

Risk Management and Cost Overruns due to delays in Construction Project using Primavera

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Abstract - The construction industry is critical to the socioeconomic development of any emerging country. Building delays are possible in any building project. Construction delays occur regardless of whether the project is simple or complex. Construction time is used to evaluate the achievement of any project. Unexpected issues encountered throughout the conception, design, and construction phases can cause unwelcome delays in project completion. Scheduling and organizing are two of the most crucial components in completing a project successfully. Industry need necessitates specific design, scheduling, and administration to enable for total cost, time, and resource optimization. Due to increased workloads and shrinking resources, the public works department discovered new technology that aids in project management. There are numerous computer software's available on the market today for project management, such as MSP, Primavera P6, and others. Proper project planning and scheduling can be accomplished with the assistance of this programme. Primavera will only compare the planned pace of building activity to the actual progress of the project. In Primavera, starting time, completion time, and length are documented by distinguishing between task and essential activity. The delays in the project's important activity are analyzed using the provided data and the Gantt chart created by Primavera. This initiative's goal is to identify construction project delays and recommend solutions for dealing with them.

Key Words: Primavera P6, Scheduling, Gantt chart

1. INTRODUCTION

The building sector is one of the primary areas that contribute significantly to the growth of an economy. Many projects, however, encounter significant delays and hence surpass early time and expense forecasts. Construction delays are regarded as a factor in project success in terms of time, cost, quality, and safety. However, construction has already begun to exhibit specialisation features for large buildings with diverse construction operations and an assortment of components and materials. Apart from recent achievements of standardisation of construction with modular or preengineered housing and prefabricated standardised components, concepts taken over from the manufacturing industries, the project-based organisational structure in construction has largely remained the same for centuries. However, despite its age, building remains an unsustainable business because of the triple bottom line of sustainability, which includes economic, ecological, and

social factors. Construction is characterised by costly and time intensive manufacturing procedures that make it susceptible to project risks and failure, mostly in regards to time and expense. Many projects face significant delays, causing them to surpass their initial time and expenses forecasts. Construction projects are typically one-time events. A project team gets together to produce a one-of-a-kind development on a specific location under conditions that are unlikely to be duplicated.

1.1 Construction Delays

A building endeavor is considered successful as it finishes on time, under budget, and to the satisfaction of all stakeholders. However, the majority of the projects did not conclude on schedule. Instead, due to the uncertainty of events and their distinctiveness, they finished ahead of or behind schedule. Delay in construction could be described as time overrun either beyond the completion date stipulated in a contract or beyond the date agreed upon by the parties for project delivery. It is a project that is running behind schedule and is a regular issue in building projects. The majority of project delays occur during the construction phase, where unforeseen circumstances such as environmental concerns and limits, ground conditions, and so on are constantly present. Construction delays increase overall project costs; therefore, finishing projects on time benefits all parties engaged in the project.

1.2 Cost Overrun

Cost overrun is simply described as "when the project's final cost exceeds the original estimates." Cost overruns are a typical occurrence in projects all around the world. Because construction cost is the most essential criterion for project success, construction project performance is commonly reported in terms of cost and variation from budget. The cost variation that results from project cost overruns has a negative influence on the economy and profitability. Despite existing literature, cost estimation methods, cost indices, and so on, building projects rarely reach their budgeted costs. Cost performance is the most important and common issue in the worldwide construction business, out of the four main restrictions of scope, cost, time, and quality.

1.3 Risk Management

Risk management (RM) is a concept that is employed in various industries, including information technology,

vehicles, and pharmaceuticals, as well as the construction industry. Each industry has created its own RM standards; however, the overall notion is usually the same irrespective of the sector. Project management of risks is one of the nine most crucial aspects of project commissioning, per The Project Management Institute (PMI) (2004). This suggests a strong link between risk management and project success. While RM is regarded as the most demanding aspect of construction management. The Risk Management Plan covers the management methods used on the undertaking to plan, identify, analyse, categorise, quantify, handle, and report risk related to meeting the project's needs and goals. A "Risk" is defined as an incident with the potential to generate an unfavourable change in the project. The goal of this research is to critically examine and discover the applicability of previous studies on finding the reason causing schedule delays and expense overruns. Contractors mostly deal with quality, time, and money, yet the bulk of construction contracts are awarded based on only two of these criteria, typically time and cost.

