

TIME AND COST ANALYSIS OF DHOHO KEDIRI AIRPORT ACCESS ROAD PROJECT USING EARNED VALUE METHOD

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Abstract: Delays in project completion are something that any project contractor must avoid. Because apart from having a negative effect on the credibility of the project contractor, delays in project completion also cause penalty costs to be borne by the contractor, so that the profits to be obtained are reduced.

Earned Value Method. This method is used to determine project performance in terms of costs at one time, determine project performance in terms of schedule/time at one time, predict costs to complete the project after the evaluation time and predict the time to complete the project after the evaluation.

By using this method in the Kediri airport access road construction project, it was found that the project was delayed from the plan. The ETC (estimate to complete) value obtained was the estimated budget value required for completion was IDR 17,470,510,292.77, while the EAC (estimate at complete) value obtained was the final total cost estimate. project is IDR 32,509,153,464.05. TE Value Results (Time Estimate) to complete the project to completion in 89 calendar days or 5 days later than the contract time of 84 calendar days.

Keywords: Time and cost analysis, Earned value method, National Access Road, Airport

INTRODUCTION

Delays in project completion are something that any project contractor must avoid. Because apart from having a negative effect on the credibility of the project contractor, delays in project completion also cause penalty costs to be borne by the contractor, so that the profits to be obtained are reduced. To prevent delays or wasteful use of costs in a project, it is necessary to refine the activity schedule and budget to a minimum, so that the completion time and costs used can provide maximum benefits for the contractor [1].

Based on data from the Department of Public Housing and Settlement Areas and City Land *Earned Value Analysis (EVA)*. *Earned Value Analysis* is one of the tools used in project management that integrates costs and time. The earned value concept presents three dimensions, namely the physical completion of the project (*the percent complete*) which reflects the cost absorption plan (*budgeted cost*), the actual costs that have been incurred or what is called actual costs and what is obtained from the costs that have been incurred or what is called earned value. From these three dimensions, with concept *earned value*, can be linked between cost and time performance which comes from calculating the variance of cost and time. [2]

Many factors cause additional costs or time delays, as is the case with the Dhoho Kediri Airport Access Road Construction Project. These factors include problems with material delays, less than optimal mobilization of personnel and tools, changes in drawing and structural planning, weather and many other things that cause these delays. Thus, to increase effectiveness in monitoring and controlling project activities, it is necessary to use a method, one method that meets the problems above is using the Earned Value Method. This method is used to determine project performance in terms of costs at one time, determine project performance in terms of schedule/time at one time, predict costs to complete the project after the evaluation time and predict the time to complete the project after the evaluation.

RESEARCH METHOD

Research design

This research combines quantitative methods referring to secondary data. The research location is in Bulusari Village, District. Tarokan, Kediri Regency, East Java. The research instrument used in this research is Calculation Analysis using the Earned Value method



Figure 1. Working Drawings of the Dhoho Kediri Airport Access Road
Source: PT. NAHENDRA PUTRA (2023)

Data collection

In this research, the data collection method used is secondary data.

Secondary data used includes RAB, Time Schedule, Daily Project Report.

Cost And Time Analysis

Cost and time analysis using the earned value method in the construction of the Dhoho Kediri Airport access road to determine the steps as follows: [3]

1. Calculation of BCWP, ACWP, BCWS
2. Variance Calculation
 - a. Time Variance (SV)
 - b. Cost Variance (CV)
3. Performance Index Calculation
 - a. Schedule Performance Index (SPI)
 - b. Cost Performance Index (CPI)
4. Cost and Time Analysis
 - a. Estimate To Complete
 - b. Varian At Complete (VAC)
 - c. Schedule Estimate To Completion 9SETC)
 - d. Shedule Estimate At Completion (SEAC)
 - e. Time Estimate (TE)

Drawing Conclusions and Suggestions

From the calculations and analysis that have been calculated for the Dhoho Kediri airport access road construction project using the earned value method, conclusions and results can be drawn that the project is experiencing slowdowns or accelerations, waste and savings.

RESULT AND DISCUSSION

Calculation of BCWP, BCWS, ACWP

Calculations of BCWP, BCWS, ACWP for the construction of the Dhoho Kediri Airport access road are presented in the table below:

Table 2. Calculation of BCWP, BCWS, ACWP for the construction of the Kediri Airport Access Road

WEEK	BCWP	BCWS	ACWP
1	Rp. 296,313,875.11	Rp. 335,584,388.68	IDR 553,714,241.32
2	Rp. 631,898,263.79	Rp. 628,328,217.11	Rp. 785,767,276.05
3	IDR 1,142,414,940.19	Rp. 1,213,815,873.95	Rp. 1,309,778,728.93
4	Rp. 1,820,723,810.93	IDR 1,831,433,951.00	IDR 1,805,479,711.57

WEEK	BCWP	BCWS	ACWP
5	Rp. 3,034,539,684.89	Rp. 3,070,240,151.77	Rp. 3,508,927,488.80
6	IDR 5,247,968,631.51	Rp. 5,340,789,845.40	IDR 5,422,365,412.22
7	Rp. 9,631,985,964.49	Rp. 9,735,517,318.45	Rp. 9,220,145,378.55
8	Rp. 16,482,905,558.96	Rp. 16,597,147,052.98	IDR 15,038,643,171.29

