

RISKS IN PROGRAMMING AND PERFORMANCE MONITORING DURING PROJECT DELIVERY

1.0 Introduction

Construction projects represent significant financial risk for both the Client and the Contractor, which can be managed and transferred through effective procurement, selection of delivery method, and continuous programming and planning.

Programming serves a particular purpose for each project phase and must accommodate the ever changing list of risks within phases.

As programming begins in the initial stages of a project, a control system needs to be selected and implemented to guide the project towards the established goals and ultimate success. These systems implemented by the project team must focus on meeting the needs of the Client, Stakeholders and end users within budget/schedule, whilst also achieving compliance, financial, governance and other reporting requirements.

Best practice programming during a project lifecycle includes various functions that must be present to manage the project. These functions include:

- Introducing Best Procurement Practices
- Defining the Project Control Structure
- Implementing Project Cost, Schedule and Risk Management Processes
- Incorporating Contractual Processes and Requirements
- Finalising Project objectives within budget and targets
- Progressive status and final Reporting

This paper discusses five major problem areas associated with programming during project delivery. The paper also summaries key lessons and risks associated with each of the five major problem areas.

2.0 Programming During Project Delivery – Lessons and risks

2.1 Understanding of clear critical activities

Many multidisciplinary projects have complex, time-consuming and the interdependent sequences of events. These can be organised by critical path analysis, which involves a diagrammatic representation of the project as a network of activities.

The major consecutive activities are defined as critical path. Any delay in one of the activities on the critical path will delay the overall schedule for completion of

the project. On complex multidisciplinary projects there may be more than one critical path and probably several sub-projects. Delay in any sub-critical path or sub-project can turn into a delay to the main critical path. All paths require careful monitoring and control so that further delay is avoided.

Lessons	<i>Ensure project managers have an expert understanding of critical and near critical path and sub-paths and track progress with precision. Understanding what options are available to change project sequencing and expedite works should problems arise.</i>
Risks	<i>Project Underperformance and then the failing to meet contract milestones and financial loss.</i>

2.2 Understanding of interconnectivity of activities

A detailed understanding of interconnecting activities involves careful planning and undertaking the following steps:

- Breakdown of all project activities (into work breakdown structure, which aligns to organisational, cost and risk management structures);
- Logical links between activities;
- Durations of activities by productivity or other means;
- Finalisation of the sequential relationship diagram.

Programming is the logical representation of all activities, with defined durations and logical relationships. Once the logic diagrams are completed; the duration of each activity is determined on the basis of procurement and lead time, site location, climatic conditions, surrounding environment for construction, safety regulations and other relevant factors.

Often project teams maintain programmes and schedule independent of cost systems and risk management systems. If all these functions are not closely linked, programmes may be unrealistic and ineffectual in managing the true project works profile.

Lessons	<i>Experience is necessary to identify interconnectivity of activities. Consider previous similar projects and work as a project team to identify as many of the key interconnected activities that are key to the project. This will enable the most efficient programme to be developed and leave opportunity for flexibility as unforeseen events, variations or changed conditions arise.</i>
Risks	<i>Unforeseen delay, constructability problems, financial loss</i>

2.3 Procurement of contracts/ materials and their lead-times

The aim of project procurement is the timely and cost effective provision of all parties, resources and/or equipment necessary to complete the works. As programmes change, time and cost implications for resources will also change. The procurement process can be complicated, hence focus needs to be given to:

- Timeline to engage /secure parties/resources
- Understanding technical clarification
- Ability to deal with RFI's
- Designs, architecture details, interface configurations and overlapping Contractors
- Co-ordination between different parties
- Quality Control acceptance
- Resolution of disputes
- Major milestone and interdependencies

The timing and availability of resources and identification of delay or quality risks need to be carefully assessment before programming around resources can be determined.

Lesson	<i>Earliest procurement planning including assessment of options is essential to prevent delays, design and quality problems and cost escalations.</i>
Risks	<i>Failing to adequately manage procurement will result in works delays, and price escalations. Both this will result in financial loss</i>

2.4 Delays – failing to cascade down delays on programme

Delays are a feature of most construction projects, and frequently lead to arguments about payment for works completed, cost increases or damages and losses.

On major projects, analysis of the interaction of many delay events requires careful and detailed analysis in order to determine those events which have caused the critical delays to the project. This critical path analysis is generally also required to establish responsibilities for the delays.

As a result of construction methods, sequences and interactions must be carefully understood in order that the proper time for the delaying events to be established.

Adjustment will be required to the programme, including the possibility of re-sequencing, and the delays and implications communicated to the client as early as possible.

