

Analysis of Time Control Using the Earned Value Method on The Container Yard Project of the Banjarmasin Navigation and KPLP Office

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Abstract: The use of an inappropriate implementation method will result in a delay in project completion time, and conversely, a properly planned implementation method will result in a time-efficient project. In the Container Yard construction project for the Navigation Office and the KPLP Office in Banjarmasin, there was a discrepancy between planned and actual progress in the 23rd week of May, where the actual progress did not reach the planned progress on site. Project execution faced obstacles and constraints, including the availability of skilled labor and the limited supply of construction materials at the project site, as well as the late arrival of materials. In addition, there were also weather factors that caused the project duration to be slightly slower than planned. The earned value method is one of the methods used to analyze a project's time performance. This method can be used to calculate the estimated time required for project completion. This underlies this research to analyze earned value to determine the extent of the project's time performance. Furthermore, the use of the earned value method in this research object is based on the need to integrate project performance measurement, which includes time and work items. The results of the study show that time performance (Schedule Performance Index) has a value of less than 1, indicating that the project performance is slower than the planned schedule. Meanwhile, the Estimate At Completion (EAC) value shows a value of 244 days, which is 4 days longer than the planned schedule.

Keywords: Time, Earned Value Method, Container Yard

INTRODUCTION

Construction management aims to process management functions effectively and efficiently so that agreements with the project owner achieve good results (Ndruru et al., 2022). The agreement made by the project owner includes the target of timely project completion in accordance with the planned schedule. Project scheduling planning will be estimated according to the duration of each job. The duration of these jobs will then be included in the network analysis of each job, which is prepared based on the work method of the construction project implementation. The selection of the project implementation method depends on the type and characteristics of the planned project. The use of an inappropriate implementation method will result in a delay in project completion time, and conversely, a properly planned implementation method will result in a time-efficient project (Sudjatmiko & Jayady, 2022).

Previous research conducted by Yulianti et al., 2024, used the earned value method on the Raw Water Huntap Tondo project in Palu, Central Sulawesi, with the aim of analyzing and evaluating the performance of work execution based on the CPI and SPI values. In the Container Yard construction project for the Navigation Office and the KPLP Office in Banjarmasin, there was a discrepancy between planned and actual progress in the 23rd week of May, where the actual progress did not reach the planned progress on site. Project execution faced obstacles and constraints, including the availability of skilled labor and the limited supply of construction materials at the project site, as well as the late

arrival of materials. In addition, there were also weather factors that caused the project duration to be slightly slower than planned. This underlies this research to analyze earned value to determine the extent of the project's time performance. The earned value method can help contractors to objectively measure project performance, detect and overcome time problems during actual progress, can also be used for time control, and can increase the accuracy of future project performance predictions. Furthermore, the use of the earned value method in this research object is based on the need to integrate project performance measurement that includes time on the container yard project of the Navigation and KPLP Office in Banjarmasin.

METHODS

Research design is a strategy that organizes the context so that researchers can obtain valid data in accordance with the characteristics of the variables and the research objectives. In scientific research, common types of research include qualitative and quantitative methods. The qualitative research method is a research approach that studies objects in their natural context where the researcher acts as the main instrument, data collection is carried out through triangulation, data analysis is inductive, and research results tend to be descriptive, static, and concrete (Nasution, 2023). The quantitative research method is a type of research that produces findings that can be achieved or obtained through the use of procedures or other ways that involve quantification or measurement. This approach is used to study research samples and populations, with sampling techniques generally done randomly. Data collection is done through predetermined research instruments. The data analysis used is quantitative, where the data can be measured, and the goal is to test hypotheses that have been established previously (Wiratna Sujarweni, 2014). Based on the characteristics of the research methods explained previously, this research falls into the category of quantitative research. In this research, the resulting data is generally analyzed using descriptive statistics. The location of this research is the container yard project of the Navigation and KPLP Office in Banjarmasin. The following is the research flowchart:

