

PORTFOLIO MANAGEMENT OF MULTIPLE BUILDING PROJECTS USING EPPM

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Abstract - The portfolio is widely used by top-level management. The portfolio contains a group of projects. A portfolio is a set of projects organized according to criteria specific to the needs of each. The portfolio allows you to select a project group and review, analyze, and evaluate high-level summary data about the organization's ongoing initiatives and upcoming proposals. The portfolio will provide effective and efficient decisions. In this study, we selected four commercial/institutional buildings. The drawing of the project were collected from the office where the project was studied. The quantities were calculated in excel format for each and every material quantity of the project. Labour productivity was assembled from different contractors, engineers depending on which the labour required to carry out quantity of work and duration required to complete the activity were calculated. The management software used for planning and scheduling of projects is Primavera EPPM P6v16.1. After the planning and scheduling of projects, baseline where created and updated the projects. Budget required for individual project also calculated. Depends upon budget and activity scheduled, arranged a monthly spending plan of each project. Then using Primavera P6 EPPM prepared a portfolio of projects. After evaluating of portfolio concluded that it raises the issue of cash flow available for use in expansion and growth of the project, transport facility optimally used; bulk transportation becomes cheaper, less warehousing cost and reduction in administrative cost.

Key Words: Portfolio, Primavera EPPM P6v16.1, Cash flow, ROI etc.

1. INTRODUCTION

Construction industry has various problems due to environmental challenges. Resource availability is affecting to construction industry due to mobilization and comparative prize. Companies have to be very efficient to gain the expected client. It has forced to execute multi-project simultaneously to utilize resources across the multi-project. The benefit of the handling multi project can be reduces the resource availability problem, cash flow problem, and warehousing problem etc. That help us to reduce the cost, time management and risk management. The ability to handle multi-project within the portfolio such as construction of building, highway, bridges, tunnels etc. becomes easier and can be manage efficiently using the software like Primavera P6 EPPM P6v16.1.

1.1 About Primavera P6 EPPM

Primavera is used for facilitating project management smoothly. In civil engineering, it is useful to create strategies, to control the delay of the project and to determine the optimal use of resources. Primavera is used to completing the project within the time and costs indicated. It is the application of skills, tools, and techniques to project activities to meet the owner's demands. The Primavera program is used to schedule, control and estimate all types of projects.

P6 EPPM is a fully online interface whose goal is for the venture group to get business data anywhere, anytime. P6 EPPM can provide cost management, asset planning and scheduling that enables the association to establish well-informed options and improve their ability to deliver projects and tasks on time and on spending plan.

P6 EPPM helps as follows:

- It is provider of far-reaching venture administration arrangement.
- Recognized and used comprehensively
- It can deal with different tasks in a brought together area
- It provide opportunity to integrate ERP or bookkeeping framework.
- It is an electronic venture administration; allow to access venture group activity data anywhere and whenever it required.
- A 100% online user interface covers the entire lifecycle of venture administration.

1.2 Introduction about Portfolio

The portfolio is widely used by top-level management. The portfolio contains a group of projects. A portfolio is a set of projects organized according to criteria specific to the needs of each. The portfolio home page allows you to select a project group and review, analyze, and evaluate high-level summary data about the organization's ongoing initiatives and proposals. The portfolio will provide effective and efficient decisions.

1.2.1 Project Portfolio Management (PPM)

"Project Portfolio Management (PPM) refers to a set of procedures or methods used to collectively analyze and manage a group of projects based on a variety of

characteristics". It is widely used by project management organizations and project managers.

The basic objective of project portfolio management is to determine the optimal mix and sequence of projects proposed to achieve the overall objectives of an organization.

Project Portfolio Management (PPM) incorporates all information about project into a single web business solution in the form of a portfolio. Organizations use PPM solutions to procure and display all information about their projects, and then rank and prioritize each project based on certain conditions. When creating and using a PPM system, an organization's managers have panoramic views of projects. This is used to efficiently resources distribution, monitor requests for multiple priorities, review changing demands, and detect possible redundancies.

If implemented correctly, PPM is a very effective way for large organizations to manage the environment of their projects and have a significant impact on the use of their resources, namely finance, service, staff, equipment, and facilities.

Portfolio management refers to the science of analyzing strength, opportunities for weakness and threats to carry out a wide range of activities related to a person's portfolio in order to maximize performance at a given risk.

The main tasks related to portfolio management are as follows.

- Make decisions on the combination of investments and policies.
- Link investments to objectives.
- Asset allocation to individuals and institutions.
- Balance between risk and performance.

