limited investment, especially in the reclamation of more land areas through providing water for irrigation. Data for the period 1990-2017 are used in the analysis. They include the quantities of funds invested in the reclamation of land area, the numbers of hectares reclaimed, the gross domestic product and the annual agricultural production.

A mathematical model is formulated by which the economic phenomenon is analyzed by means of the method of Ordinary Least Square. GDP and the value of agricultural production were positively proportionate with the quantities of funds allocated to be invested in the reclamation of arable land and conformable to the rules of economic theory. When the value of agricultural production increase by 10%, the fund's investment in the reclamation process will increase by 56.8 million dollar. However, there was no influence to the variable of the agricultural area reclaimed on the funds of investment in the reclamation process. It was negatively proportionate with the quantities of funds invested.

Keywords: investment, reclamation, mathematical model, agricultural infrastructure**.**

العوامل المؤثرة على استثمار الأراضي الزراعية في العراق للفترة ١٩٩٠-٢٠١٧

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المستخلص:

يركز البحث على الاستثمار في البنية التحتية الزراعية العراقية. المشكلة التي يتناولها هذا البحث هي أن القطاع الزراعي في العراق يعاني كثيرا من انخفاض الإنتاجية بسبب محدودية الاستثمار، وخاصة في استصلاح المزيد من الأراضي من خلال توفير المياه الري. استخدمت بيانات الفترة ١٩٩٠-٢٠١٧ في التحليل وشملت كميات المبالغ المستثمرة في استصلاح الاراضي الزراعية، أعداد الهكتارات المستصلحة، الناتج المحلي الإجمالي والإنتاج الزراعي السنوي.

تم صياغة انموذج رياضي يتم من خلاله تحليل الظاهرة الاقتصادية بطريقة المربعات الصغرى. كان إجمالي الناتج المحلي وقيمة الإنتاج الزراعي متناسبين إيجابياً مع كميات التخصيصات المالية للاستثمار في استصلاح الأراضي الصالحة للزراعة وهي مطابقة لقواعد النظرية الاقتصادية، فعندما تزيد قيمة الناتج الزراعي بنسبة 10٪ فإن تخصيصات الاستثمار في عملية الاستصلاح ستزيد بمقدار 56.8 مليون دولار. ومع ذلك لم يكن هناك تأثيرا معنويا لمتغير المساحة المستصلحة على حجم تخصيصات الاستثمار في عملية الاستصلاح والعلاقة بينهما ظهرت سالبة.

الكلمات المفتاحية: الاستثمار، الاستصلاح، الانموذج الرياضي، البنية التحتية الزراعية.

Introduction

Investment is a positive economic activity resulted in increasing fixed and variable capital. However, from among the most important type of investment is the investment in the agricultural infrastructure. In Iraq, the total area is 43.6 million hectares, topically it is a basin comprising the large alluvial plain between the Tigris and Euphrates rivers. The total agricultural area is 12 million hectares (27.5%), 13.5 million hectare is desert (31%), 11.9 million hectare water surfaces and residential land (27.4%), 4 million hectares natural pastures (9.2%), 1.75 million hectares natural forests (4.0%) and 0.425 million hectares barren mountain (0.01%) (World Bank, 1).

Reclamation of arable land is considered as one of the most important type of investment as it restricts agricultural production and, thus, increase productivity of land (Al-Ageeli, 2), (Alexej & Others, 3), (Stona, 4), (Boom & Jenny, 5). There is positive relationship between investment in the agricultural infrastructure and agricultural productivity,

which has much been investigated by the Iraqi as well as the world researchers. Economists in Iraq are concentrating on arising agricultural sector as a proper strategy for the economic development in such projects which need large expenses and which often take long periods to achieve their objectives. In the long run, both returns and costs must consider both the time period and per capita investment of projects. They see that the basic projects are important and of a prime demand to start the economic development process as they create suitable environment and, thus, responsibility to the government to invest in such projects which need large expenses and which often take long periods to achieve their objectives. In the long run, both returns and costs must consider both the time period and per capita investment of projects (Ronald, 6). Therefore, in most countries including Iraq, land reclamation projects are the responsibility of the government. In 1992, about 625000 hectares were reclaimed by both the Ministry of Agriculture and the Ministry of Irrigation which increased the arable land. However, the total arable land in Iraq is 10.5 million hectares, while the total area available for planting is only 3.1 million hectares because of the lake of water for irrigation and rainfall modicum (Alsamarraie, 7).

