

Project Control – Practical Aspects

Sajeewa Amantha B.Sc.(QS) Hons. MRICS

Sajeewa is a Quantity Surveyor graduated from University of Moratuwa, Sri Lanka and currently working in Manila, Philippines, for Australian managed project management organisation.

Introduction

The delivery of a project 'on time', 'to budget' and 'at the required quality' are generally considered key performance indicators of any project. How often do project managers experience projects that are delivered 'on time, to budget and at the required quality'? Although most projects are eventually completed more or less to specification, they are not often on time and within budget. There is an overabundance of reports on project overruns. Some research reports indicate that approximately fifty percent of construction projects encounter substantial time and budget overrun. Some reports have even suggested that a good rule of thumb is to add a minimum of fifty percent to every first estimate of time and the budget. If this is the case, the goals of 'on time' and 'to budget' would be extremely difficult task for the Project Manager to achieve.

The consequences of varying the project plan are apparent. However, Project Managers need to understand what the benefits and/or penalties are in terms of cost of delaying a project. When a project is completed and the facility commences its useful life, it commences generating revenue from that point onward. Hence, any delays to project completion influence revenue generation and ultimately cash flows and return on investment.

The discussion indicates the importance of having an efficient and effective project control system in place to ensure successful delivery of the project.

This paper discusses the scope of project control in general, to appreciate the importance of each task of the project control system. It is important to understand the effect that each individual task may have on the project performance. An integrated project control approach should be used as an ongoing monitor of project health.

The Project Control Manager is responsible for establishment of an appropriate project control system for the project. The key elements of a project control system and scope of each task are discussed below in detail.

Project Control scope

A number of Project Managers believe that monitoring and project control are the same thing, and that monitoring revolves around budgets and plans. This is not the case. Reports are for the Project Manager and Client to have summary details on what has happened thus far on the project. By implication, they deal with the history of the project, no matter how recent. On the other hand, control is taking action in response to these reports.

Monitoring is a key element of project control systems and it is important to establish, for example, if the project is performing in accordance with plans and budgets with the sole purpose of invoking controls necessary to re-establish the project. Therefore, monitoring exists to establish the need to take corrective action, whilst there is still time to take such action. Control on the other hand is management, not paperwork. Control involves analysing the situation, deciding what to do and actually doing it.

Project Control Plan

The Project Control Plan is the primary project control document for a project. It exists as a subset of the Project Management Plan as the framework for the control, measurement and reporting of a Project.

The Project Control Plan should be developed to satisfy both Corporate and Project reporting. The Corporate section of the plan is to be reviewed at regular intervals to ensure any corporate strategy changes are incorporated into the plan. The Project plan shall be prepared at the commencement of each Project and includes key

information on the Project such as scope, definitions, programming, meetings, reporting, procurement, and auditing.

The Project Control Manager is the key person responsible for the implementation of the Project Control Plan. The Project Control Manager shall ensure that component personnel are engaged to effect proper control and reporting regimes over the project. The Project Control Manager shall be authorised to operate within limits required by the project control scope. On smaller projects, the Project Control Manager's role will be played by the Project Manager and he or she is then will be responsible for the implementation of the Project Control Plan.

Programme Management

A programme is a tool to monitor project performance in terms of its time factor.

It is a critical requirement that the programming be completed to the extent necessary for the proper planning, control and reporting requirements. The networked programmes are commonly used for the purpose and Gantt chart formats are popular in the construction industry because of their simplistic presentation and easy readiness. Other forms of Programme (such as March charts) may be used in addition, depending on the nature of the Project.

The Programming software requirements may be as listed in Project (Contracts) document and/or the Company's choice. The Programme shall be developed in the initial stage of the Project with available information and then shall be reviewed regularly to introduce necessary changes with information that is more realistic to reflect planning changes and progress. The Programme must be supported by analysis of determined activity durations and dependency. The Programme may be developed as 'resources loaded' programmes or 'time duration' programmes depending on the nature of the Project and Project (Contracts) requirements.

The level of detail shall be sufficient to enable effective planning of the Project Works. The Programme shall be developed at least at level four as a minimum and shall clearly identify critical path(s) to completion(s). In general, the Work Break-Down Structure shall reflect the Project Cost Structure for better reporting and interpretations.