Portfolio management can be described as follows: (1) customer support portfolios or (2) business line portfolios. This approach would include any type of commercial or government organization offering all its services or products in business lines and various categories of projects to support these business lines.

2. LITERATURE REVIEW

Based on scheduling, planning, and tracking of construction project with the help of Primavera P6 software some research review are as follows:

S.M.B.Jaswanth et. al. (2018)^[1] this paper deals with study of conventional method of planning which consumes more time to planning than planning using primavera P6. In addition, he found that many companies are still using conventional method of planning and very few are using Primavera P6. In this paper author carried out optimization of scheduling and planning method and optimized 6% of schedule with the help of primavera P6 and 2.9% cost variation after optimization of cost.

Hitanshu, Khushpreet, Uma Malik et al. (2017)^[2] studied the project monitoring and controlling using Primavera P6 and

find out causes for delay. In addition, they categorized causes as follows: Excusable or non-excusable, Critical or noncritical, Concurrent or non-concurrent, Compensable or non-compensable. For doing a study, they consider a four storey building of Ayurveda Research Centre, which is situated in the Pandoh, Mandi (H.P). Further, they stated that the Primavera software shows the progress of the project step by step and it can show the clear image of the project progress which helps in minimizing the impact of delays in the project

Anna Jerbrant et. al. (2013)^[9] this paper analyses the practice of managing the portfolio of localization projects and explores their improvisational nature. The overall goal is to deepen the understanding of what project portfolio managers do when managing portfolios from the perspective of organizational theory. In this research, the author explores the actions of portfolio managers who manage project portfolios and draws on two different case studies. The approach is qualitative and interpretative, to gradually develop an understanding. This document addresses an identified need to study the practice of portfolio management of located projects.

3. OBJECTIVES

- To identify the commercial building construction sequence.
- To obtain the quantities for all the required activities from the estimation and costing.
- To estimate the practical durations required to perform the activities.
- To identify scheduling method used by the organization in generating plans and schedules.
- To develop planning and scheduling of institute building in Primavera EPPM P6v16.1 based on cost and the quantity of work.
- To develop portfolio of the multiple project in Primavera EPPM P6v16.1
- To find out the cash flow in Primavera EPPM P6v16.1
- To serve as a project control tool.

4. METHODOLOGY

The following are the some of the methodology obtained for study

- Calculate the quantity of all the activity using Microsoft Excel 2016.
- Planning, scheduling and budgeting of all the activities using Primavera EPPM P6v16.1
- Resource allocation for each activities using Primavera EPPM P6v16.1
- Creation of baseline at different stages of project in Primavera EPPM P6v16.1
- Updating the actual progress of the project in Primavera EPPM P6v16.1
- Developing portfolio of multiple project in Primavera EPPM P6v16.1

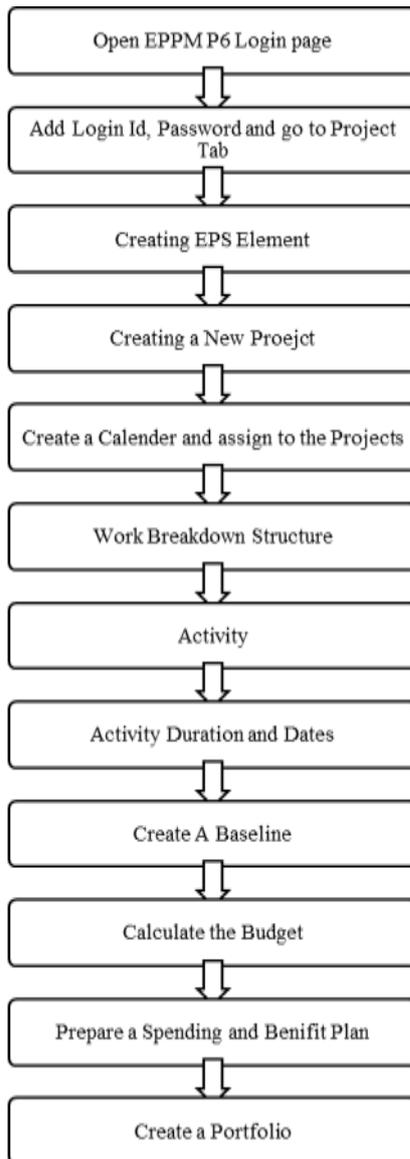


Fig -1: Steps Involved in Portfolio

- Project Name: ALL INDIA INSTITUTE OF MEDICAL SCIENCE
- Location: MIHAN, NAGPUR
- Scope of work: Construction of hospital and academics campus at AIIMS Nagpur (Maharashtra) including internal electrification, HVAC, PHE, Fire Fighting and external developments work etc. and their maintenance during defect liability period.
- Civil Structural Consultant: H.S.C.C (INDIA) LIMITED E-6, SECTOR 1, NOIDA-UP
- Architect: PERKINS EASTMAN DPC. 115 FIFTH AVENUE, NEWYORK
- No. of Building: 9
- Project Duration: 22 Months
- Contract Value: 583.5 Cr.
- Contract Type: Item Rate Contract
- No. of Building Considered for Study: 4