Since 1970s, the Iraqi government offers reclamation for more land area through the operations of washing up soil, leveling, chapping and cleaning off salinity. During the period 1976-80, about 637.5 hectares were chapped, and about 250 hectares were totally reclaimed. During the 1980s, it was planned to reclamation for about 2.75 million hectare, however difficult circumstances were stopped this plan (Al Khafaji, 8). Many problems are facing agricultural sector in Iraq which had resulted in declining productivity of land, however the most important reasons of such problems were the deterioration of land and bad exploitation of water for irrigation, especially in the middle and southern regions of the country. The amount of precipitation of salt in soil after the evaporation of water was about 3 million tons which implies the expansion of investment in reclamation of agricultural land to achieve higher levels of production by using modern technologies and applying the advanced programs in agriculture (Debertin, 9). About 3.9 million hectares of the area in Iraq is non-arable land which can be altered to arable land by means of the reclamation programs.

Problem of Research: Iraq is classified as one of the food shortage countries as the local production is not enough to cover the whole needs of population despite the availability of economic resources. Agricultural sector in Iraq is still suffering from lower productivity which reduces its contribution in the gross domestic product (GDP). The reason behind this is attributed to the weakness of investment especially in the reclamation of more land areas through offering water for irrigation which has vital role in increasing rates of production and productivity.

Objectives of Research: The objectives of research are: first, to study the productive investment expenditure in land reclamation and the factors affecting investment during the period 1990-2017, and second is to determine the size of investment in reclamation processes, in addition to find some important economic indicators regarding the rate of contribution of agricultural production in the gross domestic product.

Mathematical Model: In order to analysis situation of investment in the agricultural sector, a mathematical model is formulated by which economic phenomena are analyzed using data for the period 1990-2017. They include the quantities of funds allocated to be invested in the reclamation of area, the numbers of hectares reclaimed, the GDP and the annual agricultural production, as shown in table 1.

This step requires the specification of dependent and independent variables and the theoretical expectations about signs and sizes of parameters. Such expectations are considered as an advanced theoretical criteria used in the evaluation of results of model, in addition to its mathematical form regarding the number of equations and characteristics (linear or non-linear). In this research, the variables are as follows:

$Y = f(X_1, X_2, X_3)$,

Where:

Y is the investment allocations of reclamation projects (m ID),

X_1 is the area reclaimed,

X_2 is the GDP (Fixed prices 1998=100, m ID), and

X_3 is the values of agricultural product (Fixed prices, m ID)

Table (1): The quantities of funds allocated to be invested in the reclamation of area, the areas reclaimed, the GDP and the value of the annual agricultural production for the period 1990-2017.

Years	Quantities of Funds ($ m)	Areas reclaimed (h.)	GDP ($ m)	Value of agricultural production ($ m)
1990	83.130	78911.000	7427.800	861.950
1991	46.310	5250.000	278.700	1068.200
1992	40.310	2950.000	168.200	674.450
1993	41.100	29880.000	47.200	249.370
1994	1.860	53250.000	8.170	41.850
1995	6.600	38058.250	2.510	11.690
1996	7.240	126064.500	3.850	18.570
1997	8.930	122225.000	2.810	17.910
1998	8.660	122225.000	2.760	21.930
1999	11.130	57375.000	2.630	21.820
2000	15.380	104675.500	2.380	21.950
2001	10.210	89203.000	2.290	21.340
2002	15.100	68537.500	6.600	19.350
2003	10.140	68537.500	3.020	13.940
2004	17.150	72371.500	3.110	28.640
2005	11.090	25950.000	4.040	29.510
2006	2.720	72776.250	4.200	32.440
2007	4.170	67610.750	3.540	38.290
2008	6.930	69539.750	3.530	44.490
2009	6.100	74525.000	2.800	47.820
2010	8.880	76571.000	4.500	48.400
2011	9.240	67666.000	4.800	46.980
2012	10.500	65430.000	6.700	50.500
2013	10.500	65540.000	6.600	50.500
2014	4.870	4440.000	3.200	33.650
2015	2.450	3890.000	3.690	20.250
2016	3.440	4430.000	3.750	20.850
2017	4.500	5005.000	4.320	16.750

Sources:

1. Ministry of Planning, Central Statistical System, CSS, different years.
2. Ministry of Agriculture, Planning & Following up.
3. Reports on "Agricultural Investment" from the internet.

Notes:

1. Areas measured by Donum, changed to hectare (4 dons.=1 h).
2. All the values measured by Iraqi Dinar changed to American Dollar by multiplying by the values of the exchange rate of each year (a list given from the CSS and the Iraqi Central Bank, ICB).

The method of Ordinary Least Square (OLS) is used to estimate parameters of the model selected. It is one of the most applicable methods used in studying relationships of an econometrics model as it is characterized by some features such as the unbiased, minimum variance and easiness.

