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WORK BREAKDOWN STRUCTURE IN PROJECT MANAGEMENT WITH SOFT LOGICS

Akhila S[1], Mrs. Sujithra.G[2]

[1]M.E STUDENT,(DEPARTMENT OF CIVIL ENGINEERING ,SIVAJI COLLEGE OF ENGINEERING & TECHNOLOGY ANNA UNIVERSITY: CHENNAI)

[2] ASSISTANT PROFESSOR(DEPARTMENT OF CIVIL ENGINEERING ,SIVAJI COLLEGE OF ENGINEERING & TECHNOLOGY ANNA UNIVERSITY: CHENNAI)

ABSTRACT

This paper presents a Work Breakdown Structure (WBS) based model for repetitive projects when considering soft logic. Previous researches are based on the assumption that work sequence cannot be changed for different work zones. In reality, work sequence between work zones are not fixed (actually, constantly adjusted) throughout the project. Instead, they are often changed to shorten the construction time and minimize the total cost. Scheduling with the non-fixed work sequences between work zones is known as the soft logic method. Considering the soft logic in repetitive projects, the proposed WBS model aims to assist the project team to find the minimum overall cost subjecting to different output rates and logical sequences. The software used in this work is Oracle Primavera P6. Unlike some scheduling software programs that are somewhat of a bottom-up approach, Primavera P6 encourages to create a WBS at the beginning of the project. With the help of soft logic consideration in work breakdown structure of repetitive construction projects the site working team can find the after effect of change in work pattern through various sequence of the proposed work. Primavera P6 software makes it easier to apply that change and also to track the overall progress of the work. Final result clearly shows that planning the work in different pattern, before execution, will help the project manager to select an optimum sequence of work breakdown structure.

Keywords: WBS, PRIMAVERA P6, SOFT LOGICS.

I. INTRODUCTION

The main objective of this project is to assist the building entrepreneurs by developing a work breakdown structure by taking in to account of soft logics which can be used for repetitive construction projects. Operation under continuously changing environmental conditions is being involved in complex and unique projects, which require multidisciplinary collaboration, construction companies have to develop realistic schedule and update them regularly. Increasing competition within the industry also forces construction companies to provide products of higher quality, in shorter durations, for lower costs and under safer working environments. Obviously, it is not possible to achieve these objectives simultaneously in the absence of an adequate schedule. Project work breakdown structures can also be used to identify potential risks in a given project. If a work breakdown structure has a branch that is not well defined then it represents a scope definition risk. These risks should be tracked in a project log and reviewed as the project executes. By integrating the work breakdown structure with an organizational breakdown structure, the project manager can also identify communication points and formulate a communication plan across the project organization. When a project is falling behind, referring the work

breakdown structure will quickly identify the major deliverables impacted by a failing work package or late sub- deliverable. The work breakdown structure can also be colour coded to represent sub-deliverable status. Assigning colours of red for late, yellow for at risk, green for on-target, and blue for completed deliverables is an effective way to produce a heat-map of project progress and draw management's attention to key areas of the work breakdown structure.

II. METHODOLOGY

2.1. SITE DETAILS

The site chosen for this project work is Construction of new buildings for Valiyathura Fisheries School in Thiruvananthapuram District which is a work undertaken by Kerala State Coastal Area Development Corporation Ltd (KSCADC). The work consists of the construction of 4 buildings.

2.2. WBS PREPRATION

WBS is prepared for all the four sequences by varying the activity relationships. Relationship changes (i.e., soft logics) are expressed in Primavera software just by changing the list of predecessor activities. Various WBS involved in this construction work are as follows:

a) Approval

b) Site preparation

c) VHSS academic block

d) HSS academic block

e) Administrative block

f) Toilet block

g) Finishing works

2.3. RESOURCES

Resources required for the completion of above-mentioned activities are listed. Unit rates of each item are collected along with the plan and other data from the office itself. Primavera software deals with dollar rate only. Hence Indian rupee is converted to US Dollar. Allocation of resources is done based on the previous work details. Minimum number of resources available at site can also be given to the software. Software calculates the total amount of resources needed for the completion of an activity. Resources involved with the construction can be categorized as follows:

a) Engineers

b) Labors

c) Hire charges

d) Materials

2.4. PRIMAVERA P6

Oracle ‘s Primavera P6 Enterprises Project Portfolio Management is the most powerful, robust and easy-to-use solution for globally prioritizing, planning, 62 managing and executing projects, programs and portfolios. Primavera P6 provides a single solution for managing projects of any size. steps: Procedure for scheduling using primavera P6 includes the following

