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Study on the Optimization of Implementation Time for the Construction of the Baraka Sports Facility Center (APBD PEN) Kab. Enrekang South Sulawesi

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A B S T R A C T

In some projects, there are often delays in the completion of work, especially during construction work. To reduce the occurrence of cost overruns, it is necessary to optimize work time that is more carefully planned so that work delays can be avoided. In the field of construction engineering, the Microsoft Project application is used to manage plans or task times so that an ongoing project can be evaluated according to all stages of tasks in the project. The implementation of the Baraka Sports Facilities Center Development Project in June to July 2022 shows the time or duration of the planned implementation of the roof work for 37 calendar days and after analyzing the data using Microsoft Project, the optimization time is 32 calendar days. For 32 days, by increasing the number of workers, the following adjustments were made to improve efficiency: a. For SCH 20, 4" pipework, 3 welders and 3 additional workers were added; b. For batten work with CNP 150.50.20.2, 3 craftsmen and 3 additional workers were added; c. For bitumen asphalt roof covering work (CTI), 7 workers and 7 handymen were added; d. For bitumen asphalt work, 1 worker and 1 handyman were added.

1. Introduction

In certain projects, delays frequently occur in completing tasks, particularly during the execution of construction work [1]. These delays subsequently hinder the progress of various other tasks that follow the construction phase [2]. In some projects, there are often delays in the completion of work, especially during the implementation of construction work [3]. This resulted in the hampering of several other works carried out after the construction work was completed [4]. The delay in the implementation of construction work also resulted in a considerable swelling of work costs [5]. To reduce the occurrence of cost overruns, it is necessary to optimize work time that is more carefully

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planned so that work delays can be avoided [6]. Time optimization is carried out by paying attention to other things such as quality, quality of work, and others [7]. The impact that often arises when there is a delay work is a lack of manpower and a delay in implementation [8]. There are several ways to keep up with the implementation time when there is a delay, namely by adding manpower and remaking the implementation schedule according to the time of starting work, where the completion of this project is scheduled for December 30, 2021, after 123 days which is projected to start on August 26, 2021 [9]. Therefore, the author is interested in conducting a study on optimizing the implementation time of the Baraka sports facility center construction project (APBD PEN) at Enrekang Regency South Sulawesi [10].

2. Research Method

The method used in making this final project is a literature study [11]. Literature studies are carried out by reading journals or references about the application of time optimization in building construction, the object of this research is the construction project of the Baraka sports facility center, and the data obtained are the Cost Budget Plan (RAB), Work Drawings, Unit Price Analysis of Work (AHSP) [12].

3. Description and Technical

1. Research Steps
    1. Literature Study, which is to find and study literature related to this research. Test the Microsoft Project model used in this study [13].
    2. Data collection: The author used previously collected information from UTE UTAMA in the form of budget plans and implementation schedules when researching conducting research to collect data [14].
    3. Use Microsoft Project to enter data obtained from the project in the form of a list of work item descriptions, unit price lists, unit price analyseis, wages and material prices, work volume, and schedules.
    4. Data analysis is the process of obtaining processed data from Microsoft Project after data from project documents is entered. This data is examined for further discussion [15].
    5. Discuss data obtained from project documents to discuss research findings that have been carried out. The results of the study will be presented in this debate [16].
    6. After completing a round of analysis and discussion, the conclusion of the completed research will be obtained. Considering Taking into account the research findings and comparing them with the data collected from the project under study, data conclusions are made.
2. Data Analysis Techniques.
    1. Set project deadlines. The Project Information menu item can be selected to do so. If forward calculation is selected, use Schedule from Start Date. Instead, use a schedule of end dates if you decide to use a countdown.
    2. calendars that you select or create. Individual calendars are used for each project. Some people have 24-hour shifts, night shifts, or office hours from 8:00 to 17:00. By selecting Tools - Change Working Time, you can create or select this calendar.
    3. The Gantt Chart table entry must have a task created. Project tasks are things that need to be done. You can enter the task name, duration, start date, and finish date into the View-Gantt Chart - Entry table. Previous tasks can also be handled with Predecessors [17].
    4. Resource creation When working on a project, resources are used. Equipment, people, or cost can all be considered resources. Select View Resource Sheet from the menu to populate the resource [18].
    5. Provide a list of resources used in each task. When more than one resource is required for a single activity, double-click the task so that the task information is displayed, and then enter the resource in the Resources tab of the task information [19].
    6. Achieve baselines. Basic planning is what is meant by baseline. By selecting Tools > Tracking > Set the Baseline, you can establish the baseline[20]. After a baseline is established, anything that is discovered is referred to as deviation. Select View-Gantt Chart, Table - Variation to view the variance or deviation in terms of percentage[21].
    7. Observe the progress of the project. Select ViewTable> Tracking. The actual Start, Finish, and Completion can all be set there [22].