Several functional forms were developed e.g., the linear, double log, semi-log and inverse log, however, the linear form was the most suitable among others and was as follows:

$Y=11.866 - 0.069\ X_1 + 0.473X_2\ 0.568X_3$ t= (2.736)(-0.735)(4.798)(5.007)

VIF = 1.680 1.868 2.465

$R=0.944,\ R^2= 0.891,\ R^{-2}=0.875,$ DW= 1.965, F =56.942

Statistical Analysis

Regarding statistical tests, the independent variables included in the model explained 89.1% of changes in the dependent variable, while the rest (10.9%) is attributed to some other variables which were not included in the model. The value of F indicates the significance of model. Regarding the econometrics tests, the value of DW refers to the absence of autocorrelation problem as d=1.965 which is higher than du=1.669 and less than 4-du (Maddala, 10). The values of VIF are all less than 5 which refer to the absence of multicolinearity problem. We expect the absence of heteroscedasticity as the data used are time series (Gujarati, 11).

The two independent variables: GDP (X_2) and the value of agricultural production (X_3) were both statistically significant on the level of 1%, and positively proportionate with the quantities of funds allocated to be invested in the reclamation of arable land and conformable to the rules of economic theory. This means that when the GDP increase by 10%, the funds of investment in the reclamation process will increase by 47.3 million dollar. Similarly, when the value of agricultural production increase by 10%, the fund's investment in the reclamation process will increase by 56.8 million dollar. The determination coefficient is 0.891

which means that the two variables are explained 89 % from fluctuations of the dependent variable. Theoretically, any increase in the investment will lead to increases in the income or the GDP through a multiplier investment. Also, important part of this increase in the GDP must go to be invested by the acceleration. However, the unexpected result was there was no any influence to the variable of the agricultural area reclaimed (X_1) on the funds of investment in the reclamation process. It was statistically non-significant and negatively proportionate with the quantities of funds invested.

Economic Analysis: In order to discuss the reasons behind these results, it should first review the numbers of area reclaimed throughout the period studied (Table 1), which can be divided into two periods; the first is from 1990-2002. This period witnessed fluctuations in the number of hectares reclaimed, which is attributed to the political circumstances, where the country was under impetuous sanctions of some UN resolutions. The country was not allowed to trade with other countries to meet the needs of people of foods, and thus, the government has had no option other than encouraging local farmers to plant more areas available. More areas reclaimed as the period 1996-2000. However, the situation had changed by 2000-2003, when the government had allowed to import foods according to the agreement with the UN, of what is so called oil against food. Once food was provided, reclamation projects were reduced and the numbers of hectares reclaimed were started to be decline.

In order to prove analysis, the average growth of quantities of funds allocated for investment in the reclamation processes is developed by using the growth equation ($Y=Ae^{bt}$). The period 1990-2014 is divided into two stages; the first is 1990-2002. The results reveal that the average rate of development was negative (-1.220) because of the continual reduction of funds allocated because of the sanction.

The second period (2003-2014) has shown some inconstancies in the numbers of hectares reclaimed, but the general direction indicates a decline of the area reclaimed. The results of analysis reveal that the average rate of development was positive but exiguous (0.018) which means that, although the government has allocated some funds in the annual budget of the Ministry of Agriculture for investment in the agricultural land, however they were not enough to bring the country off

the continual desertification of agricultural land.

In fact, such results clearly illustrate the reasons behind the negative results of the variable (X_1). They show that the amount of funds allocated for investment in the reclamation of area strictly connected to the political situation before and after 2003. Agricultural sector in Iraq is still suffering from the absence of scientific planning as there is serious gap between the planned objectives and the actualized objectives.

Conclusion

1. The GDP and the value of agricultural production were both explained 89.1% of changes in the quantities of funds allocated to be invested in the reclamation of arable land in Iraq.
2. There was no influence to the areas reclaimed on the quantities of funds allocated to be invested in the reclamation of arable land throughout the studied period.
3. During the period 1990-2002, the average rate of development of the quantities of funds allocated to be invested in the reclamation processes was negative because of the grueling political circumstances of the country. During the period after (2003-2017), the average rate of development was positive, but was very low to get rid of problems in the agricultural sector of the country.

Recommendations

1. The new strategy for developing agricultural sector in Iraq should abandon the archaic plans and use more developed and realistic planning which can arise agricultural sector through:

A. Supporting domestic private investment in the field of agrarian reform in general, and reclamation of land area in special.
B. Providing loans with lower interest rates to the investors.
C. Controlling and monitoring prices of agricultural products, both in the short and long runs as this will help investors to direct their resources towards the reclamation of land areas.

2. Putting plans of reclamation of lands under the direct impact of the governmental policy should be discharged. The government must only subsidize investors through the legal acts and adapting enactments encourage foreign investors as well.

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