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Application of the Fast Track Method to Accelerate the Development of the Chapel of the St. Thomas Aquinas ITN Malang

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***Abstract*—** *Project completion delays still occur frequently until now, this is caused by a number of factors such as the late submission of materials to the project site, or also called force majeure, an event that occurs beyond human capability and cannot be avoided so activity cannot be carried out. On the chapel building construction project Thomas Aquinas, which is located on campus II of the Malang National Institute of Technology (ITN), is experiencing delays due to limited funds, where the project is carried out with funds originating from bailouts, from these problems accelerated method is needed so that the project can be completed faster than the planned deadline based on work rest. The acceleration method is used in the study is the Fast Track method, where the Fast Track method is accelerated on activities that are on critical paths and have a long duration. From the results of the acceleration using the Fast Track method, the minimum duration of project completion is 124 days and the time savings obtained are 66 days or 34.74% of the normal duration of 190 days based on work rest, due to the acceleration of time the project cost savings are obtained, where the cost saved is Rp. 53,786,668 or 1.74% of the project costs based on work rest, i.e. Rp.3,096,808,192.*

Keywords *— Cost, Scheduling, Critical Track Fast Track, Church Projects.*

I. INTRODUCTION

Construction planning is the biggest stage in the management and implementation of construction projects. Success in implementation is determined by several things such as estimation of resources and determining the duration for each individual, picking up good technology, and identifying every interaction between various work tasks. Planning and scheduling are the main keys to successful project implementation on time [1].

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 set up, but the problem that is still faced today is that often the increase in project development time is not in accordance with the initial plan and results in cost overruns. The fact shows that 80% of the development undertaken is experiencing time delays and cost overruns [2]. The factors that influence the delay in project development are lack of funds, material supply, equipment supply, human resources, project location, and weather. Besides the usual scheduling arrangements used today are conventional, namely scheduling using the Bar Chart and Curve S methods, the method does not describe activity dependency and activity description, where critical development activities are not revealed, and this can cause delays in project implementation [2]. In estimating the time and cost in a project, it is necessary to accelerate the process, acceleration is usually done to shorten the duration of existing activities and minimize risks while still getting optimal results.

Project for building the Chapel of St. Thomas Aquinas Malang is located in the location of ITN Campus II Malang, Jalan Raya Karanglo Km 2 Malang, the project was carried out with funds originating from bailouts, laying the first stone on the project was carried out in February 2017, and after that the work was continued in phases source of funds originating from the bailout funds, as of December 2019 the project had not yet been completed and there was still a shortage of funds amounting to 3,096,808,192, and after the lack of funds had been collected the work continued to be carried out and planned to end on June 2019. Based on the problem, Therefore, in this study using the fast track method to accelerate the project completion time, where the acceleration is carried out on activities that are in critical paths, aiming that the project can be completed sooner than the specified time.

II. LITERATURE REVIEW

A. Construction Project

The project is a series of temporary activities that take place in a period of time, with the allocation of certain resources to carry out the tasks that have clearly defined goals [2].

Construction is a process in which plans and specifications are converted into physical structures and facilities, and this involves the organization and coordination of all sources, namely labor, equipment, materials, funds, and time to complete on time [3].

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 in a project, limits have been determined namely the size of the budget (cost) allocated and the schedule (time) and quality (quality) that must be met. These three constraints are called three constraints that are often associated with project goals [2].

C. Construction Poject Delay

There are several factors that affect delays in construction projects [4] including:

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

D. Project Scheduling

Project scheduling techniques are created to achieve high 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 stated in one time interval, the lower limit is the fastest time or optimistic time and the upper limit is the longest time or pessimistic time [2].

The purpose of scheduling is:

- Facilitate the formulation of project problems.
- Determine the method or method that is appropriate.
- The smoothness of activities is more organized.
- Determine the total duration needed to complete the project.
- 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. Construction Project Costs

Things that must be considered before the project starts are to carefully estimate 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 amount of costs required for materials and wages and other costs associated with the implementation of the project.

The Budget Plan (RAB) has several uses that 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 that are directly related to the volume of work carried out including material costs, labor wage costs, subcontractor costs and equipment costs [5].
- Indirect costs or overhead costs are costs related to the length of time the work is completed, but not directly related to the volume of work such as salaries for employees and project management, equipment rental costs, insurance office rental, taxes and others [6].