The Programme shall be updated at least weekly to understand the Project status and this is a key performance requirement that is required to determine the financial health of the project.

The Project Control Manager needs to work closely with the construction team and heads of other disciplines to obtain the correct information to update the Programme on a regular basis to ensure that the Project Programme accurately reflects Project status and intentions.

The summary Programmes may be useful in reporting to higher-level control and reporting (for corporate reports).

Not all activities in a programme are critical to achieve Project completion. The Project Control Manager should understand the critical activities (areas) of the Project Programme and should closely monitor those areas/activities to understand how well those activities are performed. A programme may have multiple critical paths if the project is having different milestone dates to deliver the project in different phases. The other vital point the Project Control Manager should monitor is that the programme critical path will be moving from one area to another, depending on the performance of different areas of the project. Thus, regular monitoring is an essential function of programme control. Any time slippages and gains of critical and closely critical activities should be reported and necessary warning and corrective measures introduced to the Programme.

The possible actions may have sometimes-critical impacts on budget, quality, and/or time. The Project Control Manager should evaluate actions which have zero or minimal impact on project cost, time and quality. To look at a simple example: assume that progress reports show that a project has to absorb a delay to a deliverable on the critical path. Most Project Managers will without much thought reach options such as reducing the scope of the deliverable, reducing the quality of deliverable, applying additional resources (generally manpower and/or capital) and rearranging the workload. Some of these options may be constrained by logistical problems e.g. unavailability of suitable labour to be assigned to a project when required. However, in many cases, the Project Control Manager has to use instinct as to deciding the appropriate course of action. The basic point here is that logistical problems and political thinking do exist within a project and the

Project Control Manager should not ignore these facts but should understand the implication of the action that is about to be taken and not ignore the effect their action will ultimately have on the final outcome of the project.

Project Cost Control

The Project budget should be developed at the initial stage of the Project and reviewed and updated during its progress to incorporate more realistic figures. The budget should be structured in a manner that reflects the intended manner of project execution. It should logically split costs according to activities and type of costs in a manner that provides for meaningful feedback for assessment of costs versus progress, and feedback for the estimators for future use.

As the nature of the construction business is one where productivity is largely measured by inputs of plant, labour and subcontracts versus linear progress, activity codes should generally include only these cost types. Materials and indirect costs should be accounted for in other codes. There will be activities where this does not apply and discretion shall be used in these cases.

Project cost shall be allocated in a manner that reflects the budget structure and intent. A costing map shall be prepared for the project that describes the way the budget costs have been allocated. This map will be used for allocation of costs in a manner that reflects the budget.

A cash flow forecast shall be prepared based on the project Budget and Programme detailing expenditure and revenue.

The cash flow forecast shall be reviewed and updated regularly to incorporate changes to the budget and programme during the progress of the Project. The impact of changes shall be clearly identified and reported to relevant parties for their information, avoiding any possible payment issues due to fund allocations by financiers of the Project. The information may be presented in worksheet form and in graphical format for easy understanding.

Risk Management

Contract agreements are documents that describe liabilities and responsibilities of parties to Contracts in delivering different elements of the project. The Agreements describe how parties share commercial and

other risks involved with the project in performing their roles. These risks need to be understood by each party well in advance. A risk management system should be in place to respond to any risks that materialise whilst delivering the project. A Risk register is a good tool the parties should use in recording, monitoring, and introducing necessary measures to the risks; each party is liable.

Though Contracts Conditions define each party's responsibilities/liabilities it is common fact that parties have different interpretations and opinion on the same term of the Contract. This will lead to disputes among parties and will adversely affect project performance. Early identification of risks involved with the project and monitoring them closely will minimise potential disputes and improve project health.

It is apparent that some risks can be avoided or at least the effects minimised if they are identified in early stages. The risk register should include not only the risks identified but also possible risk mitigation strategies and measures introduced to avoid or minimise the effects. For example, if the Project Control Manager identifies obtaining a tree cutting permit from an environmental authority as a risk which will affect the Project Programme, it is then the Project Control Manager's responsibility to suggest a strategy to avoid or, if not possible, mitigate the negative effects of this risk on the Programme.

Procurement Management

A materials procurement plan should be prepared for the Project and this should highlight any long lead items and their necessity to the Project Programme. The procurement plan should be tailored to the size of the Project and the value of the procurement.