5.1 Estimation of the Project Quantity

The drawing of the project were collected from the office where the project was studied. The quantities were calculated in excel format where each and every material quantity of the project like earthwork excavation , steel reinforcement required , concrete quantity etc. was calculated and was summarised in a excel sheet.

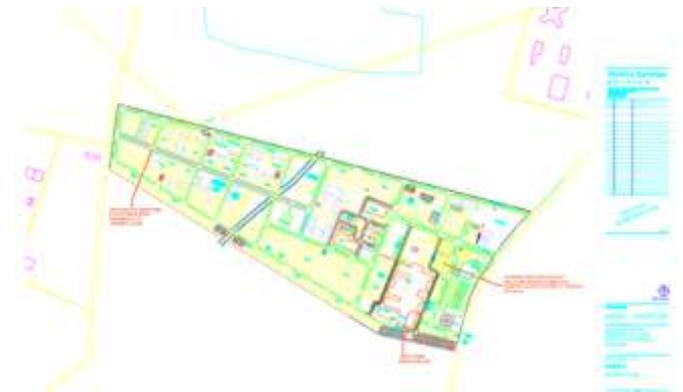


Fig -2: Master Plan of AIIMS, Nagpur

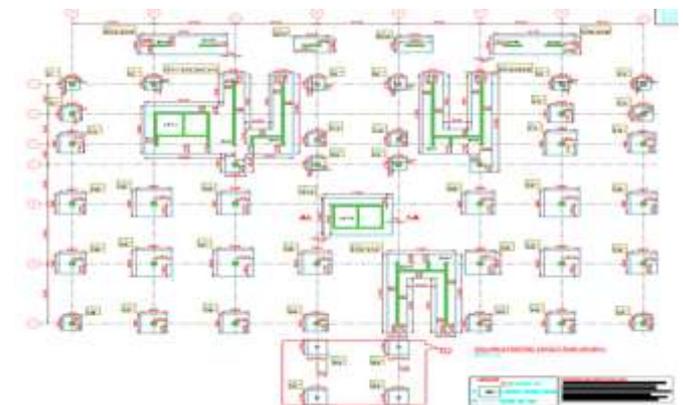


Fig -3: Column and Footing Layout of Ayush

4.1 ROI

ROI represents Return on Investment. This page displays cost/benefit information based on live data for the group of open project. Net Present Value (NPV), period of payback and ROI calculations are based on the spending and benefit plan values, the discount rate and the rate application period recorded for a project.

ROI calculations are given below.

$$NPV = \text{Total Benefit Plan PV} - \text{Total Spending Plan PV}$$

$$ROI(\%) = \frac{NPV}{\text{Total Spending Plan PV}} \times 100.$$

The Payback period is the period required to recover the amount of the initial investment.

5. INVESTIGATION AND ANALYSIS

Brief detail about the Project

- Company name: ACIL, NEW DELHI

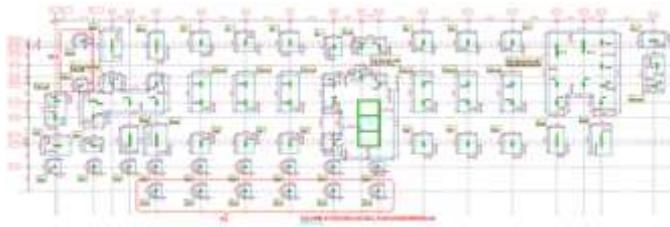


Fig -4: Column and Footing Layout of Dharmashala

5.2 Resource Calculation

Labour productivity was assembled from different contractors, engineers depending on which the labour required to carry out quantity of work were calculated, and the same was implemented to planning depending on the duration of the activity, again if any changes required in the number of labours required per day was changed.

