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REDUCTION OF DELAYS IN INFRASTRUCTURE PROJECTS

Ankesh C.Khona[1], Ashish G.Jayshinpure[2], Prof. Madhukar R. Nagare[3], Dr. Balakrishna E. Narkhede[4]

M.Tech Project Management, Veermata Jijabai Technological Institute, Mumbai, India[1]

M.Tech Project Management, Veermata Jijabai Technological Institute, Mumbai, India [2]

Professor, Department of Production, Veermata Jijabai Technological Institute, Mumbai, India [3]

Head of Project Management, Veermata Jijabai Technological Institute, Mumbai, India [4]

***Abstract*— With the government's keen commitment on developing and improving infrastructure, there are a number of infrastructure projects coming up around the country. However it is important that the projects undertaken should complete in time and within budget in order to ensure full utilization of invested money and larger and better infrastructure for the people. Also, infrastructure projects require are carried out over an extended period of time and involve large capital and hence delays in such projects may lead to considerable damages to its stakeholders in terms of money as well as market reputation. This paper tries to review the common causes of delay in infrastructure projects and how introduction of some sound project management practices can help in reduction and / or mitigation of these delays.**

***Index Terms*— infrastructure projects, delays, project management, reduction of delays.**

I. INTRODUCTION

The world has seen a swift growth in population as well as economies. This growth in turn has led to a steep increase in the need for infrastructure and in energy demands on a world scale. In view of the increasing energy demands, companies take on a number of projects aiming at increasing the supply and/or improving the efficiency by replacing existing facilities or constructing new ones. But even with the best intentions, there are considerable occurrence of delays and overruns. However time holds prime importance in any project. Time performance is one of the most stressed after aspect of project management. Irregular time performance in a project can lead an array of claim activity. Today, projects taken up involve multiple stakeholders and often are executed through multiple organizations coming together in order to share the risk and capital expenditure, and hence if there are delay and disruption claims, it is a complex task to analyze and present and/or defend the claims. Thus it has become imperative to identify and analyze various factors that cause delays in order to ensure that correct decisions, to ensure project success, are taken and to establish appropriate claim decisions.

II. PROJECT DELAYS

A project delay can be defined as the overrun either beyond the completion date specified in a contract, or beyond the date that the parties agreed upon the delivery of a project. Various factors contribute towards causing the delay whose impact on the project is different. In general delays in project are attributed to erroneous designs, improper communication, sluggish decision making process, improper framing of contracts and inadequate scope definitions. However delays in infrastructure projects have financial, environmental and social implications. Hence it is necessary to identify, categorize and analyze the various delays and the factors leading to delays.

Project delays are commonly classified as:-

a. Excusable and Non-excusable delays

Excusable delays are those whose occurrence cannot be attributed to the contractor. Typical examples include delays caused due to unforeseen circumstances like labour strike or due to natural calamities like flood, earthquake etc. Non Excusable delays are those that are caused due to negligence on the part of contractor. Typical examples are delays caused due to faulty work, late supply of items in contractor's scope or shabby performance of subcontractors.

b. Critical and Non-critical delays

Delays that critically affect the projects time performance i.e. which affect the final completion date of the project or a milestone event are critical delays. Delays that do not affect the final completion date of the project or a milestone event are non-critical delays

c. Compensable and Non-compensable delays.

A compensable delay is the case when the contractor may be provided a time extension to cover up the delayed work, typically in case of excusable delays. Examples of compensable delays may include delay caused due to frequent design changes by the owner or delay in procurement of land by the owner and so on. Non compensable delays are those in

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which no additional extension may be provided for work completion to the contractor.

Now, a number of efforts have been made by researchers to identify the various factors that cause delays in such projects in different countries and for projects of different natures. Reymon Fayek Aziz (2013) in his research has shortlisted a number of factors and grouped them into 9 major categories –Consultant related factors, Contractor related factors, Design related factors, Equipment related factors, External related factors, Labour related factors, Material related factors, Owner related factors and Project related factors and among those the identified ones that affect the most were payment to contractors, transparency in contract awarding, proper vendor selection, effective planning. Owolabi James D (2014) in his research to identify the causes and effects of delays on construction delivery time identified lack of working capital finance, frequent design changes, ineffective communication practices, slow decision making as the ones affecting the most. Yaw Frimpong et al.(2003) carried out a similar research to identify causes of delays in groundwater construction projects in Ghana and concluded that Payment Conflicts with contractors, poor technical performance, escalation of material prices and poor resource management(technical, human and material) have the most profound effect in causing delays in projects. Aditi Dinkar (2014) in her research on delay analysis in construction projects has voted communication between the involved parties and lack of availability of qualified labour, equipment and material as the major problems. Enas Fathi Taher , R.K. Pandey (2013) in their research have blamed frequent changes in clients requirements and poor contractor selection for causing project delays. In general, conflicts between involved parties, ineffective procurement strategies, working capital issues, sluggish decision making and frequent changes in user requirements are the factors highlighted in a number of research efforts carried out to identify common delay causing factors in projects.

