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# Application of Fast Track Method to Accelerate Project Implementation Time in the Hospital Construction

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***Abstract*** *— In a construction project, we must complete the project with quality, duration, and cost as planned. Therefore, usually, we will arrange a project schedule before starting a construction project. Although the schedule has been arranged, in reality in the field there are still often delays in project completion. Of course, we will be increasingly demanded to be able to control the project scheduling so as to reduce the risk of project delays. This study analyzes to obtain the amount of time and cost acceleration due to the acceleration of the completion of the construction of Muhamadiyah General Hospital Ponorogo which is experiencing delays. Fast Track method is a method used to accelerate project time. Based on the analysis of the calculation of the acceleration of the building project of the Muhamadiyah General Hospital Ponorogo using the Fast Track method, it obtained 12-day savings from 132 project calendar or a 9.09% savings occurred from the project calendar and the result of cost savings due to the acceleration of Rp. 49,850,511.36 or 0.41% of the contract value, for an acceleration fee of Rp. 0*

***Keywords*** *— Project, Fast Track Method, Time, Cost.*

## I. INTRODUCTION

The construction industry has an important and strategic role in supporting the growth and development of various fields in development. The development of the construction industry is closely related to the implementation of development in all fields. Given its role, construction services must continue to develop a role in development [1]. Construction planning is the biggest stage in the management and implementation of construction projects. Success in implementation is determined by resource estimation and determination of duration for individuals [2]. Other supporting factors for success are also determined by the selection of good technology, as well as the identification of every interaction between various work tasks. Planning and scheduling are the main keys to the successful implementation of projects on time [3].

Each construction project generally has an implementation plan and schedule for when the project will be carried out and how to provide funding sources. That way the project can be carried out in accordance with the plans and implementation schedules that have been prepared, but the problem currently faced is that there is often an increase in project development time that is not in accordance with the initial plan and results in cost overruns. The fact shows that 80% of the development carried out is experiencing a time delay and cost overruns occur [4]. The factors that influence delays in project construction are lack of construction materials, material changes in form, function and specifications, delays in delivery of materials, damage to equipment, financial availability during implementation, delays in the payment process by the owner, design mistakes made by planners, shortages labor, workforce capability, differences in sub-contractor schedules in project completion [5]. Besides that the scheduling that is commonly used today is conventional, namely scheduling using the Bar Chart and Curve S methods, the method does not describe activity dependencies and activity descriptions, where activities on critical paths are not revealed, and this causes delays in project implementation. In estimating the time and cost in a project, it is necessary to accelerate the critical path, acceleration is usually done to shorten the duration of existing activities and minimize risks while still getting optimal results.

Project for building Muhammadiyah Ponorogo General Hospital is located on Diponegoro Road No. 50, Mangkujayan, Kabupaten Ponorogo, the groundbreaking of the project was carried out in September 2018, until the 13th week in the project calendar, the project experienced delays from the initial plan. Based on the above problems, in this study using the fast track method to accelerate the project completion time, where the acceleration is done on activities that are on the critical path.

## II. LITERATURE REVIEW

### *A. Construction Project*

The project is a series of temporary activities that take place within a certain period and allocation of resources to carry out tasks that have clearly defined goals [4].

Construction is a process in which plans and specifications are converted into structures and physical facilities, this involves organizing and coordinating from all sources namely labor, equipment, materials, funds, and time to complete on time [6].

Thus it can be concluded that the construction project is an effort to construct an infrastructure building with a certain allocation of resources and time periods.

### *B. Construction Project Targets*

In achieving the objectives of a project, a limit has been determined. Among other things, the number of costs allocated and the time and quality that must be met. These three constraints are called three constraints that are often associated with project goals [4].



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### C. Construction Project Delay

There are several factors that influence delays in construction projects [7] including:

- Workers
- Ingredients
- Equipment
- Finance
- Situation
- Time and Control

### D. Project Scheduling

Project scheduling techniques are created to achieve effectiveness and efficiency of resources used for planning time productivity and costs of labor, materials, and equipment. One important thing from the project completion schedule is the amount of time needed to complete the project, because the duration is probabilistic, then the project completion is also a probabilistic statistic that is expressed in one time interval, the lower limit is the fastest time or optimistic time and the upper limit is the time longest or pessimistic time [4].

The purpose of scheduling is:

- Facilitate the formulation of project problems.
- Determine the appropriate method.
- Smoothly organized activities.
- Determine the total duration needed for project completion.
- Determine activities that should not be late and delayed and determine the critical trajectory.
- Determine the progress of project implementation.
- As a project control tool.
- Get optimum results.