Example:

- 1) Activity Name: Concrete to PCC (100 mm thick)
 Quantity of Work: 38.32 Cum
 Labour Productivity: 1 mason, 5 male helper and 5 female helper can complete 13 m³ of PCC in 1 day working 9 hours a day. Therefore,
 Let us plan the activity of laying of PCC for say 3 days
 So, quantity of work to be completed in a day is as below
 $38.32 / 3 = 12.78 \text{ m}^3$
 Therefore, the labour required per day is, 2 mason, 5 male helper and 5 female helper.
- 2) Activity Name: Shuttering to Footing
 Quantity of Work: 409.276 Sqm.
 Labour Productivity: 2 Carpenter & 1 helper can complete 16 Sqm. of shuttering in 1 day working 9 hours a day. Therefore,
 Let us plan the activity of laying of PCC for say 4 days
 So, quantity of work to be completed in a day is as below
 $409.276 / 4 = 102.319 \text{ Sqm.}$
 Therefore, the labour required per day is, 13 Carpenter and 7 helper.

5.3 Planning and Scheduling in Primavera EPPM P6v16.1

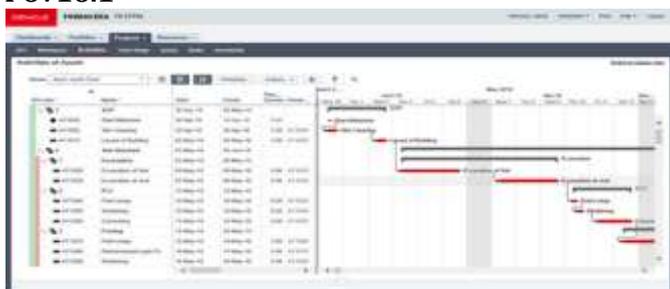


Fig -5: Standard View of planning of Ayush

5.4 Project Baseline and Updating

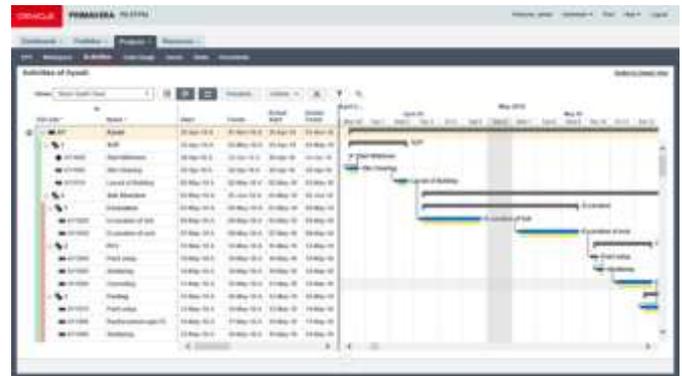


Fig -6: Project baseline and updating of Ayush

5.5 Budgeting

Budgeting will be done on the basis of allocated resources like labour, non-labour and materials used by that specific activity. The resources should be given the actual price per unit so that once the resources are assigned to the activities the software will calculate the total cost of each activity with the help of the resources quantities. The summation of all the activities will give the total budget of the project.



Fig -7: Budget Summary of Ayush

5.6 Spending and Benefit Planning

The following are the spending plans for different project, which are calculated, based on projected project spending for a specific time.



Fig -8: Spending Plan for Ayush

Current Budget = ₹ 460,00,000.00
 Total Spending Amount = ₹ 461,94,077.32
 Current Variance = ₹ 460,00,000.00 - ₹ 461,94,077.32
 = (₹ 1,94,077.32)
 Benefit Amount = ₹ 529,91,935.43
 NPV = Total Benefit Plan PV - Total Spending Plan PV

$$= ₹ 529,91,935.43 - ₹ 461,94,077.32$$

$$= ₹ 67,97,858.11$$

$$\text{ROI (\%)} = \text{NPV} / \text{Total Spending Plan PV} \times 100$$

$$= (₹ 67,97,858.11 / ₹ 461,94,077.32) \times 100$$

$$= 14.72 \%$$

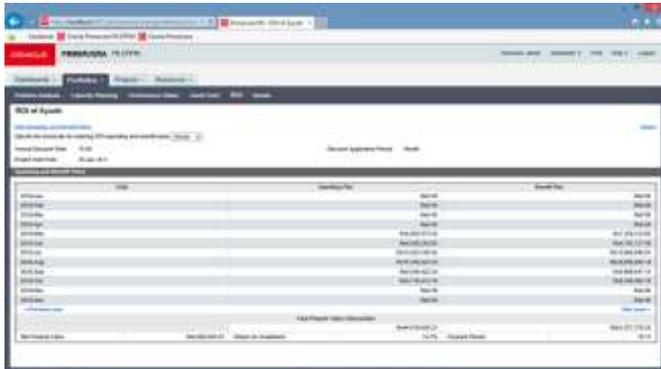


Fig -9: Spending and Benefit Plan of Ayush



Fig -12: Total Spending for Portfolio

5.7 Portfolio Analysis



Fig -10: Portfolio Analysis of AIIMS Projects Portfolio



Fig -13: Return on Investment of AIIMS Projects Portfolio



Fig -14: Monthly requirement of steel (P6 EPPM)