III. Research Method

In this study a fast track analysis was carried out with the following steps:

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

IV. Analysis And Discussion

A. Data Description

The project reviewed in this study was the St. Chapel Chapel building project Thomas Aquinas ITN Malang, Jl. Raya Karanglo Km 2 Malang, the project is planned with funding of Rp. 3,891,091,628 originating from the bailout fund, laying the first stone on the project was carried out in February 2017 and planned to end on June 2019, until December 2018 the work that had just been realized had only reached 20% with a realized fund of Rp. 794,283,435 from the originally planned fund and the delay was caused because the funds were obtained in stages through a bailout, thus the project will not be completed according to the original plan deadline of June 2019, therefore the researcher will review the plan to accelerate the scheduling so that the project can be completed sooner than the deadline for the plan, that is, the rest of the work starts from December 2018 until June 2019 with the remaining funds of Rp. 3,096,808,192.

Costs for building the Chapel of St. Thomas Aquinas Malang based on the rest of the work, from December 2018 to June 2019, amounting to Rp. 3,096,808,192. The following can be seen the recapitulation of the budget based on the job rest:

TABLE I. Budget Recapitulation Based on Remaining Work

NO	Description of Work	Price Amount (Rp)
1	Earthwork sand work	167.511.932,74
2	Empty stonework	736.391.549,80
3	Door frame, window work	408.950.000,00
4	Concrete works	375,605,47720
5	Ceiling Work	287.052.584,00
6	Sanitair's work	34.112.000,00
7	Roof work	683.085.148,68
8	Paint jobs	93.924.500,00
9	Electrical installation work	99.725.000,00
10	Plumbing work	44.000.000,00
11	Parking work	140.000.000,00
12	Park work	25.000.000,00
13	Cleaning work	1,450,000.00
	TOTAL	**3,096,808,192.42**

B. The Logic of Dependency Between activities

Arrange the network in accordance with the logical sequence of the relationship of dependency between activities and the work order between activities with one another must be in accordance with the method of completion of the work,

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for example the work of the couple is done after the earth and sand works are finished, or the concrete work is done after the work of the couple is finished. 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	Earthwork sand work	A	-	24
2	Empty stonework	B	A	33
3	Door frame, window work	C	E	10
4	Concrete works	D	B	31
5	Ceiling Work	E	G	20
6	Sanitair's work	F	E	2
7	Roof work	G	D	23
8	Paint jobs	H	J	39
9	Electrical installation work	I	C	2
10	Plumbing work	J	C	5
11	Parking work	K	J	15
12	Park work	L	H	5
13	Cleaning work	M	H	1

After the dependency logic is obtained, then the network diagram can be illustrated in the attachment of the dependency logic between the activities, then a calculation of the project activity schedule is carried out, the results of the calculation will be obtained from each activity schedule. 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 node end moves to the start node. For the normal duration obtained is 190 days.

C. Critical Path Determination

Determination of the critical path using the Gant Chart Microsoft Project scheduling application program obtained a critical trajectory that is the work of A-B-D-G-E-C-J-H. This process is carried out with predecessors as a logical sequence between activities and as determining what work is on the critical path. Here is a picture of a critical path using the Gant Chart:

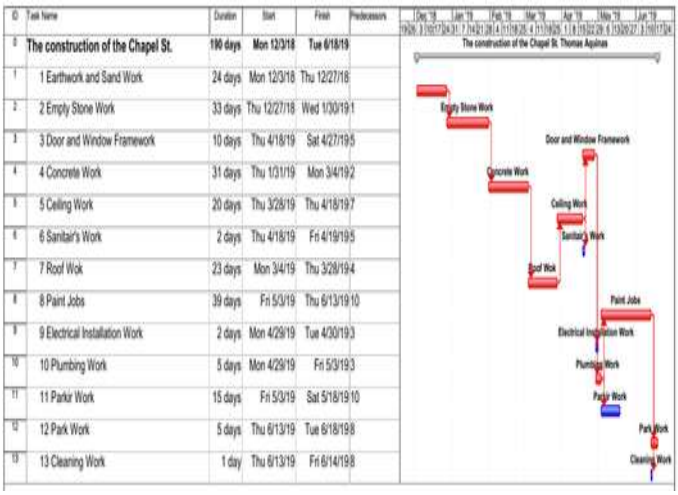

Figure 1. Critical Path

D. Fast Track

Understanding Fast Track in construction work is the completion of the implementation of a project that is faster than normal time by carrying out a slightly different and innovative strategy by applying the principle of development in parallel/overlapping on project completion [7].