### E. Project Duration and Critical Pathway

Knowledge of the overall duration of the project, it must be known in advance the critical path of the project. The project critical path is the chain of activities that has the longest completion time and determines the fastest time where the project can be completed [8].

Activities that are on the critical path are activities that have the following three characteristics:

1. The earliest start time is the same as the latest start. (ES = LS)
2. The earliest finish time must also be the same as the latest finish. (EF = LF)
3. Having a total float equal to zero or in other words, the difference between the latest finish and the earliest start is the same as the duration of the activity. (LF - ES = D)

### F. Construction Project Costs

Things that must be considered before the project starts are to estimate carefully the costs that will be incurred in the Cost Budget Plan (RAB) which contains the real cost of the project being worked on. Cost Budget Plan is a calculation of the number of costs required for materials and wages and other costs associated with implementing the project.

The Budget Plan (RAB) has several uses which are used to find out how much it costs to build a project, and has the function to plan and control resources such as material, labor, and time. The constituent components of the Project Cost Budget (RAB) are:

- Direct costs are costs directly related to the volume of work carried out, among others, the cost of materials, labor costs, subcontractor costs and equipment costs [9].
- Indirect costs or overhead costs are costs related to the length of time the completion of the work, but not directly related to the volume of work such as salaries for permanent employees and project management, equipment rental costs, insurance office rental, taxes and others [10]. Indirect costs generally do not have standard provisions about the value, this is because the value of indirect costs of each project has a need for different indirect costs and each contractor has an indirect cost standard according to their respective companies such as the intensity of meetings at field that affects the difference in costs between contractors, bank interest, measurement costs, quality control tests, as well as the cost of field personnel depending on the company requirements that are followed. In this case, the costs commonly used by contractors are used, the value is 5% of the RAB.

## III. Research Method

The steps of the project acceleration analysis using the fast track method are as follows:

- Collecting required project data such as the Budget Plan (RAB), S Curve, unit price of workers, the unit price of materials, physical progress reports that are the result of monitoring from the supervisory consultant during project implementation.
- Next, make a sequence of work activities with logical relationships and must be realistic to be carried out.
- Determine activities - activities that are on a critical trajectory with the help of Microsoft projects.
- After knowing the activities that are on the critical path, then accelerated by the fast track method on activities that are on the critical path by applying the principles of the fast track method.
- After that determine the time to be accelerated and make the desired acceleration to speed up the time of project implementation.
- After obtaining the results of the time of acceleration with the fast track method, then determine how much cost savings can be saved due to time savings.
- Finally, do a comparison of time and initial cost with time and cost after acceleration with the fast track method.



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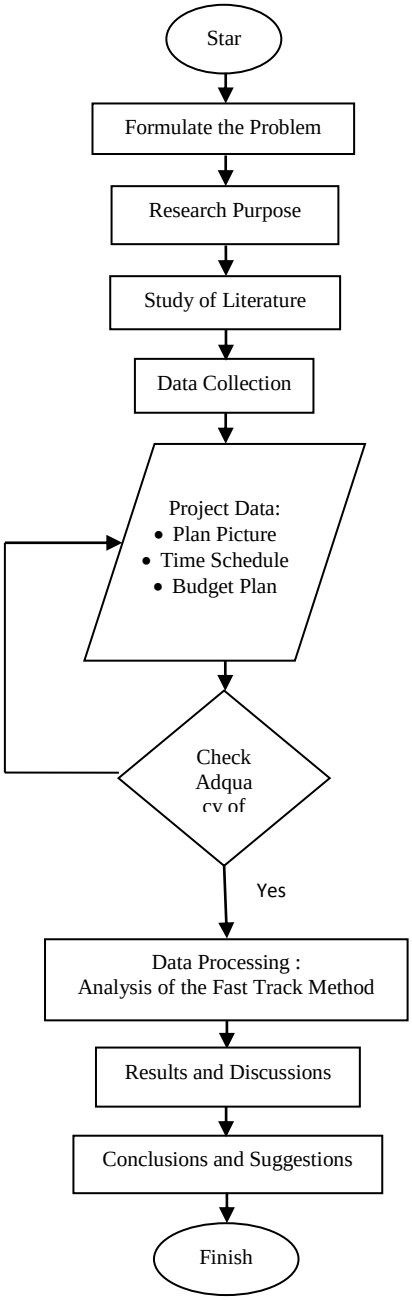


