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Analysis of Facade Implementation with Acceleration Method In The Development of Phase 4 of Supermall Pakuwon Indah of Benson Tower 6 Surabaya

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Abstract

The implementation of the façade with the acceleration method in the construction of phase 4 of Supermall Pakuwon Indah of Benson Tower 6 Surabaya is possible because of several aspects such as the delays in the work because the land is not ready. To analyze the acceleration method using the Ms Project program. From the results of the analysis with the acceleration method of adding work hours (overtime work), the duration of the implementation was 282 days, causing an increase in direct costs from Rp. 15,610,242,664.00 to Rp. to Rp. 17,661,323,855.34. And with the method of accelerating the addition of resources (labor & equipment), the duration of implementation was 287 days, causing an increase in direct costs from Rp. 17,410,735,885.96. After analyzing the acceleration of the duration of the implementation, it can be seen that the results of the study of the implementation of the façade with the acceleration method in the construction of phase 4 of Supermall Pakuwon Indah of Benson Tower 6 Surabaya is more effective using the acceleration method of adding work hours (overtime work) because the duration of the implementation is faster than using acceleration time with the method of increasing resources (labor and tools).

Keywords: Facade Implementation, Acceleration method.

1. Introduction

The high rise building project itself has several work items that are usually pursued by the owner's implementation schedule. The work is façade work, the material used is not conventional but fabricated from the workshop. The problem that often occurs in façade work is that the delivery of material arrives late from the workshop, because the material arrives late makes the completion exceed the specified time target.

Based on this background, the problem to be examined is:
1. How to analyze time and cost by increasing the number of hours worked / overtime and labor resources along with the tools.
2. How do the results of time and cost analysis with the addition of the number of hours worked / overtime compared to the results of the analysis of time and costs with the addition of labor resources and tools.

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2. Literature Review

2.1 Façade

Façade is an architectural term that means the front view of a building that generally faces the direction of the environment, and is a face that reflects the image and expression of all parts of the building.

Fig.1 Existing Front View

Fig.2 New Front View

2.2 Scheduling

Scheduling is the phase of translating a plan into diagrams in accordance with the time scale. Scheduling function determines when these activities are started, postponed and completed. So that the financing and use of resources will be adjusted according to the needs specified.

2.3 Microsoft Project

Microsoft Project is one of the software to arrange and facilitate scheduling, organizing, managing resources, analyzing the progress of a project, helping in managing a project to be more efficient and effective.

2.4 *Shorten the Settlement Time*

At the normal level the estimation for the duration of each activity can be shortened through a process of accelerating time called the crash program.

2.5 Relationship Compression Time, Labor and Costs

In completing a construction project, a method, resource and time of completion are needed. The process of speeding up project completion by performing (compression) time activities. This is done so that the incremental costs can be as minimal as possible.