<i>Lesson</i>	<i>Failing to adequately adjust programme for delays cascading down the project will result in an inability to adequately manage scope, quality time and cost. Delays must be handled by recommending prompt and aggressive action to avoid schedule delays.</i>
<i>Risks</i>	<i>Failing to cascade delays on programming will result in significant project delays and underperformance, and resultant impacts on other parties, stakeholders and the end user.</i>

2.5 Programmes not effectively recording progress and activities timing or re-scheduling

Programming is the process of identifying in detail the processes and activities required to deliver the end use facility in accordance with its design.

Resources need to be allocated to ensure qualified program staff is available to maintain the accuracy and relevance of the program. The function is essential to the monitoring of the true position of the project and is a basic requirement of construction management.

Accurate and up to date records of actual sequence of activities and progress is essential, particularly if issues or disputes arise later this accurate records will be required to verify or disprove the claims, as well as assist in understanding what did occur.

<i>Lesson</i>	<i>Effectively recording of progress and activities timing and sequence, including any rescheduling, is essential to the understanding of what was or could be achieved.</i>
<i>Risks</i>	<i>Inability to demonstrate and communicate actual activities completed and re-scheduled will result in contract underperformance, financial loss and difficulty assessing claims.</i>

3.0 Incorporating Programme requirements into Contracts

Potential clauses in Contracts that relate to programming of the works need to detail sufficient information for prospective Tenderers, to inform them of expected requirements. Particular reference should be made to the managing time and the sequencing works. From reviewing various incarnations of the Australian Standards contract series, and other contracts in use by Clients today (particularly in relation to problem areas on projects) the following programming clauses are recommended.

Potential Clauses may include:

Clause: Time Commencement / Rate of Progress

- The Contractor shall commence the works as soon as practical, and shall proceed with the works with due expedition and without delay.
- The Contractor shall not suspend the works unless agreed to with the Superintendent.
- The Contractor shall re-sequence their works as and when required to avoid and mitigate current or potential delays.
- The Contractor shall complete the works by agreed milestone or separable portion dates and complete all works by the Date for Practical Completion.

Clause: Re-sequencing and Acceleration of works

- The Superintendent may from time to time direct a preferred order for the works to be sequenced. From this direction the Contractor must reasonably comply with that direction. If the Contractor cannot comply, then detail reasons as to why the works cannot be re-sequenced within 7 days.
- Should the resequenced direction cause the Contractor to incur more or less cost, then the claim should be then valued under the relevant variation clauses. The Contractor is required to notify the Superintendent of potential claims as soon as possible and within 2 days of a reasonable Contractor experiencing any delay or issue in progressing the works.
- Contractor to provide details of the impact of the direction to re-sequence or accelerate before proceeding with the works as a result of this direction.
- Accurate further costs and impacts to be notified to the Superintendent immediately.

Clause: Re-sequencing and Acceleration of works

- The Contractor shall issue the Contract Programme to the Superintendent within 14 days of the Contract Award. The programme shall detail activities, duration and sequence and logical links in such a manner to convey an understanding of the works required.
- The Contractor should maintain competent and experience programme personnel for the duration of the project.
- The work breakdown structure of the programme shall match the items in the Progress Claim/Schedule of Prices, and in sufficient detail that no activity duration shall exceed 2 weeks in length.
- Overlaid on the programme the Contractor shall detail the resources required, trades involved and plant and equipment included in the activities.
- Risks and contingencies, from the risk register, shall be included in the programme. These can included in the form of activities or other discrete bars, milestones, float and reduced productivities, incorporated throughout the programme, and not as a bar at the end of the programme.

- On a monthly basis, the Contractor shall submit with the Progress Claim, and electronic and hard copy of the revised Contract Programme in a Primavera / Suretrak [or preferred software] format for review by the Superintendent. This revised Contract Programme shall be at status up to the date of submission, and include accurate dates activity progress and dates of commencement and completion, any re-sequence changes, change logic links, new or changes risks and contingencies, details of any delays.
- Once accepted by the Superintendent, this revised Contract Programme shall become the new Contract Programme on the Project.

4.0 Ultimate Programme and Performance Success

The Programme must be employed to manage the construction and serve as evidence to the timing and progress of works completed together with the ability to manage and communicate future work.

The Programme should bridge the gap between the owner's expectation and the actual work that has been produced – therefore it must be very accurate in its recording of works undertaken.

Effective Programming and programme management is essential if you want to:

- Finish the project to a deadline
- Avoid contract underperformance
- Avoid re-work
- Prevent a disappointed or loss to the client, stakeholders or end users
- Prevent financial dispute and litigation

A considerable volume of construction litigation results from unclear or unrealistic expectations. This type of failure can be avoided through communication during the programming phase of the project and via close monitoring of programme as a way of demonstrating real and substantiation of delays as the works progress.

A project programme should clearly define the scope and intent of a project at the outset, so that the general agreement can be reached on a way to measure the success of the completed project, and record the performance and progress until the end of the project is reached.

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