Figure I. Research Flow Diagram

## IV. ANALYSIS AND DISCUSSION

### A. Data Description

The project reviewed in this study was the construction project of Muhamadiyah General Hospital Ponorogo, Jl. Diponegoro No. 50, Mangkujayan, Ponorogo Regency, the project is planned with funding of Rp. 10,967,112,509.77, laying the first stone on the project was carried out on September 1, 2018, and planned to end on January 2019, on the 13th-week new project work was realized at 58.66% of the original plan on the 13th week of progress achieved 67.57% which means that the project experienced a delay of 8.91%, therefore the researcher will review the planned work acceleration so that the project can be completed sooner than the deadline for the plan.

The cost of building the Muhamadiyah Ponorogo General Hospital building based on the remaining work, from the 14th week to the 23rd week, is Rp. 4,912,294,797.77. The following can be seen budget recapitulation based on the rest of the work:

TABLE I. Budget Recapitulation Based on Remaining Work

| NO | Description of Work | Price Amount ( Rp ) |
|---|---|---|
| 1 | Floor Structure Work 3 | 1.529.110.823,49 |
| 2 | Floor Structure Work 4 | 1.780.449.802,30 |
| 3 | Floor Structure Work 5 | 1.047.109.227,83 |
| 4 | Roofing Structure Work | 555.624.944,15 |
| | **TOTAL** | **4.912.294.797,77** |

### B. The Logic of Dependency Between Activities

Creation of the work network in accordance with the logical sequence of dependency relationships between activities that must be in accordance with the method of completion of the work, for example, the foundation work is done after the earthwork is completed, or the roof floor structure work is done after the 5th-floor structure work is completed. The following can be seen in the sequence of dependencies between activities:

TABLE II. The Logic of Dependency Between Activities

| No | Description of Work | Kode | Get Through | Duration (Days) |
|---|---|---|---|---|
| 1 | Prepatory Work | A | - | 1 |
| 2 | Eartworks | B | A | 13 |
| 3 | Foundation Work | C | B | 30 |
| 4 | Floor Structure Work 1 | D | C | 22 |
| 5 | Floor Structure Work 2 | E | D | 16 |
| 6 | Floor Structure Work 3 | F | E | 16 |
| 7 | Floor Structure Work 4 | G | F | 15 |
| 8 | Floor Structure Work 5 | H | G | 13 |
| 9 | Roofing Structure Work | I | H | 6 |

After the dependency logic is obtained, then the network diagram can be illustrated in the attachment of the dependency logic between activities, then a calculation of the construction project activity schedule is carried out, the results of the calculation will get the schedule of each activity along with the leeway for the ease of the start time and the finish time of each activity. The calculation process is carried out in two stages namely forward calculation and backward calculation, forward calculation which is the calculation of the path that starts from the initial node and moves to the end node, while the countdown starts from the end node moves to the initial node. For the normal duration obtained is 132 days.

### C. Critical Path Determination

Determination of the critical path using the Gant Chart in the Microsoft Project scheduling application program obtained a critical trajectory that is work A-B-C-D-E-F-G-H-I. This process is done by filling the workgroups in name, filling the duration of each job and filling predecessors as logical sequences between activities and as determining what work is on the critical path. Here is a picture of a critical path using the Gant Chart:



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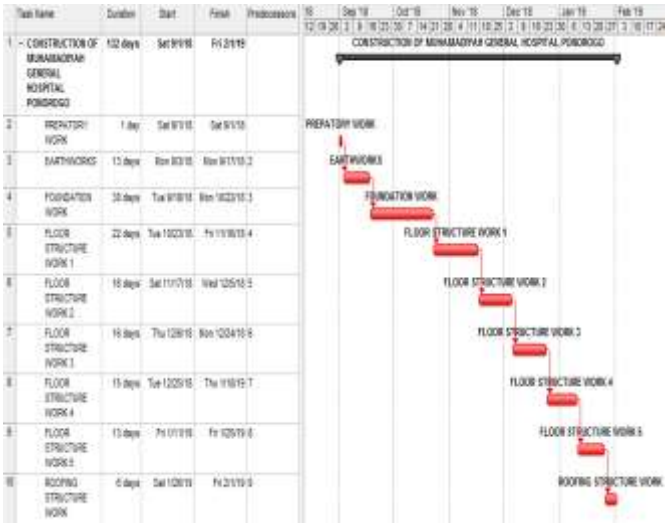

Figure II. Critical Path

### D. Fast Track Method

Fast Track method in construction work is the completion of the implementation of a project that is faster than normal time by implementing a slightly different and innovative strategy by applying the principle of development in parallel/overlapping on project completion [11].

