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THE ECONOMIC EFFICIENCY OF THE IRRIGATION SYSTEM, SPRINKLER AXIAL IN IRAQ

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ABSTRACT: *Modern irrigation technologies-especially the sprinkler - irrigation system, have proved highly efficient in increasing the productivity of wheat and corn crops in rain-fed areas similarities guaranteed rains in the provinces of Nineveh and Tamem and irrigation areas in Diyala province .Results of the economic analysis of the high standards of economic evaluation of the Irrigation project more than these before the introduction of the system, where the notes that the internal rate of return for the project was (13.6 %) when using the systems of modern irrigation , also notes the increase in the net present value and net income as well as higher yield dinar investor as costs in this project generates a return of (2.02) dinars. And payback period of capital was 2.5 years, and this gets when used during the two and a half years only*

KEYWORDS: Return of the dinar, Recovery of Capital,Net Present Value ,Internal Return

INTRODUCTION

The water resources is of great significance in the overall development process, so that the part of researchers and analysts call the coming years epoch of water instead of the period of oil that characterized the years of the seventh decade of the last century. This is because the water resources and the resulting problems is one of the most prominent challenges facing the world now and in the future. The reflection of water policy for the neighboring countries would be disastrous for Iraq, the fact that the projects implemented on the Euphrates basin will lead to a loss of about 40% of agricultural land based on this basin , equivalent (1.3 million) acres as a result of the shortage of water supply which would befall (7) of the Centers cities and (25) spend and (28) hand and (40) village inhabited by 5.5 million people, as well as the existing dam on the Tigris River (Aliso dam) will engulf half the water of the Tigris River, and will lead to the reduction of agricultural land and increase the decertified land. But it has to be the adoption of planning and economic efficiency in the investment of water resources in order to achieve water security through the development of water resources through the application of modern technologies such as drip and sprinkler irrigation in order to reduce water loss to less than what can be.

Find a problem

Iraq on the verge of water scarcity of the Tigris and Euphrates rivers, as well as the Conventional irrigation leads to increased soil salinity and low Dunam productivity of crops cultivated, which calls for rationalize the application of modern technologies in irrigating the agricultural land.

The research aims:

The research aims to measure the economic efficiency of the irrigation project by conducting an economic analysis of agricultural projects irrigated with irrigation systems Axial after determining the costs and revenues and compared with known standards in the evaluation of agricultural projects and of the rate of return (IRR) achieved as well as the net present value of the cash flows and through the return of the dinar investor and Net Income .

Find the style:

Been conducted economic analysis of the data using some economic criteria used in the evaluation of agricultural projects for the purpose of identifying the production efficiency of a project that uses system sprinkler irrigation pivot was calculated investment cost and running costs and compared to returns and the revenue , which exceeded 4.5 -fold than it was before the introduction of the system to work , and given to link the size of the main benefits of the irrigation project for modern technology and the speed of accelerating growth rates for a period exceeding 10 years , this period is sufficient to ensure coverage of capital expenditures and other costs by choosing the best way to productive activities , which achieved the highest profits , and achieved this purpose within the evaluation plan before the introduction of the system then , after determining the costs of implementing the project and the associated high costs of production , which includes (seeds , fertilizer , harvesting , fuel and salaries and wages of labor , electricity, water and other supplies) .

Costs and returns:

Table (1) shows the investment and ongoing for the costs regions covered by the research (Nineveh, Tamim, Diyala) and revenues to, has made system sprinkler Axial rates of yields in the three governorates (1450, 1450.1650), respectively, for the wheat crop and the average yield for corn crop (1700) kg \ acres of the provinces mentioned above. The cost of sprinkler irrigation system Axial (13 million dinars) equal to approximately (12 000 dollars)

(Dollar = 1122) dinars.

RESULTS AND DISCUSSION:

Been conducted to compare the accounts of two pre-implementation of the project and beyond by using some the standards adopted and conduct sensitivity analysis for some of them have included:

Internal Rate of Return

Can be rely on the standard internal rate when the long useful life of the project a way that is enough to compensate for the cost of the initial invested, where the is calculated costs and revenues annually starting to find value-added any increase in profits with the introduction of the system, or before in the year that starts the project Performance the difference between profits after the introduction of the system and pre is significance of the additional farm income obtained by the farmer as a result of the establishment of the irrigation project . The internal rate of return is the interest rate that can be achieved for the project to its capital investor, ask if the interest rate prevailing in the market of the internal rate of return for the project will get the interest rate net of the project, which can be achieved as a result of

capital outlay in this project, where the internal rate of return was (13.6%) if we assume that the interest rate on capital is 12%, it means that the irrigation project has the ability to recover capital expended during the old economic net benefit of (1.6%), and this means the project is achieves the feasibility of economic and the internal rate of return, which amounted to (13.6%) over its useful life, a proportion of which can be judged that the project is economically feasible.

The net present value of the revenues and cost

The present value of the revenues and costs consider this value to the time element in mind, and take this element and certain weight during the lifetime of the project. For the time element an effect on the cash flow of the project and achieved these values shown in Table (2) based on the idea of a discount, and are summarized in the reduction of current revenues and future costs of the equal project value at the present time, and is measured by the present value of the net income from the proceeds of the difference between the present value of the dividend and the present

Value of the costs and use the following mathematical equation:

S=T/(1+p)t……..(AL- Najafi. Salem)

T= Cash Flow

P= discount rate

t=Time

Table (1) the investment costs & other& costs revenues before and after the Introduction of the system estimated a thousand dinar