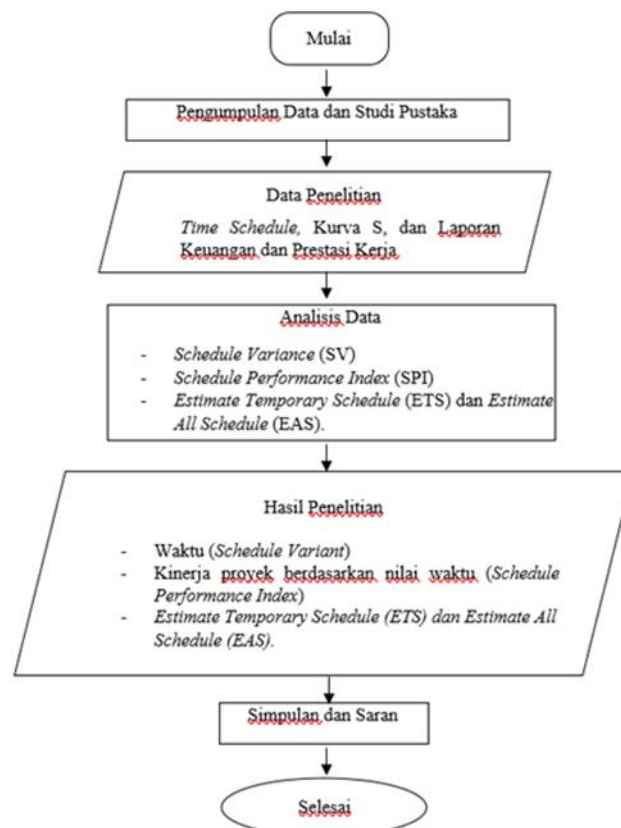


Figure 1. Research Flow Chart

RESULT AND DISCUSSION

Schedule Variance (SV) Calculation

The calculation of the Schedule Variance (SV) in the 23rd week of May is as follows

$$\begin{aligned} \text{SV} &= \text{Cumulative BCWP} - \text{Cumulative BCWS} \\ &= \text{Rp } 2,440,059,213 - \text{Rp } 2,557,714,964 \\ &= - \text{Rp } 117,655,750 \end{aligned}$$

A negative SV value indicates that the project is behind the planned schedule.

Table 1. Recapitulation of Schedule Variance (SV) Values

No.	Week	Month	Planned Weight	BCWS	Cumulative BCWS	SV
1	1	November	0.007%	348,901.27	348,901.27	64,457.90
2	2	December	0.007%	348,901.27	697,802.54	77,245.91
3	3	December	0.086%	4,448,111.97	5,145,914.51	(753,973.27)
4	4	December	0.224%	11,556,919.55	16,702,834.06	3,190,076.27
5	5	December	0.366%	18,910,414.02	35,613,248.08	(219,368.67)
6	6	January	0.300%	15,508,649.84	51,121,897.92	(1,777,146.34)
7	7	January	0.287%	14,826,016.92	65,947,914.84	(1,102,194.17)
8	8	January	0.299%	15,433,374.47	81,381,289.31	(1,034,599.56)
9	9	January	0.587%	30,325,763.57	111,707,052.89	(7,798,890.13)
10	10	January	0.591%	30,538,517.50	142,245,570.39	(7,335,469.46)
11	11	February	0.594%	30,717,302.32	172,962,872.70	(7,050,833.61)
12	12	February	1.419%	73,325,862.72	246,288,735.43	(9,123,908.44)
13	13	February	1.419%	73,325,862.72	319,614,598.15	(4,944,925.75)
14	14	February	1.187%	61,340,096.09	380,954,694.24	(4,281,145.50)
15	15	March	2.310%	119,356,881.89	500,311,576.13	(9,447,555.14)
16	16	March	2.892%	149,430,598.85	649,742,174.98	(9,035,452.85)
17	17	March	2.953%	152,569,075.81	802,311,250.79	(13,001,905.04)
18	18	March	2.960%	152,932,008.98	955,243,259.77	(18,519,698.03)
19	19	April	3.751%	193,827,138.06	1,149,070,397.83	(16,001,227.69)
20	20	April	4.727%	244,257,025.03	1,393,327,422.87	(58,487,305.15)
21	21	April	6.819%	352,360,548.17	1,745,687,971.03	(111,679,149.99)
22	22	April	7.163%	370,120,993.48	2,115,808,964.51	(114,943,875.15)
23	23	May	8.552%	441,905,999.58	2,557,714,964.10	(117,655,750.69)