The main principles of the Fast Track method in project scheduling planning [12] are as follows:

1. Logic activity on critical paths must be applied in parallel or complete one activity with another based on the start to start principle.
2. Logic activity between activities must be rational and in accordance with empirical conditions and use real productivity.
3. Must carefully consider the volume, time and resources available on the critical path.
4. Perform the Fast Track method only on critical paths, especially on activities that have a long duration.
5. Relationships between critical tracks that will be on Fast Track such as:
   a. If duration i <j, then critical activity j can be accelerated after activity i > 1 day and activity i must be completed first or together - together.
   b. If duration i> j, then activity j can start if the remaining duration of activity i <1 day from activity j.
   c. The acceleration should be done no more than 50% of normal time.

### E. Acceleration Time with Fast Track Method

The target to be achieved in accelerating project time with the Fast Track method is to accelerate the project implementation from the normal time of the project, therefore all work that is on a critical path that has a long duration is accelerated so that the target can be achieved. Following are the results of project time acceleration by applying the Fast Track method:

TABLE III. Acceleration Time of Critical Activity

| Activity | Critical Pathway Activity | Kode | Acceleration | Total Acceleration |
|---|---|---|---|---|
| G | 7-8 | SS 10 | 6 | 6 |
| H | 8-9 | SS 11 | 4 | 10 |
| I | 9-10 | SS 11 | 2 | 12 |

Note: SS 11 means: the initial activity has been carried out in 11 days, then the next activity starts

After accelerating the activities that are on the critical path, the accelerated total time is obtained in the amount of 12 days from the normal time of 132 days, thus the duration of the project completion time after acceleration using the fast track method is 120 days. Here are the results of the Gant Chart from accelerating with Microsoft Project:

Figure III. Acceleration Results With Fast Track Method

### F. Project Costs After Acceleration with Fast Track Method

In project financing using the Fast Track method, there is no increase in the amount of labor and costs for each work on both critical and non-critical tracks. in the use of materials, their use is in accordance with normal use. On labor costs, there is also no change. While direct costs are costs directly related to the volume worked, among others: material costs and labor costs. And indirect costs are costs related to the length of time of work, but not directly related to the volume of work carried out. Among other things consist of: permanent employee salaries, project management costs, project security costs, office rental fees, equipment maintenance, insurance and others [13].

TABLE IV. Project Costs After Acceleration with the Fast Track Method

| Information | Normal Time | Acceleration |
|---|---|---|
| Duration (Days) | 132 | 120 |
| Contract Value (Rp) | 12.063.823.000 | 12.063.823.000 |
| Direct Cost (Rp) | 10.967.112.509 | 10.967.112.509 |
| Indirect Costs 5% of The Contract (Rp) | 548.355.625,45 | 498.505.114,04 |
| Total Cost | 12.063.823.000 | 12.013.972.489 |

From the details above it can be seen that there is an indirect cost savings of 12 days x Rp. 4,154,209.28 obtained savings results of Rp. 49,850,511.36 and for a fee of Rp. 4,154,209.28 is indirect costs per day.



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### G. Time and Cost Savings After Acceleration with Fast Track Method

In this study, the project's normal time is 132 days and after accelerating using the fast track method, the project completion time is 120 days. For time savings, obtained by 12 days or 9.09% of the project's normal time, the cost that can be saved from acceleration is Rp. 49,850,511.36 or 0.41% of the contract value.

## V. CONCLUSIONS AND SUGGESTIONS

### A. Conclusions

The results of the time acceleration analysis using the fast track method are obtained:

1. Duration of time of 120 days from the normal duration of 132 working days of the project calendar or 9.09% time savings occur.
2. The amount of time acceleration costs on the project is Rp. 0
3. Costs saved due to the acceleration of the project time of Rp. 49,850,511.36

### B. Suggestions

1. Good management skills are needed, coordination between site managers, field supervisors, and implementers throughout the development time when applying the fast track method to the project so that desired results are achieved.
2. In order not to complicate the implementation process, it is better to accelerate the project time using the fast track method with the correct logic and rationale.
3. For further researchers, it can be developed by comparing fast track methods with various other methods of project time acceleration, to get the best project time acceleration method.

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