a. Calendar creation

b. EPS creation

c. WBS creation

d. Activity and their details input

e. Resources creation

f. Resources allocation

g. Resources levelling

h. Scheduling

III. RESULT AND DISCUSSION

3.1. ONE BY ONE BUILDING SEQUENCE

Figure 3.1shows the primavera output for one by one building sequence. The result shows the sequence will take an expected duration of 1476 days and expected cost estimate of 3276200 INR. This sequence can be adopted if there is a situation of limited resources and no specific deadline. This will take more money and time. And also there exist a chance of wastage of resources.

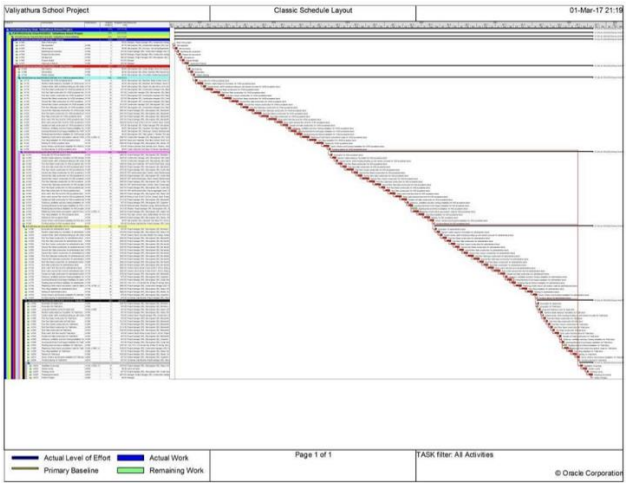

Figure 3.1: Primavera output for one by one building sequence

3.2. ALL BUILDING PROGRESS TOGETHER

Figure 3.2 shows the Primavera output for all building together sequence. The result shows that this sequence will take an expected duration of 651 days and expected cost estimate of 1528934 INR. This sequence can be adopted if there is a situation of faster completion and unlimited resources. On adopting this sequence leads to the demand of too much labors and equipment. Workers have to be separated into four crews and each crew has to be employed for each building which will lead to a little increase in the cost. Material charge remains the same.

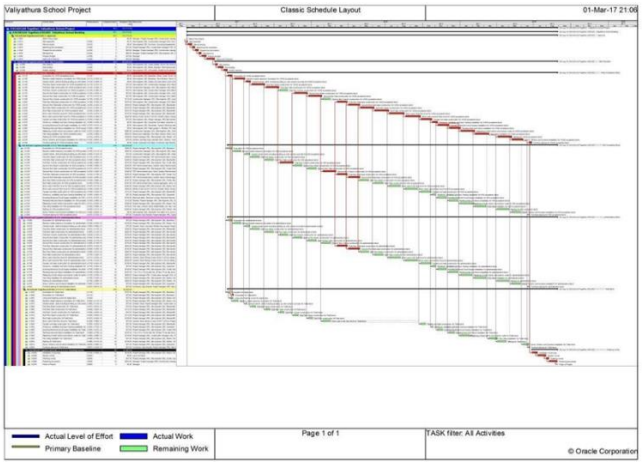

Figure 3.2: Primavera output for all building together sequence

3.3. TWO BY TWO BUILDING SEQUENCE

Figure 3.3 shows the Primavera output for two by two building sequence. The result shows that this sequence will take an expected duration of 1012 days and expected cost estimate of 1047667 INR. Figure 3.4 shows the activity Gantt chart. This is a sequence which can be adopted in normal situations. Hence the two building doesn‘t form a huge work, it can be smoothly executed.