III. Project Management and how it can help?

According to PMBOK, Project Management is the application of knowledge, skills, tools and techniques to project activities in order to meet or exceed stakeholder needs and expectations from a project. Meeting or exceeding stakeholder expectations invariably involves balancing competing demands among:-

a) Scope, time, cost & quality.

b) Stakeholders with different needs & expectations.

Now, project environment is very dynamic. Throughout the project lifecycle there may be various issues & challenges and within this environment parties are expected to achieve time deadlines. To achieve these deadlines it is very necessary that all tasks are completed within time and problem areas, if any, are identified as early as possible to eliminate possible delays. In such an environment application and following of sound project management practices helps in planning effectively as it is possible to plan the sequence of activities, estimate activity durations and resources required and highlight the problem areas that may be encountered. It also helps in better monitoring as each task/individual is to be individually monitored, critical activities can be highlighted and interlinks between various activities/tasks can be identified and better understood. Use of project management softwares helps organizations to keep track of various projects taken up along with its regular operations and achieve optimum performance. The main advantage of project management software is that it helps in realtime collaboration and visually represents the progress and interconnection between various project activities, better planning for project schedule and monitoring and also helps in what if and scenario analysis in various stages of the project in various situations. Utilizing the knowledge of project management , following steps are suggested that when followed will help a great deal in reducing/ eliminating common delay causing factors in projects.

IV. Steps to reduce common causes of delays

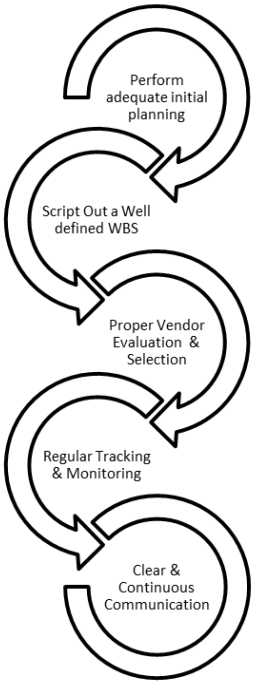

Figure 1: Steps to reduce project delays

A. *Perform adequate initial Planning*

Planning is the most critical process in a project and hence each project must be carefully planned by deciding the scope, the objectives and guidelines to achieve those objectives. It is

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often recommended that the project objective must be a SMART (Specific, Measurable, Achievable, Realistic, Time bound) one. But planning is not a one step process, significant changes throughout the project execution may lead to the plan being tweaked multiple times. However it is important to keep in mind that the project scope is well defined and there is no scope creep emerging due to these changes. Also adequate working capital forecasts should be made early in the project to prevent working capital issues. The key objective of this process should be to develop a clear course of action to successfully complete the project after thinking out all possible scenarios, sketching a clear scope and ensuring that all stakeholders are aware of the plan and agree to abide to this plan which indirectly will help in reducing conflicts and hence delays as the project progresses.

B. Script out a well-defined work breakdown structure

According to PMBOK, The WBS is a hierarchical decomposition of the total scope of work to be carried out by the project team to accomplish the project objectives and create the required deliverables. The WBS organizes and defines the total scope of the project, and represents the work specified in the current approved project scope statement. However while preparing the WBS it is recommended that each decomposed activity should clearly define expected performance and its measure. Also there should be a clear framework for escalation of issues so that decision making is fast and transparent. A good WBS shall clearly break down the project scope into a number of deliverables, define the deliverables to be submitted at each stage/milestone completion so that the projects progress can be clearly tracked. Another advantage is that although the Project Manager may be held accountable for the project as a whole, responsibilities for individual/decomposed activities/tasks is established by the WBS. Thus the project manager can smoothly control the project by concentrating on a pain/critical task and directing respective party/person. This approach ensures that the project progress and monitoring is transparent and available to all stakeholders so that everyone is aware of their accountabilities and deadlines thus eliminating unnecessary blame throwing and hiccups in the projects progress.