1.4 Primavera P6

Primavera P6 represents an Oracle software application that is used to manage projects, programmes, and portfolios. It is a sophisticated, user-friendly solution for project and programme planning, management, and execution. Primavera P6 can be utilised in programmes or projects of all kinds, from small businesses to huge capital projects. In actuality, it is not industry specific, and it is currently employed in healthcare, banking, information technology, construction, government, and defence, as well as any organisation executing a project or programme. Primavera P6 comes in two flavours: Primavera P6 PPM (also known as Primavera P6 Professional) and Primavera P6 EPPM (Enterprise Project Portfolio Management).

2. LITERATURE REVIEW

(Waqar Ahmad Paray, 2020) stated that general categories of construction delays should be thoroughly investigated before beginning schedule delay analysis. Construction delays are classified in a variety of ways. Construction delays are classified into four categories.

- Critical and Non-critical
- Excusable and Non-excusable
- Compensable and Non-compensable
- Concurrent Delay

(A. F. Serpella, 2014) proposed that the three main characteristics of cost overruns were contractor-related problems, material-related problems, and owner-related finance restrictions. To reduce time and expense overruns, they recommended that the project owner dedicate appropriate time and money during the design phase, have

sufficient funds available, and hire a competent consultant and a trustworthy contractor to do the task.

(Bajaj, 1997) They discovered that the top groups based on overall replies were labor-related, contractor-related, equipment-related, material-related, and client-related variables. They also confirmed that the maximum level of agreement is 83.1% between client and consultant, while the lowest level is 61.7% between clients and consultants.

(Hegazy, 2002) stated that the goal of this article is to assess the current state of risk management in Indian firms and to investigate the reasons for the widespread use or lack of adoption of an integrated risk management methodology. It highlights the requirements for implementing comprehensive risk management solutions that will lead to enterprisewide risk management (EWRM). The paper demonstrates that good risk management can increase organisational performance, but organisations lack the necessary infrastructure to adopt EWRM.

We came to the conclusion when reading the research articles that the development of analytical techniques or methods for constructions project planning challenges has only recently begun. However, these problem-solving approaches are not yet methodologically sound enough to make a valuable and realisable contribution to problem resolution. There are no approaches to addressing these planning issues. As a result, more sophisticated methodologies are required to incorporate the building project's environment during construction project planning.

3. METHODOLOGY

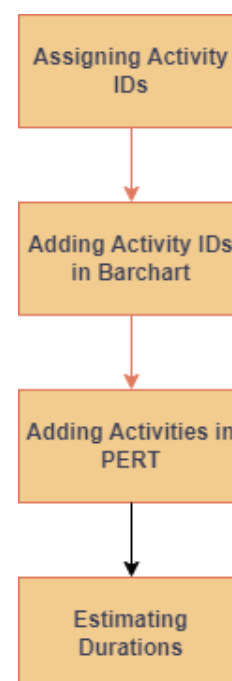


Figure 1: Methodology

3.1 Assigning Activity IDs

When P3 assigns a new ID, it first checks to see if the ID is already in use in the project. If it exists, P3 searches in 10-point increments until it discovers an unused ID.

As you add activities, P3 increments each ID by 10.

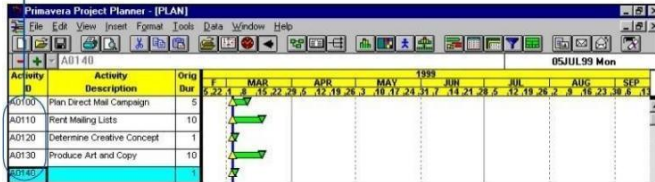


Figure 2: To assign activity IDs

3.2 Adding Activities in Bar chart

The Bar chart allows you to add activities in a spreadsheet-like format. You enter the corresponding data into each column cell for each action. After you've added activities, extend and move the timeline bars to select exact dates and durations.

P3 automatically assigns the activity ID.

P3 positions the new activity at the data date.

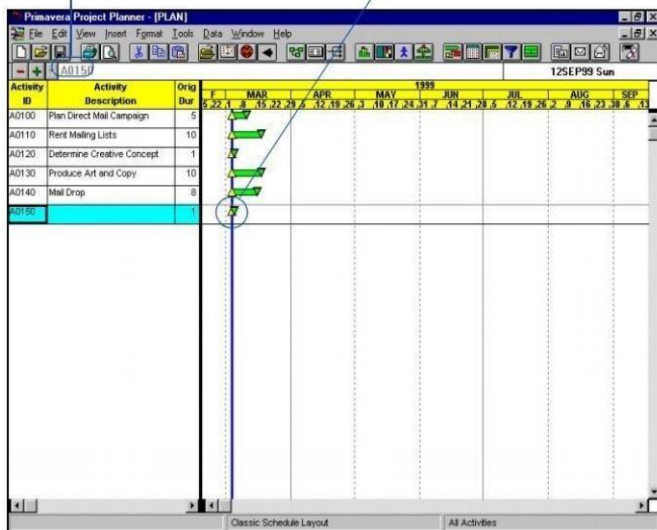


Figure 3: To add activities in Bar chart

3.3 Adding Activities in PERT

When you add activities to PERT, you can watch the progression of logic as you create your project. You can also add activities in PERT on a daily or monthly timeframe to build the work chronologically rather than by relationship. Select View, PERT from the Bar chart. To display a timescaled PERT layout rather than relationship logic, select Format, Organise, the Arrangement tab, and the PERT Layout with Timescale option from PERT.