A - costs and revenues	Before the introduction of the system	The useful life									
Investment costs		1	2	3	4	5	6	7	8	9-10	
1-The cost of the system		13000									
2- Wells (drilled + lining)		1500									
3 - crew pumping the well (Submersible or Turban)		3000									
4-Electricity materials		4000									
5 - water tank		1500									
6-Transfer wages, installation and use of the crane and a variety of other		2000									
7-Motors water, Tubes		1000									
8 - Total		26000									
B - the ongoing costs	4230	12000	12000	12000	12500	12000	12000	12000	12000	12000	
2 - the costs of pay loan		5000	5000	3000							
4 - total revenue											
A - Wheat	4500	18000	18000	18000	18000	18000	18000	18000	18000	18000	
B - Corn	4800	12000	12000	12000	12000	12000	12000	12000	12000	12000	
C - Vegetables	1000	--	-	--	--	--	--	--	--	--	
Total	10300	30000	30000	30000	30000	30000	30000	30000	30000	30000	
Net income (total revenue - fixed costs)	6070	-43000	13000	15000	17500	18000	18000	18000	17500	18000	
Value (increase in profit)		6070	6070	6070	6070	6070	6070	6070	6070	6070	
Net cash flow (net increase)		49070 -	6930	8930	11430	11930	11930	11930	11430	11930	
The rate of net income		9200									

Notes of the table (2) that the project research topic achieves cash flow continues (10) years of (270) million while the present value of his equal (160.146) million at the present time, and so for the costs observes that the value of the costs have reached (126 730) million dinars, while the present value of the costs equal to (82.616) million has been the adoption of the discount rate, which reflects the replacement cost For the capital of 12%, there are three interest rates supported in banks, which is 8% and 9% and 12% relied on the interest rate of 12% for recovery the capital in this project more than two years.

Table (2) the present value of the costs and

Revenues of the project (12%) Thousand dinars

Statement / Year	Total costs	present value of the costs	Returns	present value Returns
1	**21230**	**18.955**	**30000**	**26.785**
2	**17000**	**13.557**	**30000**	**24.000**
3	**15000**	**10.714**	**30000**	**21.249**
4	**12500**	**7.962**	**30000**	**19.108**
5	**12000**	**6.818**	**30000**	**17.045**
6	**12000**	**6.091**	**30000**	**15.248**
7	**12500**	**5.656**	**30000**	**13.575**
8	**12500**	**5.000**	**30000**	**12.146**
9-10	**12000**	**4.332**	**30000**	**10.830**
Total	**126730**	**79.142**	**270000**	**160.146**

Calculated by the researcher relying on table (1)

Net present value = present value of returns - the present value of the costs

Net present value (160.146 -79.142) = 81.004

Standard rate of return to cost

This standard shows the return on the investor monetary unit in the irrigation project to get a return investor Dinar and as follows

Return investor dinar = present value of total revenue ÷ present value of the total costs

160.146\79.142= 2.02

The investor dinar in the project as costs will return back more than 2 dinars, and this means that the project is a rewarding economically.

Payback period for the capital

The period during which the project recovers the money invested in it to be picked in accordance with the following wording:

Capital payback period (years) = investment expenditures ÷ net profit +evanescence.This equation was used to figure out the time limit through which retrieves the money invested in the project amounted to payback period (2.5 years) of any farmer who uses a axial system recovers its capital during the two and a half year.

Table (3) internal rate of return for the project

Statement / Year	Net Cash Flow	Discount factor 12%	Discount factor 15%
1	**-49070**	**-43.812**	**-42.669**
2	**6930**	**5.545**	**5.242**
3	**8930**	**6.378**	**5.875**
4	**11430**	**7.280**	**6.539**
5	**11930**	**6.778**	**5.932**
6	**11930**	**6.056**	**5.160**
7	**11930**	**5.398**	**4.487**
8	**11430**	**4.096**	**3.738**
9-10	**11930**	**4.307**	**3.737**
Total		**+2.023**	**-1.795**

Calculated by the researcher

IRR = discount rate at least + the difference between the discount price and highest least × present value of the net cash flow at a discount price at least \ difference between the present value of the net cash flow at the two rates.(Abdul Karim, Abdul- Aziz)

3.818 \2.023×12+3

0.53=13.6% × 12+3

Analysis of the sensitivity of the project

Enterprises agricultural exposed to the risk of natural disasters and the individual is not able to control, for example, the drop in prices or low production rates and high production costs,

This affects the internal rate of return achieved by the project, and in front of these types of economic risks and uncertainty should be taking into consideration following indicators … (Alizi. Jassim)

1 - Prices of agricultural products
2- The high cost of investment expenditure due to delay in the implementation of the project
3 - high production costs
4 - low rates yields dunam

In addition, taking into account the inflationary effects of the global prices due to import the system from outside the country, thus affecting the investment costs for the project.

As well as taking into consideration appreciation stock of water is an accurate and this is linked to estimates of geological survey of the area, which is intended to establish the project on them, which is supposed to be not less than estimates of inventories of water about 70-90%)) during the useful life of the project, but for the fluctuations in the price of agricultural

products, or estimates technological did not no impact as long as the demand for food commodities, especially grain crops is inelastic.

By reference to the results of the analysis, which showed a high rate of return (IRR) for the project research topic, these effects are taken into within opportunity costs. After that was a sensitivity analysis on the assumption increased costs (10%), the high total cost discounted this rate led to a decline in the net present value so that the ((79 888) million dinars after it was (84 379) million., As well as the return of the dinar investor became (1.9) dinars after it was gives the (2.02) dinars However, the project is still economically rewarding.

CONCLUSIONS AND RECOMMENDATIONS

1- Axial systems used for wide spaces in excess of the (100) dunam to take advantage ofbenefits of The production advantages emerged from the results that the period of recovery of capital exceeded (2 years) this is true with the capacity to produce returns in large spaces . .

2- Internal rate of return is less than (15%) more than (12%) and the cost of alternative opportunities are (3%), the rate of net profit.

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