Fig -11: Gantt chart of AIIMS Projects Portfolio

The steel required for foundation of project is as follows

Table -1: Building wise monthly steel Requirement

Building	Requirement Date	Quantity(MT)
Ayush	14-May-18	19.11
Dharmashala	23-Oct-18	45.14
Medical College	16-May-18	15.54
Boys Hostel	26-May-18	45.27

The total quantity of steel required for individual project is estimated every month. If the steel required for individual project is ordered separately 2 days before the activity starts, the cost of the steel as well as transportation changes for delivering multiple loads multiple times for each project separately becomes very costly and it should be noted that the steel rates vary day by day.

Thus if the total steel required for a particular month for a portfolio is ordered in bulk, the bulk transportation becomes cheaper as well as the transportation facility is utilized optimally.

6. CONCLUSIONS

The objective of this study was to develop the awareness of what project portfolio managers actually do when they administer the portfolios. To conclude, improvisation in multiple project environments, regardless of whether it is a project or portfolio management in focus, is based on creating "action spaces" and moving away from the rigid and rational formal structures pressed by time through the improvisation, instead of focusing on planned and structured work. However, the strategies used to support the creation of senses when improvising are different according to their unique project or the management of their portfolio. While the focal point of the project manager is to narrow the focus and exclude others, the focal point of the project portfolio manager is to broaden the focus and expand the "action space" by including others. These differences could be explained in part by a greater capacity for a holistic approach and an appreciation of the formal structures of standardization at the portfolio level and a situation characterized by an overload of information at the project level. While project managers use structures of sense of support created informally and collectively and/or individually to improvise (i.e. they are "narrowly focusing" and excluding "the other"), project portfolio managers increase the communication between managerial levels (i.e. they are "extension approach" and include "the other").

Our findings on the nature of improvisation in multi-project organizations contribute to a better understanding of the management of project portfolios in practice. When comparing the improvisation in the management of the portfolio of projects with the improvisation in the management of projects, we can conclude that the strategies used for improvisation seem to be different between the managers of projects and the managers of the portfolio of projects.

- It raises the issue of cash flow available for use in expansion and growth of the project: The cash flow of individual projects have been planned as above. The project managers are only concerned about their individual projects. They manage their individual project cash flow as well as estimate the budget required for the upcoming monthly expenditures. However, when the cash flow issue arises at any stage of work progression, the work gets ceased and the project gets delayed until the cash flow issue gets encountered. To overcome this problem, the overall spending plan of the portfolio is calculated.

Estimating the overall expenditure of the portfolio gives an idea about the budget required at every stage of planning and execution, which assists to arrange the required capital even before the issue arises. It, in turn, facilitates the progression of the project without delay by altering the revenue granted within the portfolio. Therefore, with the help of this method, we can resolve the issue of cash flow availability and proceed smoothly in the expansion and growth of the project.

- Transport facility optimally used; bulk transportation becomes cheaper: The total quantity of materials required for an individual project is estimated every month. If the materials required for an individual project is ordered separately 2 days before the activity starts, the cost of the materials, as well as transportation charges for delivering multiple loads multiple times for each project separately, becomes very costly and it should be noted that the materials rates vary periodically. Thus if the total materials required for a particular month for a portfolio is ordered in bulk, the bulk transportation becomes cheaper as well as the transportation facility is utilized optimally.
- Less warehousing cost: In the scenario of individual project handling, separate warehousing is required to be constructed at the project location to store all different materials. Also for arranging, and managing of the material separate team is required. With the help of portfolio management can construct a centralized warehouse, also can order materials in bulk as discussed in earlier point. Due to centralized warehousing, one can generate and provide all conditions required for the stocking of the materials, which reduces the wastage of materials.

Due to the stocking of materials in bulk, the inadequacy of material in a leading project within the portfolio can resolve the issues.

- Reduction in administrative cost: If we handle these four projects individually. The separate administration is required for each project to control and manage the overall activities within the projects. Which further influence and effects the overall cost of each project. However, with the help of portfolio management can handle all projects with a single administration, which leads to a reduction in administrative cost.

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