

## Analysis of Critical Success and Failure Factor in Public-Private Partnership in Irrigation and Water Distribution

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### ABSTRACT

There is a considerable loss of irrigation water in conveyance and distribution due to poor on-farm irrigation management. Various factors responsible for poor efficiency of the irrigation projects have been critically examined. Gross receipts from most of the projects are too low to meet even the working expenses of repair and maintenance. Considering the limited financial resources of the government, increasing cost of irrigation development and poor return from the irrigation schemes, many of which are fast becoming national liability, it is believed that limited private participation in irrigation management will bring relief to the government in guaranteeing our food and water security in future. Due to the various constraints of private ownership of water and the prevailing socio-political and economic conditions in our country, public- private- partnership (PPP) in irrigation management has been recommended. Role of consultants in PPP for improving performance of irrigation projects has been stressed. Various success and failure cases studies overall world was analyzed for project study, which is helpful in finding out key parameters. A questionnaire has been prepared incorporating of near about eighteen different factors. Various engineers in water resource department were visited for questionnaire survey. The questionnaire having critical success and failure factors about irrigation and water distribution includes The sheet of questionnaire comprises of Relative importance index to measure the factors in irrigation and water distribution by obtaining rating on the basis of Importance from the Engineers and PPP experts. Relative importance index was used for analysis of various critical success and failure factors from Questionnaires survey data for implementation of PPP projects in irrigation and water distribution.

**KEYWORDS:** Public Private Partnership, Irrigation, Water Distribution.

### I. INTRODUCTION

The mainstream of irrigation projects in India are developed with long gestation times and are being managed at a below optimum productivity level. Rapid development of the sector has led to a number of associated concerns such as the thin spread of funds, cost overruns, drainage congestion, lack of and/or delayed development of command area, inequity in sharing of water, a shift from pictured cropping patterns to water intensive patterns in head reaches of canals, a gap between irrigation potential created and that utilized, the near absence of rotational water supply practices, meager on-farm development works, deficiencies in conveyance systems, waterlogging, salinity and alkalinity problems, uncontrolled conjunctive use, and endemic water quality problems associated with surface and/or groundwater. Particular of the measures which are seen as major reform areas in the irrigation sector include effective water pricing, addressing the deficiencies of canal supplies, transformation of canals and canal controls, reclamation of waterlogged and increasing farm-water use efficiencies, and making command area development programs more effective. A number of reforms in the agriculture sector are also envisaged

to enhance production, productivity, and the farmers income and livelihood.

The irrigation sector in India has been viewed through a social perspective rather than an economic one. Except for minor irrigation or groundwater development all programs that come under major and medium irrigation, command area improvement, and flood sub-sectors are government funded. Spending on irrigation as a percentage of the total expenditure in the country has come down to 6.28% at the end of Tenth Five-Year Plan from 22.54% during the First Five-Year Plan. The cost of developing the irrigation sector is very high and even for O&M, subsidies or incentives are provided by the governments. The challenge of food security requires an upsurge in public investments in the agriculture sector, particularly for irrigation, in order to improve production and productivity. However, the government is finding it extremely problematic to fully finance irrigation and water distribution projects and this trend is similar all over the world. Compared to other infrastructure sectors, private investment is negligible in irrigation and water distribution sector are rather limited. Various strategies are being developed to involve private investments in this sector.

Up till now, the central and state governments have been playing the twin role of developers and service providers, and are now viewing to collaborate with private partners as buyers and or coordinators in the interest of greater transparency, efficiency, and effectiveness in the sector. Public and private players can work together in a number of ways in the irrigation and water sector. On the share of the government, various ministries, public organizations, departments, and local governments dealing with water may need to reorganize their roles. On the share of the private sector; various banks, stakeholders in agri-business, real estate, transport companies, contractors, cooperatives, non-governmental organizations, and beneficiary organizations could be convinced to share responsibilities with the government. In order to create a favorable atmosphere for Public-Private partner ships (PPPs), a sense of mutual trust needs to be developed among partners, to facilitate easy access and accurate evidence, prior clearances from all departments, single-window concept, prevention of long delays, etc. There is a large number and variety of projects in the irrigation and water sector which will, therefore, require all kinds of partnerships, from large contractors to small companies, as well as the development of innovative financial concepts.

## II. NEED OF RESEARCH

Private participation has been encouraged by the Ministry of water resources (MOWR), Govt. of India. In section 12 and 13 of the National Water Policy (MOWR, 2002), it is stated "private sector participation in planning, development and management of water resources may help in introducing new ideas, generating financial capitals and introducing corporate management and improving service efficiency and accountability to users". The Planning Commission, Govt. of India, in section VIII (infrastructure) of its 10th five-year plan (2002-07) document mentions "Despite massive investments and impressive achievements, a lot more investment is needed to fully harness the available irrigation potential. The unit cost of irrigation development is nearly 100 thousand per ha of CCA. This is so high that even recovery of interest on capital from the service is difficult, unlike many services which are able to pay for themselves with or without some incentives or subsidies. Hence the desirability of mobilizing financial resources from the private sector which will ensure better irrigation efficiency and better service." Indian National Academy of Engineering (INAE-2008) observed that water management and water use efficiency need to be improved in all water-use sectors to optimize productivity. Out of the several

recommendations made by the experts, one important recommendation is regarding public-private partnership (PPP) in water sector for efficient management of water. To generate funds and provide incentives for private investments, one of the ex-Secretary, Ministry of Water Resources, Govt. of India, recommended levying 10% tax on all cold drinks and bottled mineral water and transfers it to irrigation sector in a manner similar to transfer of oil cess to road sector.