Source: Researcher's Processing, 2024

Schedule Performance Index (SPI) Calculation

The calculation of the Schedule Performance Index (SPI) in the 23rd week of May is as follows:

$$\begin{aligned} \text{SPI} &= \text{Cumulative BCWP} / \text{Cumulative BCWS} \\ &= \text{Rp } 2,440,059,213 / 2,557,714,964 \\ &= 0,954 < 1 \end{aligned}$$

An SPI value less than 1 indicates that the project performance is slower than the planned schedule.

Table 2. Recapitulation of Schedule Performance Index (SPI) Values

No.	Week	Month	Cumulative BCWP	Cumulative BCWS	SPI
1	1	November	413,359.18	348,901.27	1.185
2	2	December	775,048.45	697,802.54	1.111
3	3	December	4,391,941.24	5,145,914.51	0.853
4	4	December	19,892,910.32	16,702,834.06	1.191
5	5	December	35,393,879.41	35,613,248.08	0.994
6	6	January	49,344,751.58	51,121,897.92	0.965
7	7	January	64,845,720.67	65,947,914.84	0.983
8	8	January	80,346,689.75	81,381,289.31	0.987
9	9	January	103,908,162.76	111,707,052.89	0.930
10	10	January	134,910,100.93	142,245,570.39	0.948
11	11	February	165,912,039.10	172,962,872.70	0.959
12	12	February	237,164,826.99	246,288,735.43	0.963
13	13	February	314,669,672.41	319,614,598.15	0.985
14	14	February	376,673,548.74	380,954,694.24	0.989
15	15	March	490,864,020.99	500,311,576.13	0.981
16	16	March	640,706,722.14	649,742,174.98	0.986
17	17	March	789,309,345.76	802,311,250.79	0.984
18	18	March	936,723,561.75	955,243,259.77	0.981
19	19	April	1,133,069,170.14	1,149,070,397.83	0.986
20	20	April	1,334,840,117.72	1,393,327,422.87	0.958
21	21	April	1,634,008,821.04	1,745,687,971.03	0.936
22	22	April	2,000,865,089.36	2,115,808,964.51	0.946
23	23	May	2,440,059,213.41	2,557,714,964.10	0.954

Source: Researcher's Processing, 2024

Estimate Temporary Schedule (ETS) Calculation

The calculation of the Estimate Temporary Schedule (ETS) is as follows:

$$\begin{aligned}
 \text{ETS} &= \text{remaining time} / \text{SPI} \\
 &= (240-161) / 0,954 \\
 &= 82,80 = 83 \text{ calendar days}
 \end{aligned}$$

Estimate All Schedule (EAS) Calculation

The calculation of the Estimate All Schedule (EAS) is as follows:

$$\begin{aligned}
 \text{EAS} &= \text{Time elapsed} + \text{ETS} \\
 &= 161 + 83 \\
 &= 244 \text{ calendar days}
 \end{aligned}$$

The estimated project completion time is 244 calendar days.

CONCLUSION

Based on the results of the analysis in this research, the following conclusions can be drawn:

1. The Schedule Variance (SV) value is (-117,655,750). The negative value indicates that the project is experiencing delays from the planned schedule.
2. The Schedule Performance Index (SPI) value is 0.954, which indicates that the project performance is slower than the planned schedule.
3. The Estimate All Schedule (EAS) value is 244 calendar days to complete the project.
4. Future research should include non-technical factors on the influence of project time performance and should involve planning for time performance control at the beginning of the project to determine the impact on project time performance.
5. In addition, subsequent research could use the aid of Microsoft Project software in analyzing project time performance..

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