When you add activities in timescaled PERT, they are placed in the selected area of the layout (empty or occupied). Choose Format, Reorganize Now to place activities in their correct location, based on early/actual start dates.

P3 adds the activity and assigns an ID.

Use the Activity form to enter additional information for the new activity. Click OK to close the form.

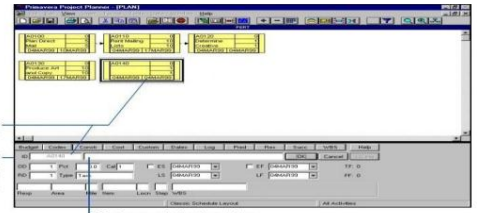


Figure 4: To add activities in PERT

3.4 Estimating Durations

P3 gives new activities a planning units (hour, day, week, or month) duration. Estimate the original time as the time required to finish the activity based on the project's planning unit. P3 sets the remaining length (the time remaining to perform the activity) to the original period.



P3 displays a Datometer to help you adjust the duration accurately.

Drag the end of the activity bar with the mouse to set the duration.

Figure 5: To Estimate Durations

4. IMPACT OF DELAY

If the owner approved a force majeure claim, the contractor must demonstrate the damages caused by the COVID-19 epidemic. A project's impacts can be divided into five categories:

- 1. Cost:** - The expenses of COVID-19 should be tracked individually by calculating damages and performance impediments. The cost analysis should be based on the impacted scope of work, idle equipment, general conditions, and other preventive measures such as heat readings, employee screening, and facility management.
- 2. Schedule:** - Evaluate and quantify the idle time, costs incurred thus far, and timetable delays caused by this incident. The contractor should review the present situation and revise the schedule to incorporate the new late-start and late-finish dates of operations, as well as the revised project completion date.
- 3. Resources:** - Evaluate the availability of resources due to sickness and social distancing guidelines.
- 4. Logistics:** - Examine the influence on material, shipment, and critical component critical lead times.

5. **Quality:** - Consider the impact of a lack of trade/skilled employees and limited travel of qualified personnel on completion.

5. RESULTS & DISCUSSION

The two most crucial aspects for the effective completion of the project are planning and scheduling. The construction industry's need necessitates accurate planning, scheduling, and administration, allowing for total cost, time, and resource optimization. Due to increased workloads and shrinking resources, the public works department discovered new technology that aids in project management. Software for project management is used as a tool for managing and organizing work in businesses that are rapidly growing. There are numerous computer software's available on the market today for project management, including MSP, Primavera P6, and others. Proper project planning and control can be accomplished with the assistance of this programme. Primavera makes it simple to compare the projected progress of building work to the actual progress of the construction project. Primavera P6 project management software collects, records, monitors, controls, and reports information on project performance.

The created framework focuses on the construction industry and the difficulties that it faces. Construction delays, cost overruns, and risk management are all part of this. We investigated how it affects the overall project. In the preceding report, we examined the reasons and effects, as well as how to handle the delays. We attempted to summarise all of those studies in order to create a review. Soft tools, like as Primavera, are also discussed in the paper. Primavera has hoped that successful adoption of this approach will benefit not only clients but also communities and the environment itself.

Oracle Primavera P6 is useful in a variety of ways, including assisting you to easily prepare and control project tasks, optimising resource management, providing a clear field of vision of what's going on in the specific project, and assisting you to easily breakdown projects' and activities' structure. Primavera also helps to mitigate risks and is relatively simple to use. It is simple to construct forecasts with it. Most notably, it aids in the breakdown of massively complex undertakings.

6. SCOPE FOR FUTURE WORK

The current research study focused on the building construction industry in Kalyan, namely Athena Enclave. Future research could be conducted in different parts of the world, focusing on specific forms of construction delays such as time management, risk assessments, cost overruns, and so on. A study similar to the current research is required for construction projects to identify factors that affect productivity, which will assist construction project

departments in minimizing excessive cost escalation and project schedule delays.

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