## III. AIM OF RESEARCH

This research sets visions to find recent issues related to PPP in irrigation and water distribution sector and to determine the critical success and failure factors of irrigation and water distribution projects implemented by means of public private partnership (PPP).

## IV. METHODOLOGY

The research on this study consists of following steps. First, a literature survey was conducted to find most critical success factor in irrigation and water distribution projects from different articles and publication. From literature survey 8 critical success factors and 10 critical failure factors were identified and shortlisted. In a second, step questionnaire was prepared and was distributed among 16 respondents. A questionnaire was distributed to government official's related irrigation and water distribution project. Respondents were asked to rate the factor from 1-5 according to Likert scale. In last step, ranks were set to the critical success factors and critical failure factors with the help of Relative Important Index based on a questionnaire survey.

$$RII = \sum W / (A * N)$$

Where, W= Weightage given by respondents, A= Highest weight,  
N= Number of respondents.

## V. DATA COLLECTION

The Factors selection was based on various success and failure case studies worldwide in irrigation and water distribution. The following are two case study:

### Success Case Study

The agreement is designed as a 30-year concession to build, finance, operate an irrigation system to channel water from the water bodies distribute it to agriculturalists in Guerdane. At the end of the concession, the infrastructure will be reverted to the government.

The concession allows distinctiveness to channel and distribute irrigation water in the

boundary while allocating operational, commercial, and financial risks among the various shareholders. The construction (time and costs) and the collection risk are transferred to the concessionaire.

The government is responsible for ensuring water security. The demand/payment risk was diminished by carrying out an initial contribution campaign whereby farmers paid an initial fee covering the average cost of on-farm connection. The concessionaire's construction commitment did not begin until contributions were received for 80 percent of the water available. The risk related to water shortage was allocated among the concessionaire (up to a substantial revenue loss capped at 15 percent), the farmers (via the application of a tariff surcharge in case of drought leading to a scarcity of water, capped at 10 percent of the tariff), and the Government (satisfying the risk of more substantial water shortage through a financial compensation to the concessionaire).

The unique selection criteria was the lowermost water tariff, in support of the government's goal of making surface water accessible and affordable to the largest number of farmers conceivable. The public subsidy was designed to maintain water tariffs equivalent to current pumping costs, making them affordable to farmers. The engaging bidder provided a price considerably lower than the price that farmers in Guerdane had typically paid for irrigated groundwater.

### Failure Case study

PPP in irrigation project in the Pontal region of Brazil. **The project did not progress as planned.** This project sought to establish a public-private partnership (PPP) for common use irrigation infrastructure in an area of 7,717 hectares of irrigable land for commercial agriculture. The scheme is situated in Petrolina, a pole of irrigated fruit production and export, in the Pontal province of Brazil. The government would surrender the land and the existing infrastructure, already covering a substantial part of the marked area. The private companion would operate, manage and further develop the public infrastructure (70 % has been constructed by the government) to ensure that the area is completely irrigated within six years of the date of signature of the contract; and that at least 25% of the irrigated land is available for minor farmers, who should be integrated into the production chain of the commercial producers that would occupy the remainder of the land. The private partner will be remunerated for the sale of water (through consumer tariffs) and a capacity payment by the government. The agreement duration is 25 years.

## VI. DATA ANALYSIS AND DISCUSSION

Identification of Critical success and failure factor was done by using RII method. Data was collected from a questionnaire survey.

Significance	5	4	3	2	1	RII	RANK
Success Factors							
Long concessionaire period	11	3	2	0	0	0.91	2
Water user association	1	8	9	0	0	0.70	7
Transfer / use of assets	4	5	7	0	0	0.76	6
Land and water ownership	4	8	4	0	0	0.80	5
Involvement of private sector	3	7	6	0	0	0.76	6
Risk sharing	11	5	0	0	0	0.94	1
Secure access to land/water	4	9	3	0	0	0.81	4
Government schemes	8	10	0	0	0	0.87	3

**Table no 1:** Critical Success Factors

Critical Failure factors are also identified in this study by using RII method. Are as follows

The factors are ranked as per the maximum relative importance index

Significance	5	4	3	2	1	RII	RANK
Failure Factors							
Nonpayment from end user	25	2	0	0	0	0.99	1
Losses in distribution	11	5	0	0	0	0.94	2
Poor recovery ratio	11	5	0	0	0	0.94	2
Reliability of payment	6	5	7	0	0	0.83	4
Loss of efficiency of distribution network	4	4	1	0	0	0.84	3
Lack of performance during operation & maintenance phase	3	8	1	0	0	0.77	7
Framework of legislation & regulation	3	4	4	0	0	0.79	6
Demand & supply gap	4	5.1	1	0	0	0.84	3
Underutilization of irrigation project	3	7	3	1	0	0.86	5
Inproper tariff system	3	8	4	0	0	0.79	6

**Table no 2:** Critical failure Factors

Top three success factors are said to critical success factors according to the RII result which are Risk Sharing (0.94), Long Concessionaire period (0.91), Government schemes (0.87). The Top three failure factors are said to critical success factors according to the RII result which are Nonpayment from end user (0.99), Losses in distribution (0.94), Poor recovery ratio (0.94) and Demand and supply gap (0.84).

## VII. CONCLUSION

This study helps to identify the critical success factors which act in irrigation and water distribution projects which impact positively. Also, the failure factors are also identified in this study which gives an idea about the factors due project may get fail. The top three critical success factors are Risk sharing, long concessionaire period, government schemes respectively. The top three critical failure factors are Non Payment from end user, losses in distribution, Poor recovery ratio and demand and supply gap respectively.

## VIII. LIMITATIONS

The factors considered in this study might not Enough to decide the impact on irrigation and water distribution projects.

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