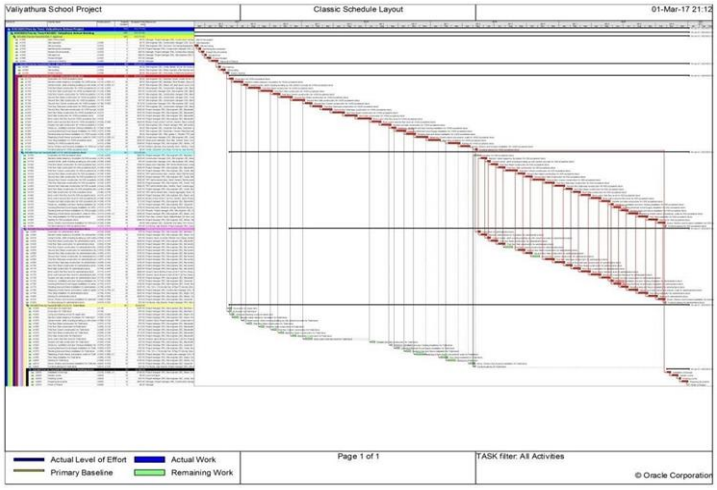

Figure 3.3: Primavera output for two by two building sequence

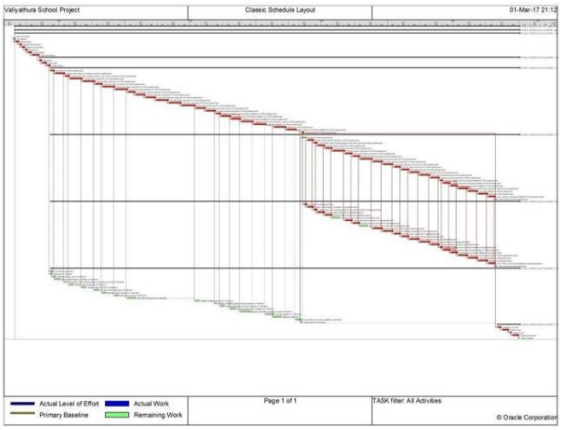

Figure 3.4: Activity Gantt chart for two by two building sequence

3.4. ONE BY THREE BUILDING SEQUENCE

Figure 3.5 shows the Primavera output for two by two building sequence. The result shows that this sequence will take an expected duration of 1003 days and expected cost estimate of 1128200 INR. This is a sequence which can be adopted in normal situations. Hence the three buildings together doesn‘t form a huge work, it can be smoothly executed.

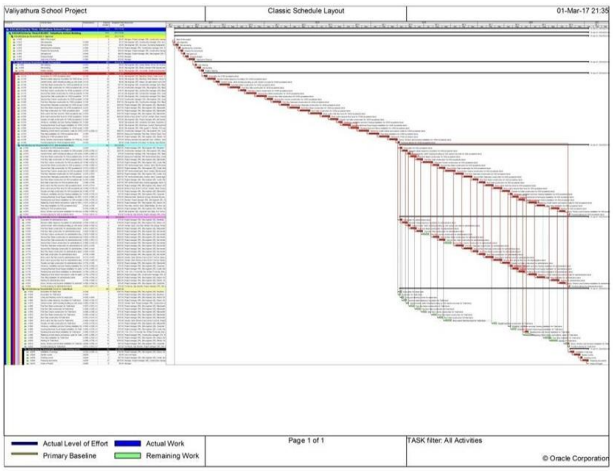

Figure 3.5: Primavera output for one by three building sequence

3.5. SEQUENCE COMPARISON

Table 3.1 shows the comparison of expected duration and expected cost of all the sequences which is obtained from the Primavera output.

Table 3.1: Comparison in budget and duration of all sequences

Sequence	Estimated completion Time(Days)	Estimated Budget	
		In USD	In Rupee
One by One building sequence	1476	49143.00	3276200.00
All building progresss together	651	22934.00	1528933.33
Two by Two building sequence	1012	15715.00	1047666.67
One by Three building sequence	1003	16923.00	1128200.00

IV. CONCLUSION

Both duration and the budgeted cost are too high for the one by one building sequence. Hence it is not affordable. For the all building progress together, hence all work has to be done simultaneously; there arises a need of too much resource. Till it can be adopted if there is plenty of resources and the deadline is too close. Two by Two building sequence is an optimum sequence. It gives an optimum duration and cost. One by three building sequence also need a little much resource during the time of constructing three buildings together. But it is also comparatively affordable. The study made using the sample project concludes that with the consideration of soft logics; duration, resource and cost can be adjusted even at the execution stage. Consideration of activity relations as fixed and non-fixed relation, and dealing the same separately helps to manage crisis in the construction site. Sudden changes can also be applied to the construction schedule by dealing with the soft logics alone. Application of soft logics relation in the work breakdown structure helps in dealing with the top to bottom level of the task. Difficult situations such as reaching deadline, lack of resources, cost control and so on can easily managed by breaking the non-fixed relation among activities.

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