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4. Results and Discussions

Time duration using field technical analysis

1. Pack. SCH Pipe 20.4 Inch
   Volume of work = 15.028 Kg
   Labor employed = Man power
   - Worker 0.0600 Oh
   - Welder 0.060 Oh
   - Handyman head 0.0060 Oh
   - Foreman 0.0030 Oh

   Sum 0.129 Oh

   Number of workers employed = 9 people
   Production capacity per day = 13 : 0.129 = 100.78 kg/person/day
   (13 hours / Working days)
   Production per day = 9 x 100.78 = 906.98 Kg/Person/Day
   Time taken = 15.028 : 906.98 = 16.57 Days = 17 Days

Table 1. Difference and Duration of Work

No	Types of Jobs	Plan Duration	Optimal Duration	Difference
1	Pek. Pipa SCH 20, 4 Inch	19	17	2
2	CNP Batten 150.50.20.2	10	9	1
3	CTI Bituminous Asphalt Cover	5	5	0
4	Bituminous Asphalt Nok	3	3	2
5	Sum	37	35	5

Source: Analysis data (2022)

As seen in table 1, the duration of the plan obtained from the contractor requires 37 days of work implementationand can be optimized for work completion with a duration of 32 days of implementation to reach 100% weight and does not discuss the costs used during implementation.

Calculation of Labor Increase

1. Pek. Pipa SCH20,4 Inch
   - Volume = 15.028 Kg
   - Normal duration = 19
   - Labor coefficient:

     Worker 0.0600 Oh
     Welder 0.060 Oh
     Handyman Head 0.0060 Oh
     Foreman 0.0030 Oh

   [23]TK = $\frac{Daily\ Productivity}{pr}$

   Where:
   TK = Number of workers
   Pr = Average work productivity

- Worker:
  TK = 906.98/19 = 47.7356

  Worker = 47.7356 x 0.0600 = 2.8641 = 3 Person

- Welder
  TK = 906.98/19 = 47.7356

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= 47.7356 x 0.060 = 2.8641 = 3 Person

- Handyman Head
  TK = 906.98/19 = 47.7356
  = 47.7356 x 0.0060 = 0.2864 = 1 person
- Foreman
  TK = 906.98/19 = 47.7356
  = 47.7356 x 0.0030 = 0.1432 = 1 Person

Table 2. Calculation of Labor on the Pack. SCH20.4 Inch Pipe

Workforce	Usual	Addition
Worker	4	3
Welder	3	3
Handyman Head	1	1
Foreman	1	1
Sum	9	8
Workforce	Usual l	Addition
Worker	4	3
Welder	3	3
Handyman Head	1	1
Foreman	1	1
Sum	9	8

Source: Analysis data (2022)

Table 3. Labor Calculation on CNP Batten 150.50.20.2

Workforce	Usual l	Addition
Worker	4	3
Welder	2	3
Handyman Head	1	1
Foreman	1	1
Sum	8	8

Source: Analysis data (2022)

Table 4. Labor Calculation on CTI Bituminous Asphalt Cover

Workforce	Usual l	Addition
Worker	4	7
Welder	2	7
Handyman Head	1	1
Foreman	1	1
Workforce	8	16

Source: Analysis data (2022)

Table 5. Calculation of Labor on Bituminous Asphalt Nok

Workforce	Usual l	Addition
Worker	3	1
Welder	2	1
Handyman Head	1	1
Foreman	1	1

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Workforce	8	4

Source: Analysis data (2022)

Optimization of time can be obtained for 32 days by increasing the number of workers for SCH pipe work 20, 4", workers plus 3 welders plus 3 people, CNP batten work 150.50.20.2, work plus 3 people builders 3 people, CTI bitumen asphalt roof covering work, workers plus 7 people, builders plus 7 people and bitumen asphalt nok work, Workers are added 1 person and handymen are added 1 person.

5. Conclusion and Suggestion

5.1 Conclusions

1. The implementation of the Baraka Sports Facility Center Construction Project from June to July 2022 shows the time or duration of the plan to implement roofing work for 37 calendar days and after data analysis using Microsoft Project, the optimization time is 32 calendar days.
2. Optimization of time can be obtained for 32 days by increasing the number of workers for SCH pipe work 20, 4", workers plus 3 welders plus 3 people, CNP batten work 150.50.20.2, work plus 3 people builders 3 people, CTI bitumen asphalt roof covering work, workers plus 7 people, builders plus 7 people and bitumen asphalt nok work, Workers are added 1 person and handymen are added 1 person.

5.2 Suggestion

It is recommended to related parties, the Baraka Sports Center Project to pay attention and provide more supervision of critical work items where critical work items have work that can affect the overall project time so that if some obstacles or factors can hinder work can be evaluated as early as possible so as not to cause project delays from the planned time.

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