

Study of Irrigation Project In View of Cost and Time Overruns

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Abstract— It is well known that most irrigation projects in India exposed to time and cost overrun or both. This phenomenon may affect the progress of country as well as may expose many institutions of construction to be destroyed. The aim of this paper is to study of irrigation projects in view of cost and time overruns of irrigation projects in Amravati region. The study clarified that "Land acquisition, Rehabilitation affected people and Increase in CSR rate was the most critical factor that influences project delay. The survey also indicated that "Other reasons" occupied the second rank in importance, where "Changes in Structural Design, Establishment tools and plant (ETP) and Extra work" were among the most important factors affecting delay. The study illustrated that "prices fluctuations of constructions project due to other reasons" which was changes in design, land acquisition, Delay in government approval, oppose of farmers and unforeseen ground conditions these are the most important factors that may lead to cost overrun. Also it clarified that contractor's delay of material delivery and equipment have led to cost overrun. The study also clarified that prices inflation highly contributes to cost overrun. The study recommended government, contractors, and consultants to hold their responsibilities to avoid any delay or cost overrun which could be achieved by good management of the project and finding new methods for storing the needed materials from the beginning of the project.

Keywords- Land acquisition; Rehabilitation; cost overruns; price fluctuations

I. INTRODUCTION

Irrigation is the artificial application of water for the cultivation of crops, trees, grasses and so on. For the urban Indian, the word irrigation conjures up images of first Prime Minister of India, Jawaharlal Nehru, and the Bhakra Nangal Dam (Temples of Modern India) and the tribal ousts of the Narmada dam. These are diverse perspectives on the story of large irrigation infrastructure in India. In fact, in popular public perception, irrigation connotes large irrigation infrastructure rather than provision of irrigation services. For a typical Indian farmer, looking up to the skies to see whether the rain gods will favor him this time, irrigation means a wide range of interventions at the farm level, ranging from a couple of support watering during the kharif (monsoon) season from a small check dam/pond/tank/dry well to assured year-round water supply from canals or tube wells to farmers cultivating three crops a year. The method of application has also evolved, from traditional gravity flow and farm flooding to micro-irrigation where water is applied close to the root zone of the plant.

One of the main objectives and policies of any public or private sectors dealing with the execution of projects is to upgrade projects performance, through reduction of costs, completion of projects within their assigned budget and time constraints, and improve quality. Another issue related to most large dams is that they are not completed within the scheduled period or budget and spill over from one 5-year plan to

another. When the Tenth Plan began, there were 410 on-going projects, some of them started in the Fifth Five-Year Plan. The spills over costs from previous projects to the Tenth Plan are Rs. 17,700 corer which is more than the allocated amount. These delays have not only led to escalated costs but also to delays in returns from the investment and lower the viability of these projects. Irrigation projects in Amravati region is suffering from many problems which affect time, cost and quality, these factors related to political situation, techniques used and other issues in Amravati region, these problems are Summarized as following:

- Large number of workers in comparison to the number of projects.
- Land acquisition problem.
- Unavailability of fund.
- Continued increase in material prices.
- Different work approval not taken on time.
- Design of construction not ready on time.
- Unstable political situation.

These factors above and others contributed to large proportion in making many problems in irrigation projects which usually related to cost and time overruns. Delay of project and cost overruns in India is one of most important problems at construction management field, also research and studies in this field in India are few compared to worthy expected results. Despite the importance and the significance of the irrigation sector in India. It is noted that the parties of project (government, consultant, and contractor) don't give the cost

and time overruns the importance at the evaluation at the end of project.

II. OBJECTIVES

The aim of this study is to assess factors influencing cost and time overruns of irrigation projects in Amravati region. The objectives of this study were achieved through two approaches the first one was to collect project related data from irrigation department in Amravati region. The second by studying some cases with seven projects exposed to cost and time overrun. The study clarified that "Land acquisition, Rehabilitation affected people and Increase in CSR rate was the most critical factor that influences project delay. The study illustrated that "prices fluctuations of constructions project due to other reasons" which was changes in design, land acquisition, Delay in government approval, oppose of farmers and unforeseen ground conditions these are the most important factors that may lead to cost overrun. Also it clarified that contractor's delay of material delivery and equipment has led to cost overrun. The study also clarified that prices inflation highly contributes to cost overrun.

III. METHODOLOGY

1. To study and identify various literatures and collect data from irrigation department.
2. To evaluate the magnitudes of the cost increases and time delay.
3. To evaluate the degree of agreement /disagreement regarding the ranking of these factors.