In its simplest form, the Procurement plan may be a worksheet (Spread sheet). The plan shall include details of the materials to be purchased by package, details of the potential vendors, engineering and construction interfaces, latest date to make a formal order (in order to meet the programme) and any contract requirements (specific Vendors or prior approvals for vendor). The decision on procurement will be made not only on price and quality but also on availability and delivery time and methods.

A sub-contract plan should be established by the Project Control Manager and in general, this plan

includes elements of the Works to be completed by Package Contractor(s), latest date for commencement of subcontract works and from that, a timeline established for the procurement of subcontractors for each package. The selection of subcontractor will be based on capacity, availability, and price. Standard conditions of contract will be used with any particular terms in preparing necessary agreements for suppliers and package contractors.

The expenditure approval authority matrix should be prepared indicating limits of authority of all key members of the Project, and this shall be strictly followed to avoid later disputes on approved personnel.

Contract Management

It is essential that adequate commercial controls are established at the commencement of a Project. Underlying the establishment of adequate controls is the need to understand the functioning of Contracts. In particular, a sound understanding of the operation of the Contracts with respect to payment terms, notices (including any time-bar provisions), change orders, delays, insurance and dispute settlement procedures.

It is good practice to prepare a flow chart on the operation of the Contract and brief the project team accordingly. The commercial team may prepare pro-forma documents for change orders, notices, schedule of change requests /delays and claims and where required, these document forms shall be agreed among the parties as information flow. Any entitlements under the Contract Conditions should be ensured by communicating messages to the relevant party as appropriate in a timely manner.

The package contracts shall be managed in a similar manner to the head Contract pursuant to subcontract terms and conditions. The Project Control Manager shall ensure that insurance obligations are met and certificates of insurances obtained. A schedule of change requests shall be established and maintained for all packages contractors. The final forecast value of each package contract shall be assessed and reviewed periodically to ensure correctness. A provision of manpower, safety and environmental statistics should be made a pre-requisite to entitlement to any payment under the contracts as a control measure

The Project Control Manager shall ensure that all required insurances are in place prior to the commencement of

works under Contract(s). The Project Control Manager shall ensure that whenever an event occurs that may be covered under an insurance policy that the insurer is notified and evidence collated in support of a possible claim. It is again good practice to establish and maintain a register of insurance events detailing claim number, policy, likely value, loss adjustment status and close out status.

Project Organisation

The organisational charts clearly identify all positions of the project. Organisational charts shall be prepared in a format that suits the requirements of the Project and these charts should be reviewed regularly and updated to include changes taken place during the period.

The charts shall be developed for the purposes of communicating project-reporting lines and identifying key project personnel by name and position. Furthermore, they will provide a tool for the management of personnel and present labour resources on the project.

Meetings

Regular internal meetings and meetings with other parties of the Project are vital in communicating project issues in a timely manner.

All meetings shall be minuted and circulated among participants to receive any comments and/or feedback on the matters discussed and recorded in the minutes of meetings.

The Engineering and Procurement meetings and construction meetings shall be held weekly.

Internal Project Coordination will be held as determined by the Project Manager and dependent on the size and complexity of the project.

For major Projects, supervisory board meetings (corporate level) may be conducted on a monthly basis.

Project coordination meetings are other essential meetings for major projects where many parties are contracted to deliver different elements of the project (civil, mechanical, electrical etc). In these meetings, parties can discuss and agree on their programme requirements, safety procedures etc to avoid any future conflicts, which will affect overall project performance.

Document Control

The Project Control Manager shall implement a document control system. The system should have the characteristics of:

- All correspondence and documents (incoming and outgoing) go through document control
- All correspondence and documents should have a distinct identifying number
- All documents should include a Revision Status to enable the tracking of changes
- A documented distribution matrix to ensure that documents are effectively distributed to all personnel requiring them
- All correspondence and documents are approved prior to issue
- Registers are maintained for all correspondence and document transmittals
- Registers are reconciled on a regular basis with other parties involved

The Project Control Manager shall implement a file security system that may include secured hard copy files and access restrictions on electronic files. A file access authorisation matrix should be developed and maintained for each project. IT administrators should administer electronic file access restrictions in accordance with this plan.