3. Research Methods

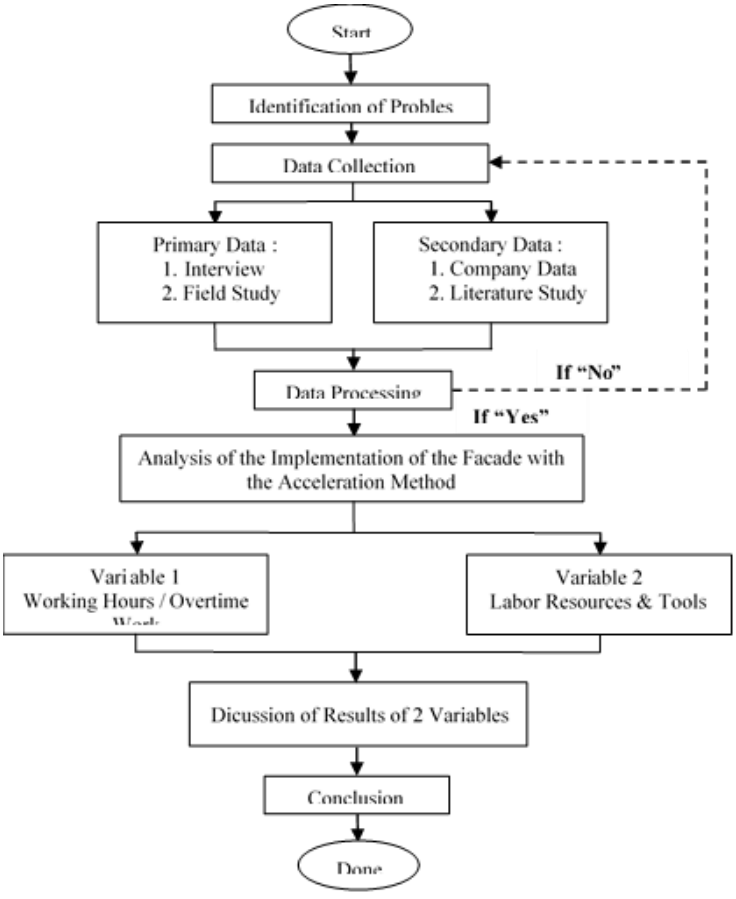

Fig.3 Flowchart of research

4. Results and Discussion

4.1 Alternative 1 Addition to Working Hours (Overtime)

In finding the cost slope of an activity there must be an alternative that can reduce the time of project implementation. Alternatives used can be taken from the components of labor, equipment, and materials used. In this Final Project alternative 1 used is a labor component that is by adding hours of work (overtime) with assumptions that can be taken as follows:

1. Normal activities use 7 (seven) hours 1 (one) day and 40 (forty) hours 1 (one) week for 6 (six) working days in 1 (one) week. (RI Law on employment No. 13 Th.2003, Article 77 paragraph 2)
2. Overtime using overtime can only be done at most 3 (three) hours in 1 (one) day and 14 (fourteen) hours in 1 (one) week. (RI Law on employment No. 13 Th.2003, Article 78 paragraph 1)
3. Workers 'wages for each overtime hour are 2 times an hour's wage or 200% of the price of workers' wages during normal work. (Source: Minister of Manpower Decree No: 102 / MEN / IV / 2004, Article 11)
   a. The calculation for looking for cost slope is as follows :
   b. Volume (known)
   c. Unit cost = worker + equipment (known)
   d. Normal duration (known), Normal cost (1 x 2)
   e. Crash duration
      1) Daily productivity (1/3)
      2) Productivity per hour (5a / 7 hours)
      3) Daily productivity after a crash (7 x 5b + 4 x 0.75 x 5b)
      4) So crash duration (1 / 5c)
   f. Crash cost
      1) For normal workers the hourly cost (5b x 2 costs)
      2) Overtime hourly fee (2 x 6a)
      3) Crash cost per day (7 x 6a + 4 x 6b)
      4) For normal hourly cost (5b x 2 tools)
      5) Overtime per hour (2 x 6d)
      6) Crash cost per day (7 x 6d + 4 x 6e)
      7) So crash cost (6c + 6f) x 5d
      8) Slope cost = (Crash cost-Normal cost) / (Normal duration-Crash duration)

   g. *Crash Duration Working Hours (Overtime)*

      Normal Stage
      Duration = 300 days
      Critical Path = Aluminum and Glass Floor Work 1 ➡ Aluminum and Glass Floor Works 39
      Total cost = Rp 16,785,207,165.59

      The normal direct cost assumption is 93% then,
      Total cost = Rp 15,610,242,664.00

      The normal indirect cost assumption is 7% then,
      Total cost = Rp 1,174,964,501.59
      Indirect costs / day = Rp 3,916,548.34

   h. *Compression Addition to Working Hours (Overtime)*

      In the compression process the activities contained in the critical path are crashed from the normal time duration, which begins with the lowest cost slope to reduce the overall implementation time. In the compression of aluminum and glass work by accelerating the addition of working hours (overtime work), the duration of the implementation period is reduced by 18 days from 300 days, so that the duration of the implementation is now 282 days.

      With the calculation of implementation costs as follows:

Direct costs due to normal	: Rp 15,610,242,664.00
Additional costs	: Rp 936,614,559.84
Direct costs due to crash (a)	**: Rp 16,546,857,223.84**
Indirect costs / day	: Rp 3,916,548.34
Indirect costs due to crash	: Rp 1,104,466,631.50
Indirect costs due to overtime (Assumption)	: Rp 10,000,000.00
Total indirect costs (b)	**: Rp 1,114,466,631.50**
Total cost (a + b)	**: Rp 17,661,323,855.34**

4.2 Alternative 2 Addition of Resources (Labor and Tools)

In finding the cost slope of an activity there must be an alternative that can reduce the time of project implementation. In this thesis alternative 2 used is the addition of resources (labor and equipment) with the following assumptions:

1. Normal activities use 7 hours of work and 6 working days in 1 week. (RI Law on employment No. 13 Th.2003, article 77 paragraph 2)
2. Prices for additional labor are the same as normal prices
3. Increasing the number of workers by 50% of the total number of workers
4. The addition of equipment is 50% of the group

