

CRITICAL ANALYSIS OF LIFT IRRIGATION SCHEME: A CASE STUDY ON WAKURDE LIFT IRRIGATION SCHEME

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Abstract - Wakurde lift irrigation scheme is under Maharashtra Krishna Valley Development Corporation (MKVDC). A scheme is located in Wakurde of Sangali district, Maharashtra State, India. It is major ongoing irrigation project of Krishna basin basically implemented for irrigating areas of Shirala and Valava Tal. in Sangali district also Karad Tal. in Satara district. Techno-economic viability of project is one of the important key factor having significant contribution in success of lift irrigation scheme. The aim of this study is to check economic feasibility of LIS and assess its social impact, as it is important to know that whether the project is beneficial or not. For this purpose, we calculated the economic feasibility and sanctioning of projects by working out benefit to cost ratio and Internal Rate of Return (IRR). The purpose of this study is to overcome problems in execution and cost-time overruns. We assessed actual facts and problems in implementation of this LIS. We also studied practical irregularities while running this scheme. In this study suggestions are given to improve efficiency of project and to overcome actual on field problems.

Key Words: MKVDC, economic feasibility, socio-economic impact, Lift Irrigation System, cropping pattern, benefit to cost ratio.

1. INTRODUCTION

Wakurde Lift Irrigation Scheme is under Warana Irrigation Project which is located on Warana River in Krishna basin. It is proposed to lift water from (LBC) Left Bank Canal of Warana project. It consists of main 2 parts and again first part divided into 3 stages and second part is divided into 2 stages. As per the original standard approved by the Corporation in 1998, it was planned to irrigate 15775 hectares of irrigated area by pumping water in one area in 3 phases.

As per the proposed second RAA of this scheme, a total irrigated area of 28,035 hectares is proposed to be irrigated as 12,275 ha in 3 phases under Part 1 and 15,760 ha in 1 phase under Part 2. Total cultivated command area of Wakurde LIS project is 33,062 ha. Out of that irrigable command area is 28,035 ha. The crop structure proposed in the first RAA approved was 126% and 123% for Sangli East and Sangli West respectively. It had 20% cane crop for both the regions. According to the proposed crop structure, 173.36 gallons of water is required for Modified Penman method for irrigation.

An economic feasibility of project is worked out by Benefit to Cost ratio (B/C ratio) and Internal Rate of Return (IRR) methods which are considered as economic analysis methods.

1.1 Necessity

India's ultimate irrigation potential is 140 million hectares but only 87 million hectares is utilized through major, medium, minor irrigation project and ground water. This gap can be reduced by using irrigation system of higher water use efficiency. The conventional method for conveying water for irrigation in India has certain limitations as evaporation losses, seepage losses, land acquisition and thefts. In order to overcome these drawbacks, pipe distribution network system is best alternative. It is necessary to search innovative alternative for modernization of existing water distribution network system. There are various irrigation methods available but an importance of 'Lift Irrigation Scheme' is unique. The total 8% LIS of Maharashtra irrigates 22000 ha of land which finances Rs. 6462.5 million.

Basically, lift irrigation schemes are used to lift water from lower level to higher level mainly consists of water sources (such as dams, K.T.weirs, river canals), lifting medium and conveying medium. Dams and canals are constructed to increase irrigated area at lower level than dam level but scarcity of water remained the problem for higher areas.

India is mainly an agricultural country and water resources plays vital role in irrigation. Now a days, industrialization demands for more water availability which leads to reduce water available for irrigation. Stress due to water scarcity increasing day by day. To reduce this water scarcity and meet rapid water demand of irrigation, adoption of new irrigation methods is essential.

Warana and Krishna rivers are two major rivers which flow in Maharashtra state and are linked together by Wakurde LIS in Tal-Shirala, Dist-Sangali.

1.2 Project Details

An original administrative approval of the project, the first Revised Administrative Approval (RAA) and proposed administrative approval details are as follows:

Table 1.2.1 Administrative Approval (AA) details

Sr. No	AA	Year of tariff	Amount (Rs.Crore)	ICA (Ha.)	Water consumption per unit
1	Administrative approval	1995-96	109.68	15775	4.60
2	First RAA	2003-04	332.31	19575	5.88
3	Second RAA	2018-19	888.07	28035	6.12

The water requirement has been met with the maximum efficiency of 64.13 percent for proposed 2200 ha. area and remaining 24803 ha. area is proposed to be irrigated for eight months through newly closed pipeline system.

Wakurde LIS is implemented by pumping 2.77 per unit of water annually in left canal of Warana project. There are three phases of left bank 24 km canal as: 6515 ha.in Tal. Shirala of Dist. Sangali, 3560 ha. in Tal. Walva of Dist.Sangali & 2200 ha. in Tal. Karad of Dist. Satara. It is planned to irrigate a total area of 12275 ha. in part 1 and 15760 ha. in part 2. The details are given below :

Table 1.2.2 Area to be irrigated

Sr. No.	Taluka/ District	Part 1 Area (ha.)	Part 2 Area (ha.)	Total Area (ha.)
1	Shirala Dist. Sangli	6515	755	7270
2	Karad Dist. Satara	2200	-	2200
3	Valva Dist. Sangli	3560	15005	18565
	Total	12275	15760	28035

1.3 OBJECTIVES

1. To understand/examine water distribution scenario of Wakurde LIS.
2. To check economic viability of Wakurde LIS.
3. To asses socio-economic impact of scheme.
4. To recommend measures to be taken to increase planned benefits.