IV. THEORETICAL CONTENTS

A. Study Problem

Project finishing on time and absence of cost overruns are considered the most important factors of successful projects, which help to decrease problems for all parties and give new chances to construct other related projects. It also helps to increase the farmers or government benefits and agricultural development in Amravati region and also full fill the drinking water requirement. Most irrigation projects in Amravati region are exposed to delay to the extent that it may extend to the double period of time specialized for that project, causing loss of project's benefits increasing cost and leading to technical and managerial problems between project's parties.

Cost overruns is also considered another a big problem, which hinders project's progress, since it decreases the contractor profit leading to huge losses leaving the project in a big trouble. This problem is a result of hard political situation and land acquisition. Weak economy, lack of managerial skills, bad labor productivity, bad planning, increasing the prices of materials, environment, type of project and others.

B. Measuring Cost Increases Due To Delay

Delays in scheduled completion of projects can lead to additional deterioration of infrastructure that could have been avoided by timely completion. They also impose additional operational costs required to handle the impacts of closures, diversions etc. We employed a simple surrogate to measure these effects. A portion of the cost escalation in excess of inflationary effects was used to capture these effects. Clearly there are instances where the cost increases are simply due to original engineering design revisions, or some other extraneous events outside of the purview of the project management team. We feel, however, that this approach based on the assumption that original project conception accurately identified all risks and mitigation is justified. Thus the cost increase due to delay is determined as

$$\text{Cost Increase} = \beta * (\text{Revised Cost} - \text{Original Cost adjusted for inflation})$$

The factor β was subjectively applied to represent the role of extraneous events and technical design issues in causing the delay for each project.

C. Relative Importance Index Technique

The Relative Importance Index method is used to determine the relative importance of the various factors. The goal of such analyses is to partition explained variance among multiple predictors to better understand the role played by each predictor in a regression equation. The seven-point scale ranged from 1 (Extremely Important) to 7 (Not important) were adopted and transformed to relative importance indices. The RII was used to rank the different factors which affect the cost overrun of project. These rankings made it possible to cross-compare the relative importance of the major factors and minor factors amongst each major factor as perceived by the government organization. Each individual factors RII perceived by all respondents should be used to assess the general and overall rankings in order to give an overall picture of the factors affecting the cost and time overrun in irrigation projects.

D. Delay Mitigation In The Irrigation Project

An analysis is needed to identify the impact of delay on cost and time followed by taking the appropriate action to mitigate delay and minimize the cost required. It is important to improve the estimated activity duration according to the actual skill levels, unexpected events, efficiency of work time, and mistakes and misunderstandings. Mitigation efforts are necessary to minimize losses and this can be achieved by many procedures such as protection of uncompleted work, timely and reasonable re-procurement, and timely changing or cancellation of purchase orders. It is important to predict and identify the problems in the early stages of construction and diagnose the cause to find and implement the most appropriate and economical solutions.

It was indicated from the survey findings derived from different levels of management that the major causes of delay are due to financial problems followed by manpower shortage and changes in the project requirements. All parties

involved in the project also agreed that delay occurs mostly during the construction phase.

Therefore, in resolving those problems, the units of analysis suggested to increase the construction productivity, followed by increase the expertise and skill of human resources, and conducted site meetings more frequently. A strategic view of solving delay problems should consider the importance of the management aspects, the effects of knowledge and information flow between the organization levels, and the importance of top management contribution in solving the problems.

E. Types Of Delay

These types are Excusable delay, Concurrent delay, Compensable delay, and Critical delay. The types of delays above have internal or external impacts on project process. Internal causes of delay include causes that come from the owner, designers, contractors, and consultants. External causes of delays are originated from outside of construction projects such as utility companies, government, subcontractors, suppliers, labour unions, nature, etc.

V. RESULT & DISCUSSION

According to weight age, it seems that Land acquisition and Rehabilitation is the most important performance factor as it has the first rank among all factors with relative index (RII) equal to 0.367. Increase in current schedule rate has been ranked in second position by the respondents with RII equal to 0.428. Changes in design has been ranked in third place with RII equal to 0.489. Other expenses has been ranked in fourth place with RII equal to 0.571. ETP has in fifth position with RII equal to 0.653. Acceptance of higher tender has been ranked in sixth place with RII equal to 0.714. Extra work has been ranked in seventh place with RII equal to 0.897.

VI. CONCLUSION

The study provides general information about "Land acquisition, Rehabilitation affected people and Increase in CSR rate influences project delay. Changes in Structural Design, Establishment tools and Extra work" were among the most important factors affecting delay. The study illustrated that "prices fluctuations of constructions project due to other reasons" which was changes in design, land acquisition, Delay in government approval, oppose of farmers and unforeseen ground conditions these are the most important factors that may lead to cost overrun. It clarified that contractor's delay of material delivery and equipment has led to cost overrun. The study also clarified that prices inflation highly contributes to cost overrun.

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