The Efficiency of Project Planning in IT Service Provider Using Traditional Methods, and CPM

A Comparative Study

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Abstract. This research was conducted in an IT service provider that provides the installation of information systems for customers. Planned projects often did not meet their target set by both provider and customer. For example, an SAP project that was set to be completed in six months was delayed until two years by some problems in operational activities. So, the CPM methods were conducted to be used in this case to see the efficiency of meeting the target set previously. Generally, these methods are completed in steps such as identifying the scope and breaking it down into components activities; dependency logic settings and development project network; estimating the duration of each activity; identifying critical path, float, and completion time duration; and crashing stage in several activities needed. This will give a result of comparison between the traditional method delivered and the CPM method using units of time completion. The traditional method using a Bar Chart results in 150 days of project schedule and the CPM Method can be faster with 140 days of Project Schedule. The most efficient method will be proposed to be used in time-consuming projects in the future with the additional recommendation.

Keywords: CPM · PERT · time efficiency · project management · information system

1 Introduction

It is important to complete projects in an increasingly competitive environment in the foresighted time. Effective project management is necessary to finish the projects without delay and with the available qualifications identified beforehand. The project planning techniques are utilized to satisfy these necessities [1].

Inability to manage time, for example, the company's incompetence with sudden alterations and the inevitable representing process by proper tool, can put the company hardly monitoring the project's status [2]. Critical Path Method (CPM) is also a method that is widely used as a tool for scheduling and feasibility of time. The CPM technique is based on deterministic estimates for the duration of activities [3]. Several researchers studied the use of the CPM method in a construction project. In luxury villa construction, CPM (optimistic time) can be completed in 186 days, while another researcher comparing

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method is 205 days with a 50% probability the villa construction will be delayed [2]. In a horizontal laminar production project, the CPM method can show that the construction project can be completed in 520 h and, if accelerated, can be completed in 334 h [3]. In research of parking lot construction project, CPM can achieve 105 days of project schedule while the initial with bar chart only can achieve 140 days [4].

Some researchers also use a prolonged CPM Method called Critical Chain Project Management (CCPM) to minimize delays. This method can provide schedule revision to projects for a better result. Application of CPM using a web-based information system in ship construction projects also can help maintain the project schedule and reduce project delays [5].

This research was conducted in an IT service provider that provides the installation of information systems needed by customers. Planned projects often did not meet their target set by both provider and customer. For example, an SAP project set to be completed in six months was delayed until two years by some problems in operational activities. So, CPM methods were conducted to be used in this case to see the efficiency of meeting the target set previously.

2 Research Methods

This research type was Job and Activities Analysis. This research mainly consisted of activities required in the information system project [6]. Figure 1 shows several steps in conducting this research. Meanwhile Fig. 2 shows the network model of this research.

Research activities in conducted the research can be described as follows:

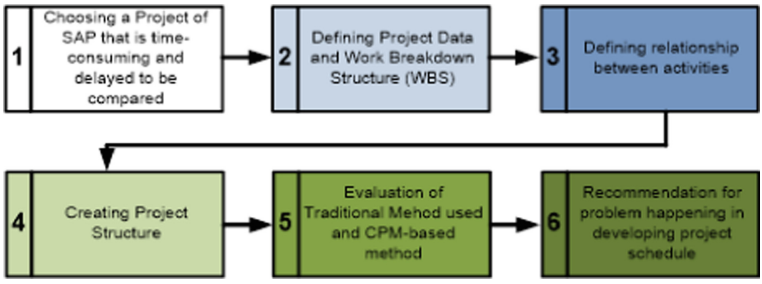

Fig. 1. Block Diagram of Activities in this Research

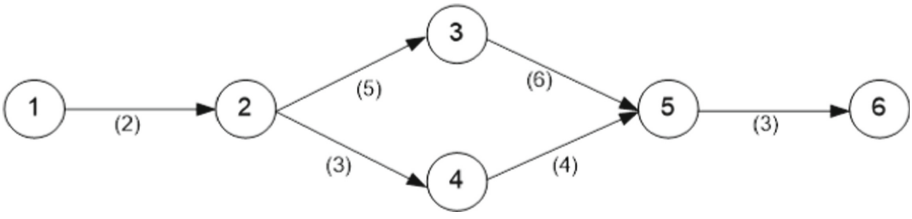

Fig. 2. Network Model

1. Choosing a sample of the project
   The project installed SAP Installation in one of the customers, which is time-consuming and out of schedule.
2. Defining project data and work breakdown structure
   Relationship activities need to define, such as which project must be started along with another project. Also, which project can be started after another project is finished. In manual terms, this can be done by developing a network diagram. A network diagram shows activities arranged in predecessors and the start and end date of each activity [2]. This schedule was developed using the Microsoft Office Project Professional 2019 to make the scheduling process easier and can be copied to stakeholders needed.
3. Defining the relationship between activities
   In this stage, project data needed was collected. Work breakdown structure divides the project into primary elements which define the project scope. This will help users understand the project easily and effectively [2].
4. Creating the project structure
   This stage will show us the project schedule created using CPM Method. The CPM method will give the optimistic time that we can depend on if the project is implemented as scheduled.
5. Evaluation of results
   Results were evaluated. It will compare the schedule developed in the traditional method and the CPM-based method. This stage will also show us the root problem of the traditional method (bar-chart).
6. Recommendation
   The recommendation will be given so the project schedule developed in the future will be more effective.

3 Results and Discussion

3.1 Defining Project Data and Work Breakdown Structure

Data collected in this step defined the task name and duration needed for each activity in the project. The work Medanbreakdown structure of this project can be seen in Table 1 and Table 2.

3.2 Defining Relationship Between Activities

Since this research used Microsoft Office Project Professional 2019, the relationship between activities (tasks) can be done with some codes as follows:

1. Predecessor using the combination between letters and numbers
   For example, in row 4 can be seen the predecessor using code 3FS + 3. FS stated for Finish-Start. This means activity in row 4 can be started after activity in row 3 is finished and with additional 3 days. While using code 8SS in row 57 can be defined as Start-Start, which means activity in row 57 can be started if activity in row 8 started.

Table 1. Phases 1–3 Work Breakdown Structure and Relationship Between Activities

Row	Task Name	Duration	Pred.
2	Phase 1: Project Preparation		
3	Determine workplan, project organization, Roles and Responsible	6 days	
4	Workshop - SAP Overview Training for all module	3 days	3FS + 3
5	Prepare Master Data and Distribution	2 days	4
6	Prepare project charter	1 day	3
7	Kick Off	0 days	5
8	Phase 2: Blueprint		
9	PM	30 days	7FS + 1
10	Subject matter expert	4 days	
11	2.1 Workshop - Understanding TO - BE Process	6 days	
12	2.2 Fit - Gap Analysis, Identify RICEF and detail business proc	6 days	11
13	2.3 Workshop - Review TO-BE Process & RICEF	3 days	12
14	2.4 Document TO-BE Process into Business Process Blueprint	3 days	13
15	2.5 User Role and Authorization Matrix Design	2 days	14
16	2.6 Workshop - Review user role & refine Authorization Matrix	2 days	15
17	2.7 Review and Finalize of BPB & RICEF	2 days	16
18	2.8 Design System Configuration	0 days	
19	2.9 Design Form (FDS) and Data Conversion	4 days	17
20	2.10 Workshop - Review Design	2 days	19
21	2.11 Sign Off BPB, FDS & CS	0 days	20
22	Phase 3: Realization		
23	PM	40 days	21
24	Subject matter expert	2 days	
25	3.1 Copy W-Plant solution	25 days	
26	3.2 Technical Development - RICEF Items	25 days	
27	3.3 Construct Master Configuration w-plant solution	5 days	
28	3.4 Verify SAP configuration completion	0 days	27
29	3.5 Develop Authorization & Testing	5 days	28

2. Predecessor using numbers
   For example, row 5 can be seen predecessor using the number 4. This is actually means abbreviated from 4FS. This means the activity in row 5 can be started once the activity in row 4 is finished without any delay.