   The calculation for looking for cost slope is as follows:

   a. Volume (known)
   b. Unit price of tool resources according to RAB analysis (handyman + worker) as well as existing tool groups
   c. Normal Duration (known)
   d. Normal Cost (1 x 2)
   e. Daily Productivity (a / c)
   f. Productivity / day / group tools (5/2)
      Crash Cost (increase in the number of tool resources is 50% from number of groups)
   g. Unit price of tool resources
      1.5 times the number of normal groups with a production capacity of 150% from normal
   h. Production / day / group of tools (6/7)
   i. Crash Duration (1/8)
   j. Crash Cost (7 x (8 x 9)
   k. Slope cost = (Crash cost-Normal cost) / (Normal duration-Crash duration)

4.2.1 Crash Duration of Resources (Labor and Tools)

Normal Stage

Duration = 300 days

Critical Path = Aluminum and Glass Floor Work 1 ➡ Aluminum and Glass Floor Works 39

Total cost = Rp 16,785,207,165.59

The normal direct cost assumption is 93% then,

Total cost = Rp 15,610,242,664.00

The normal indirect cost assumption is 7% then,

Total cost = Rp 1,174,964,501.59

Indirect costs / day = Rp 3,916,548.34

4.2.2 Compression of Additional Resources (Labor and Tools)

In the compression process the activities contained in the critical path are crashed from the normal time duration, which begins with the lowest cost slope to reduce the overall implementation time. In the compression work of aluminum and glass with the acceleration of the addition of resources (power and equipment) for the duration of the implementation period reduced 13 days from 300 days, so the duration of the implementation is now 287 days.

With the calculation of implementation costs as follows:

Direct costs due to normal	: Rp 15,610,242,664.00
Additional costs	: Rp 676,443,848.77
Direct costs due to crash (a)	**: Rp 16,286,686,512.77**
Indirect costs / day	: Rp 3,916,548.34
Indirect costs due to crash (b)	**: Rp 1,124,049,373.19**
Total cost (a + b)	**: Rp 17,410,735,885.96**

Table 1. Recapitulation of Calculation of Cost and Time After Compression Analysis

Information	Normal	Added Work Hours	Additional Resources
Day	300 Days	282 Days	287 Days
Direct cost	Rp 15,610,242,664.00	Rp 16,546,857,223.84	Rp 16,286,686,512.77
Indirect Costs	Rp 1,174,964,501.59	Rp 1,114,466,631.50	Rp 1,124,049,373.19
Total Cos	Rp 16,785,207,165.59	Rp 17,661,323,855.34	Rp 1,124,049,373.19

5. Conclusions and Suggestions

5.1 Conclusions

Based on the results of the analysis and discussion in Chapter IV, in this study a conclusion can be drawn that can illustrate the results of the acceleration of the implementation of the Pakuwon Indah Phase 4 Supermall Development project in Surabaya as follows :

1. The acceleration of time by increasing working hours or overtime work (alternative 1) on façade work causes the normal execution time to be 300 days and compressed to 282 days, causing direct costs to increase from Rp. 15,610,242,664.00 to Rp. 16,546,857,22384 while indirect costs reduced from Rp 1,174,964,501.59 to Rp 1,114,466,631.50 which resulted in total costs changing from Rp 16,785,207,165.59 to Rp 17,661,323,855.34. In accelerating time by adding power and equipment resources (alternative 2) to the façade work, the normal implementation time is 300 days and compressed changed to 287 days, causing additional direct costs from Rp. 15,610,242,664.00 to Rp. 16,286,686,512.77 while indirect costs are reduced from Rp. 1,174,964,501.59 to Rp 1,124,049,373.19 which resulted in total costs changing from Rp 16,785,207,165.59 to Rp 17,410,735,885.96
2. The results of the comparison between the two alternative calculations, the acceleration of time with the method of increasing work hours or overtime work is more effectively used in the façade of the Pakuwon Indah Supermall Development Project Phase 4 of Benson Tower 6 Surabaya, because the completion time of the work is less than using the acceleration of time by the method increase in power and equipment resources.

5.2 Suggestions

Some suggestions for further research are as follows:

1. For further research objects, it can be in the Pakuwon Indah Phase 4 Laviz Tower 7 Surabaya Supermall Development project, or in other High rise building construction projects.
2. For the next research object, the Software Network diagram application can use the primavera project, so that in the future it will not be monotonous using the Microsoft Project Network diagram software like previous research.

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