The main principles of the Fast Track method in planning project scheduling [8] are as follows:

1. Logic activity on critical paths must be applied in parallel or complete one activity with another based on the principle of start to start.
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. Do Fast Track only on critical tracks, especially on activities that have a long duration.
5. Hubungan antar lintasan kritis yang akan di Fast Track seperti :
   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.
   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

In accelerating time with Fast Track the target to be achieved is to accelerate the implementation of the project 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. The following results are the time acceleration by applying the Fast Track method:

TABLE III. Acceleration Time of Critical Activity

Activity	Critical Pathway Activity	Kode	Acceleration	Total Acceleration
A	0-1	SS 12	12	12
B	1-2	SS 21	12	24
D	2-3	SS 18	13	37
G	3-4	SS 12	11	48
E	4-5	SS 10	10	58
C	5-6	SS 6	4	62
J	6-8	SS 3	2	64
H	8-9	SS 37	2	66

Note: SS 12 means: the initial activity has been carried out in 12 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 66 days from the normal time of 190 days, thus the minimum time duration resulting from the acceleration to complete the project is 124 days. Here are the results of the Gant Chart from accelerating with Microsoft Project:

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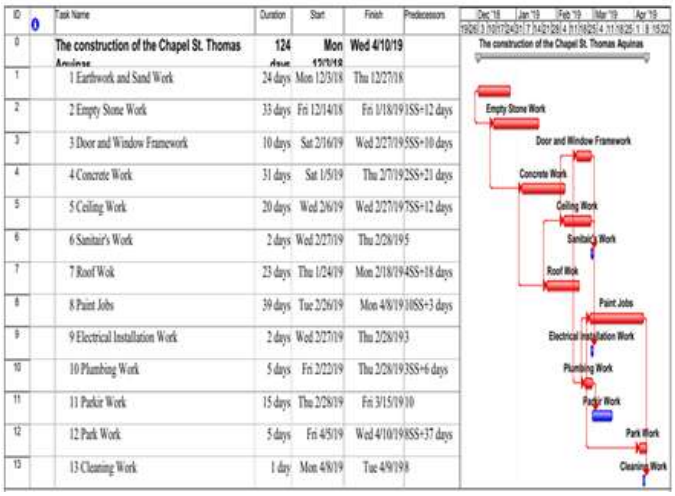

Figura 2. Acceleration Results With Fast Track

F. *Project Costs After Fast Track Acceleration*

In project financing with Fast Track, there is no increase in the amount of labor and costs for each work both on critical and non-critical tracks, as well as in the use of materials in accordance with normal use including the price of materials. Labor costs also did not change according to prices at the time the study was conducted. Indirect costs are operational costs incurred by the contractor is 5% and direct costs are 95%.

TABLE IV. Project Costs after Fast Track

Information	Normal Time	Acceleration
Time / Duration (Days)	190	124
Contract Value (Rp)	3.096.808.192	3.096.808.192
Direct cost 95% of the Contract (Rp)	2.941.967.782	2.941.967.782
Indirect Costs 5% of the Contract (Rp	154.840.409	101.053.740
Total Cost	3.096.808.192	3.043.021.522

From the details above it can be seen that there was an indirect cost savings of 66 days x Rp. 814,949.52 obtained savings of Rp. 53,786,668. and for a fee of Rp. 814,949,668 is an indirect cost per day.

G. *Time And Cost Savings After Acceleration with Fast Track*

From the results of this study obtained the normal project time of 190 days, from the results of the acceleration using the fast track method obtained an acceleration of 124 days from the normal time of the project. And as for the time saver obtained by 66 days or 34.74% of the normal time of the project, the cost that can be saved from acceleration is Rp. 53,786,668 or 1.74% of the contract fee based on the remaining work.

V. Conclusions And Suggestions

A. *Conclusions*

From the results of the acceleration analysis using the fast track method the following results are obtained:

1. From the results of the acceleration analysis using the fast track method, the minimum duration is 124 days from the normal duration and the time savings obtained are 66 days or 34.74% from the normal time of 190 days.
2. After accelerating, a cost savings of Rp. 53,786,668 or 1.74% of the initial cost based on the remaining work of Rp. 3,096,808,192.

B. *Suggestions*

1. Good training and mastery are needed in accelerating the fast track method so that the results obtained are more effective and efficient.
2. To speed up schedules using the fast track method, it should be done with the correct logic and rationale so as not to complicate the implementation process.
3. Other researchers can save time using the fast track method because it can save time and money.

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