Table 2. Phases 3–5 Work Breakdown Structure and Relationship Between Activities

Row	Task Name	Duration	Pred.
30	3.6 Internal Testing (Unit Test & Integration Test)	5 days	29
31	3.7 Collection Master Data from BPO/Key user	0 days	30
32	3.8 Preparation System integration Test Training plan & Material	7 days	31
33	3.9 Migration to KQA	0 days	32
34	3.10 Upload master data to KQA	5 days	33
35	3.11 Conduct SIT for Key User Training (KUT)	8 days	34
36	3.12 Conduct User Acceptance Test	5 days	35
37	3.13 Sign off User Acceptance Test	0 days	36
38	3.14 Develop User Manual by Key User	0 days	
39	3.15 Develop Data Conversion Strategy & Plan	0 days	
40	Phase 4: Final Preparation		
41	PM	20 days	37
42	Subject matter expert	2 days	
43	4.1 End User Training – SAP	15 days	
44	4.2 Review Data Conversion Strategy & Plan	0 days	
45	4.3 Collect & Resolve Issue	0 days	44
46	4.4 Migration to Production Server	0 days	45
47	4.5 Prepare Master Data Conversion (MDC)	3 days	43
48	4.6 Upload Master Data Conversion (MDC) onto Production Server	2 days	47
49	4.7 Prepare Cut Over Transaction Data to Production server		
50	4.7.1 Collect & Upload Opening Balance	2 days	48
51	4.7.2 Collect & Upload Open Transaction	2 days	50
52	4.8 Upload Opening Balance & Confirm (sign off)	1 day	51
53	Phase 5: Deploy		
54	PM	30 days	52
55	5.1 Go Live Support	20 days	
56	5.2 Period (1st month) Closing Support	10 days	55
57	Basis	60 days	8SS

3.3 Creating Project Structure

Once the data required is complete, the software can show the result as a project structure that can be used to control activities until the project is finished.

This results in 140 days of project schedule using the CPM Method. The schedule shows which activities need to be finished before other activities start.

3.4 Evaluation and Recommendation

The company uses the traditional method of using a bar chart to schedule activities required in the project. This results in 150 days of project schedule. Compared to the CPM Method with 140 days of project schedule, CPM is better in scheduling the project. It can lead to a faster and more efficient schedule. But there is still a need to be clear when developing a project schedule; the schedule is faster and cost-efficient [3] and needs to minimize the project delays [7].

The traditional method scheduled is easier to do. However, it can be longer because some scheduled activities give unneeded additional time caused of how detailed the data needs to be shown. Nevertheless, in the simple activities in the project, the traditional method is better because faster and simple. While in CPM, activities can be calculated by hours, not only days of work. This is good to be used, especially in a project with many activities.

The CPM Method shows the resources used in each stage that cannot be shown by the traditional method. So, in terms of control, the CPM method is better than the traditional method [2]. When there is a delay in a project schedule, this software can also give information and predict how much additional cost is to be borne by the company if the schedule is prolonged [7].

To achieve a better result, web-based timely-report and reminders can be used to control project schedules. This will provide a better result, as seen in the previous research of Abdurrasyid et al. [5].

It is recommended to use the PERT method along with the CPM method for a better schedule. This will give a better schedule and control if the company can follow the CPM-PERT schedule in the construction process [7]. The company also can identify the least disruptive scenario using both CPM and PERT methods than the traditional method [8].

4 Conclusion

From this research, it can be concluded that the traditional method is easier to do and easier to understand a project with several activities. The CPM method is better to be used in a project with many complex activities. From the study case in the SAP installation project, it can be seen that using CPM can result in 140 days, which is better than the traditional method that needs 150 days to complete the project. The most efficient method will be proposed to be used in time-consuming projects in the future with some additional recommendations.

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