Source: Author's processed data (2023)

Variance Calculation

The calculation of cost variances and time variances for the construction of the Dhoho Kediri Airport access road is presented in the table below:

Table 3. Calculation of Cost Variances and Time Variances for the construction of the Kediri Airport Access Road

WEEK	SV	CV
1	-Rp 39,270,513.57	-Rp 257,400,366.21
2	IDR 3,570,046.69	-Rp 153,869,012.26
3	-Rp 71,400,933.76	-Rp 167,363,788.74
4	-Rp 10,710,140.06	IDR 15,244,099.36
5	-Rp 35,700,466.88	-Rp 474,387,803.91
6	-Rp 92,821,213.89	-Rp 174,396,780.71
7	-Rp 103,531,353.95	IDR 411,840,585.94
8	-Rp 114,241,494.02	IDR 1,444,262,387.67

Source: Author's Processed Data (2023)

Performance Index Calculation

The calculation of the Cost Index and Time Index for the construction of the Dhoho Kediri Airport access road is presented in the table below:

Table 3. Calculation of Cost index and Time index for construction of the Kediri Airport Access Road

Sunday	SPI	CPI
1	0.88	0.54
2	1.01	0.80
3	0.94	0.87
4	0.99	1.01
5	0.99	0.86
6	0.98	0.97
7	0.99	1.04
8	0.95	1.10

Source: Author's Processed Data (2023)

Cost and Time Analysis

Because the percentage of work up to the 8th week has only reached 246.49%, the assumptions used to predict the budget for remaining work use the formula:

$$\begin{aligned} \text{ETC} &= (\text{Rab} - \text{BCWP}) / \text{CPI} \\ &= (\text{Rp. } 35,700,446,881.00 - \text{Rp. } 9,631,985,964.49) / 1.1 \\ &= \text{IDR } 17,470,510,292.77 \end{aligned}$$

The EAC calculation is the estimated total cost at the end of the project obtained from the ACWP added to the remaining work costs or ETC.

$$\begin{aligned} \text{EAC} &= \text{ACWP} + \text{ETC} \\ &= \text{IDR } 15,038,643,171.29 + \text{IDR } 17,470,510,292.77 \\ &= \text{Rp}32,509,153,464.05 \end{aligned}$$

Estimated funds absorbed when the implementation of this work is completed is Rp32,509,153,464.05

Varian at Complet (VAC)

Calculation

$$\text{VAC} = \text{RAB} - \text{EAC}$$

$$\text{VAC} = \text{Rp } 35,700,446,881.00 - \text{Rp } 32,509,153,464.05$$

$$\text{VAC} = \text{IDR } 3,191,313,416.95$$

The predicted profit obtained if the work has been completed is IDR 3,191,313,416.95

Schedule Estimate To Completion (SETC)

The SETC calculation is an estimate of the time for the remaining work calculated using a formula with the assumption that conditions are as they were when the evaluation was carried out:

$$\text{SETC} = \text{Remaining time} / \text{SPI}$$

$$= 4 / 0,90$$

$$= 4,5$$

From the Estimate Temporary Schedule (ETC) calculation above, we get an estimated total project completion time of 4.5 weeks.

Schedule Estimate At Completion (SEAC)

The SEAC calculation is the estimated total project completion time plus the remaining work time calculated using the formula:

$$\text{SACK} = \text{Reporting time} + \text{SETC}$$

$$= 8 + 4,5$$

$$= 12.5 \text{ Weeks}$$

From the values above it can be seen that when analyzing in week 2 the project experienced a delay from the initial plan for project completion from 8 weeks to 12.5 weeks.

Rusunawa Residential Unit Rental Rates.

Time Estimate (TE)

Time Estimate (TE) is the estimated time from project completion to completion. TE is calculated using the following formula:

$$\text{THE} = \text{ATE} + ((\text{OD} - (\text{ATE} \times \text{SPI})) / \text{SPI})$$

$$\text{ATE} = 56 \text{ Days}$$

$$\text{FROM} = 84 \text{ Days}$$

$$\text{SPI} = 0,95$$

$$\text{TE} = 56 + ((84 - (56 \times 0,95)) / 0,95)$$

$$\text{TE} = 56 + ((56 - (53,2)) / 0,95)$$

$$\text{TE} = 88.42 \approx 89 \text{ days}$$

So the estimated time needed to complete the project is 89 days, with a difference of 5 days slower than the planned schedule.

CONCLUSION

Based on the calculation analysis that has been carried out, the things that can be concluded from this research are:

- 1 From the results of the calculation analysis, the total BCWP value of the project is IDR 35,700,446,881.00, the ACWP value up to week 8 is IDR 16,482,905,558.96. The ETC value obtained is the estimated budget value required for completion is IDR 17,470,510,292.77, while the EAC value obtained is the estimated final total cost of the project is IDR 32,509,153,464.05.
- 2 From the results of the calculation analysis, the project contract time value is 84 days, an SV value of 0 means there is a delay. The TE value or estimated time needed to complete the project is 89 days, with a difference of 5 days slower than the planned schedule.

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