C. Proper process for Vendor Evaluation & Selection

Once a contract is awarded to a vendor, the vendor is assigned a share of responsibility in the project and acts as a major success facilitator. Unless vendors are properly evaluated and managed, project success is difficult. As a major share of infrastructure projects in the country are taken up by government organizations, the procurement process followed is a traditional one where the contract gets awarded to the lowest bidder. However, the lowest bidder may not always be the best suitable to undertake the job. Moreover lowest cost may also introduce the risk of work not being up to the mark, resulting in rework and repetition and thereby introducing unnecessary delays and cost overruns. In order to avoid this, vendors should be properly evaluated by revewing their expertise/past performance in such jobs, financial risk taking capability & ability to adhere to contract terms. Once potential vendors are identified, they may be introduced to the work, communicate expectations and ensure that they understand the contract terms. Thereafter negotiations may be carried out and an optimized selection may be made. Also, a vendor database to be prepared that shall detail the type of work carried out by the various vendors involved in previous projects and then they may be rated depending on their performance in the respective job. This will ensure that better performing vendors may be identified and while awarding contracts they may be given preference. A good vendor selected will help a long way into the project not only ensuring better project progress in terms of time performance but also the quality of job executed will be better.

D. Regular Tracking and Monitoring

In general Infrastructure projects require long term commitment in terms of an organization's resources – both financial and human, and organizations generally take up multiple projects in order to meet their organizational objectives. Although it may be assumed that the size and complexity of these projects may vary, it becomes a tedious task to manage all the projects along with operations if they are not regularly tracked and monitored. In this regard, many organizations still use traditional methods which include first person account of the progress from site and in some, use MS Excel to provide stipulated start and end dates. However it is strongly recommended to keep track of project progress using a project management software as it is possible to visualize interconnections between various tasks and hence a better understanding of the project allowing for better execution and risk planning. In addition to this use of project management software gives the following advantages –

- Understanding the critical path and hence which activities execution to prioritize
- Assess and allocate staff and also resources
- A detailed breakdown of tasks.
- Links between various tasks
- What if scenario analysis.

With the use of a project management software a detailed schedule is to be prepared in collaboration with all parties involved. Once the schedule is finalized all parties will be aware of the deadlines and when different deliverables are expected from them. The project can be easily monitored and critical activities can be catered to in various stages to ensure that the project progresses smoothly and incase of any conflicts, those may be easily resolved by taking into reference the accepted schedule.

E. Clear & Continuous Communication between involved parties

In a project environment, it is always best to communicate

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bad news as early as possible. Due to the involvement of various stakeholders having diverse expectations from the project, any hindrance or issue affecting the project must be brought into notice of all involved parties. Regular meetings to be conducted with key personnel involved in the project from all parties. In such meetings, the projects progress in terms of milestones reached and upcoming tasks should be communicated to all parties. In fact, in today's environment the project management software itself provide the feature of realtime collaboration thus providing a better communication medium to connect all parties. It is to be ensured that expectations of all parties and issues faced by them are discussed with each other. For a projects progress it is very essential that all the parties achieve their targeted objectives. Each party may maintain performance reports, deliverables status, progress according to schedule and also expenditure reports so that in the suggested meetings, there are documented evidences for claims by the respective party which may be cross verified by the others. Also, all correspondence in terms of letters, documents, e-mails must be preserved. In view of overall success of the project, parties may record/share their previous experiences & lessons learnt so that issues that the project may face may be foreseen and corrective steps may be taken well in advance. Thus presence of a good communication process in a project environment is a great boost to its progress as there is better collaboration, timely issues identification and co-operation between involved parties.

V. Conclusion

The suggested steps when taken in a project environment will be of great help in reducing and or elimination the common delay causing factors. Efficient initial planning will help in defining a concrete scope and reduce possibility of scope creep and rework thus reducing conflicts. A well defined WBS will ensure that each individual is aware of his responsibilities and accountabilities and hence better co-operation and decision making can be expected. Also deadlines for deliverables can be expected to be honored. Vendor's evaluation and then selection based on the type of job will help in building a good vendor database ensuring better co-operation and project performance. Regular Tracking and monitoring of project progress using a project management software will ensure better collaboration, timely identification of possible issues and also help in catering to the critical activities encountered throughout the project lifecycle. The importance of a clear and continuous communication is upmost in a project. An open and transparent communication framework helps share issues and experiences, ensures trust of all stakeholders and individuals from different organizations work as a team leading to better collaboration, reduced conflicts and most of all a better project delivery.

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