2. METHODOLOGY

A. PHASE 1- Economic Feasibility Analysis:

In this study, economic feasibility of project is worked out by using two methods of economic analysis. These methods are benefit to cost ratio (B/C ratio) and Internal Rate of Return (IRR).

1. Method 1: Benefit to Cost Ratio:

The BCR compares the present value of all benefits generated from a project to the present value of all costs.

- BCR > 1: Project will give profitable returns
- BCR = 1: Project will neither give profit nor loss
- BCR < 1: Project will not be profitable

The benefit cost ratio is calculated by dividing the present value of benefits by that of costs and investments.

Where:

BCR = Benefit Cost Ratio

PV = Present Value

CF = Cash Flow of a period (classified as benefit and cost, respectively)

i = Discount Rate or Interest Rate

N = Total Number of Periods

t = Period in which the Cash Flows occur

$$BCR = \frac{|PV [Benefits]|}{|PV [Cost]|} = \frac{\sum_{t=0}^N \frac{|CF_t [Benefits]|}{(1+i_t)^t}}{\sum_{t=0}^N \frac{|CF_t [Costs]|}{(1+i_t)^t}}$$

Formula for BCR (Benefit Cost Ratio)

2. Method 2: Internal Rate of Return (IRR):

It is the discount rate at which a project's returns become equal to its initial. Internal rate of return (IRR) is the percentage of returns that a project will generate within a period to cover its initial investment.

$$C_0 = \frac{C_1}{(1+r)} + \frac{C_2}{(1+r)^2} + \frac{C_3}{(1+r)^3} + \dots + \frac{C_n}{(1+r)^n}$$

$$C_0 = \sum_{t=1}^n \frac{C_t}{(1+r)^t}$$

$$= \sum_{t=1}^n \frac{C_t}{(1+r)^t} - C_0 = 0$$

Formula for IRR (Internal Rate of Return)

B. PHASE 2 - Socio-economic Study:

Socio-economic study is carried out with following aspects:

1. To assess socio-economic impact of scheme.
2. To recommend measures to be taken to increase planned benefits.

In this phase 2, project is studied with socio-economic aspect by analyzing impact on various social factors. For an assessment of socio-economic impact of scheme, factors affecting feasibility of LIS are considered and analysis is done to check for which factors Wakurde LIS will be efficient. Actual problems in implementation of LIS are found out by overall study. Overall analysis is carried out to overcome these drawbacks then suggestions are given to improve benefits from LIS project.

Points noticed while practical execution of Wakurde LIS:

1. Crop pattern is not being followed by farmers.
2. Operation of valves is improper.
3. Scouring of pipes and its maintenance problems.
4. Irregularity in distribution of water as per requirement
5. Problems due to breakdown of electricity supply
6. Difficulties in flooding situation
7. Limitation on irrigation potential of particular water source
8. Illiteracy of farmers leading to improper operation of lift irrigation system

3. RESULTS AND DISCUSSION:

From Economic Analysis, for Wakurde Lift Irrigation Scheme, the total cost worked out to be Rs. 908.44 Crore that is 181000 Rs. per Hectare. Benefit Cost Ratio of the project is 1.43 which is nearly equal to 1.5 and is approved by corresponding Government authority. Hence project is efficient. Internal Rate of Return (IRR) of the project is 14.78% which is more than 12% which fits the project criteria. Hence the project is efficient and economically feasible.

From socio-economic analysis, the factors which affect feasibility of LIS are location, availability of water sources, proposed cropping pattern, water conveyance systems. Many points were came to notice while actual implementation of LIS such as operation of LIS, un following proposed cropping pattern, pressure in pipes, souring & maintenance of pipe distribution system, distribution of water, electricity supply, limitation on irrigation potential, problems in land acquisition, illiteracy of farmers.

Suggestions / recommendations to improve planned benefits

1. A technical authority should be appointed for execution and operation of water distribution system.
2. Crop patterns should be followed by farmers.
3. Regular inspection and maintenance should be carried out to check blockage in pipes.
4. Pressure should be checked properly while designing and operating lift irrigation system.
5. Cleaning of canals and sediment removal should be done periodically.
6. Distribution of water should be as per requirement and there should be check on wastage of water.
7. Pipe distribution network should be preferred over canal distribution system.

CONCLUSION

The study concludes that B/C ratio of project is 1.43 which is nearly equal to 1.5 hence implementation of this project is profitable. Internal Rate of Return (IRR) for this project is worked out as which is greater than 12.5% hence project will give profitable returns. From these two methods of economic feasibility study (Phase1), it is concluded that project is feasible.

Second phase of project is to assess socio-economic impact of scheme and recommend measures to increase planned benefits. From socio-economic study of Wakurde LIS, it is concluded that even if there are some problems in actual implementation of LIS, LIS is more efficient by using Pipe Distribution Network (PDN) also planned benefits will increase if implementation is carried out with recommended measures.

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