Whilst restricted access is not required for most project files, it is essential that only personnel authorised to access sensitive project files are permitted to do so. These files will include financial records and reports, commercial/claim records and personnel data of Project employees including wages and salaries.

Project Audit Plan

The Project Control Manager shall prepare a Project Audit Plan for the approval of the Project Supervisory Board. The Audit shall be performed by corporate personnel or third parties as required. The Audit plan shall include financial auditing, total quality management auditing, health, safety and environmental auditing and quality control auditing.

Project Reporting

The Project Control Manager shall develop a reporting matrix detailing type of report, due date, responsibility of preparation and distribution list. The Project Control

Manager shall review Contracts and determine reporting requirements under Contracts and where possible internal reports shall be used as the basis for Contracts report to minimise unnecessary duplication of effort.

The daily progress reporting is one of the key report that should be maintained to record the progress of the Project on a daily basis. These reports shall include, as a minimum, daily progress verse daily planned progress, deviation from programme in days for the day, summary safety statistics, manning, equipment (in operations and idling), issues, and mitigation strategies. A daily report format should be prepared that will form the basis of progress reporting to relevant parties of the project.

Weekly financial and programme status reports are common in many construction projects. The intention of this report is to discover gross deviations from budget and programme in a time frame enabling early corrective actions to be taken.

The monthly report is the primary report on the health of the project. It is correct practice to agree on a fixed date for project status (e.g.20th of each month). Submission on time is a key performance indicator for personnel involved in report preparation, review, and submission. The monthly reports should includes details of Health, Safety and Environment status, Engineering, Procurement and Quality status, Progress/Programme status, manning information, insurance and financial status.

The health, safety, and environment section in general reports details of total man-hours achieved during the reporting period including any loss hours due to accidents. It usually includes accidents, near misses, and damages. The monthly quality report shall focus on quality control status. It is good practice to establish and maintain registers for NCR, RFI, TQ and narrative on QC issues. Monthly Engineering reports should detail status of engineering using key performance indicator's as determined on the Engineering plan. This section of the report in general records engineering percentage completion, drawings, and reports at approved status and engineering man-hours during the period.

A monthly procurement report is applicable to major projects with significant procurement scope. The data may be presented in a graphical form (typically S-curve) contrasting actual performance with planned

performance. The procurement report shall also include a copy of the procurement status and expediting status reports and shall detail key issues and mitigation strategies and a summary of risks and opportunities exists.

The programme report shall include actual performance with planned performance by month and cumulatively. The report shall discuss slippage and/or gaining of programme, changes to critical paths, forecast completion dates, key issues of programme achievement, mitigation measures, summary risks and opportunities. The manning report will comprise a manpower histograms/curve detailing actual verses planned under categories of Project Management, Construction Management, Construction Services, and Package Contracts.

The monthly report should include a forecast cost at completion that shall accurately reflect the Project Control Manager's view of the likely final cost. The forecast should consist of a baseline estimate reflecting the updated programme and actual /anticipated resources levels to the anticipated end date. The report should include a financial assessment of risks and opportunities identified on the project that should be maintained in a matrix with an assessment of costs on a best/likely/worst outcome.

It is good practice to include an updated register for change orders, including details of notice submission, value, status (approval, pending), any extension of time involvement with change order etc.

Summary

Many project control systems involve monitoring, reporting and introducing necessary corrective actions to maintain project cost and time targets. The project cost control systems include monitoring and controlling of budgets, cash flows, commercial risks, and management of contracts. The programme control system involves monitoring and controlling of project time, resources and, procurement schedules. It will also monitor risks associated with the programme and strategies to minimise the effects.

Most Project Managers recognise the need for project control as it applies to budgets and plans. However many Project Managers fail to make the connection between these two elements in responding to situations.

In order that lessons learned on each project are communicated to the organisation to enable operating practices and procedures to be improved, a Project Close Out report will be generated.

Chichester Joinery Ltd v John Mowlem & Co plc (1987)

A quotation submitted by a sub-contractor was accompanied by their standard terms and conditions. The main contractor sent a purchase order containing their own standard terms which stated that 'any delivery made will constitute an acceptance of this order'. Sub-contractors delivered the work, but not until after they sent the main contractor a printed acknowledgement of order, which stated that the order was accepted 'subject to the conditions overleaf'.

Held that by accepting the joinery the main contractor had accepted the sub-contractor's conditions.