International Journal Science and Technology
IJST Vol 3 No. 2 July 2024 | ISSN: 2828-7223 (print), ISSN: 2828-7045 (online), Page 1-11

ANALYSIS OF COST AND TIME PERFORMANCE ON THE EAST SURABAYA HOSPITAL CONSTRUCTION PROJECT USING THE EARNED VALUE METHOD

Harfandi Almi[1*], Hanie Teki Tjendani[2], Budi Witjaksana[3]
Master of Civil Engineering, Faculty of Engineering, University of 17 August 1945 Surabaya, Indonesia

Article History
Received : Mei 2024
Revised : July 2024
Accepted : July 2024
Published : July 2024

Corresponding author*:
hayadiam@gmail.com

Cite This Article:
M. K. K. Ali, H. T. Tjendani, and B. Witjaksana, "ANALYSIS OF COST AND TIME PERFORMANCE ON THE EAST SURABAYA HOSPITAL CONSTRUCTION PROJECT USING THE EARNED VALUE METHOD", IJST, vol. 3, no. 2, pp. 1–11, Jul. 2024.

DOI:
https://doi.org/10.56127/ijst.v3i2.1309

Abstract: The construction of the East Surabaya Hospital is a multiyear project, starting from 2023 to 2024. The project has a contract value of Rp. This 494,603,098,000 is funded by the Regional Revenue and Expenditure Budget (APBD) of the Surabaya City Government. This research aims to analyze the cost and time performance of the project. The method used is the earned value method. The results of the cost and time performance analysis using the Earning Value method show that the cost performance and time performance of the East Surabaya Hospital Construction in the 22nd (twenty-second) week is considered not good. This result is shown by the Cost Variance value of Rp. - 608,118,565 and Schedule Variance value Rp. - 44,410,784,255. The Cost Performance Index value of 0.996 and the Schedule Performance Index value of 0.76 also shows that the cost and time performance of this project in the 22nd (twenty-second) week is not in good condition.
Keywords: Earned Value Method, Project Performance, Project Control.

INTRODUCTION

The city of Surabaya is the capital of East Java Province, located at 07°9' s.d. 07°21' South Latitude and 112°36' s.d. 112°54' East Longitude. The city of Surabaya has an area of 335,925 square kilometers. Based on data from the Surabaya City Central Statistics Agency, the population of Surabaya City in 2023 will reach 3,009,286 people.[1] This number is certainly a challenge for the local government to provide services to the community evenly, so that every resident of the city of Surabaya gets program/service intervention from local government. Based on data in the East Surabaya Hospital Development Feasibility Study Document prepared by the Surabaya City Government Health Service in collaboration with the Faculty of Public Health, Airlangga University, currently there are 60 hospital units operating in the City of Surabaya, two of which are government-owned hospitals. The city of Surabaya, namely Dr. Mohamad Soewandhie which is located on Jl. Rejo Pond No. 45 Simokerto District and Bhakti Dharma Husada Regional Hospital which is located in West Surabaya, precisely on Jl. Kendung No. 115 Benowo District.[2] Based on Surabaya Mayor Regulation number 69 of 2023 concerning the 2024 Surabaya City Regional Government Work Plan and based on Surabaya City Regional Regulation number 8 of 2023 concerning the 2024 Surabaya City Regional Revenue and Expenditure Budget, the Surabaya City Government will build a Regional General Hospital to serve the community which is in the eastern region of Surabaya City. The location for the construction of the East Surabaya Hospital is located on Jalan Medokan Asri Tengah, Surabaya City. The East Surabaya Hospital will be planned as a modern Type C Regional General Hospital (RSUD) which can be developed into Type B. With the construction of this hospital, it is hoped that it will be able to improve health services for the people of Surabaya City, especially for the people of Surabaya City who live in the eastern region. In this way, health support facilities at every point in Surabaya will be more evenly distributed and can be used as support for the government's strategic plans in efforts to improve the quality of public health.[3]

The East Surabaya Hospital Construction Project is being implemented in multiyears, namely from the 2023 to the 2024 budget year.[4] The project was successfully contracted with a value of Rp. 494,603,098,000,- with an implementation time of 360 calendar days (12 months), starting on September 29 2023 and finishing on September 23 2024. Based on the work progress report in the 22nd (twenty-second) week, the progress achievements of this project work were realized amounting to 31.34%. If compared with

the weight of the plan for that week which is in the technical method document, the weight of the work should have reached 41.3%, meaning that the progress of the East Surabaya Hospital Construction work up to the 22nd (twenty-second) week was delayed or deviated by - 9.96%. The East Surabaya Hospital Construction Project is one of the regional strategic projects and is also a priority program for the regional head. Of course, this project will receive special attention from all parties, both from the People's Representative Council, and of course the people of Surabaya City as beneficiaries. For this reason, this hospital construction project must be closely monitored and it must be ensured that it is carried out in accordance with the time allocation specified in the contract document, namely September 23 2024.[5]

This research aims to determine cost and time performance in the 22nd (twenty-second) week of project implementation using the Earned Value Method (EVM). The earned value method presents three dimensions, namely the physical completion of the project (the percent complete) which reflects the planned cost absorption (budgeted cost), the actual costs that have been incurred or what is called actual cost and what is obtained from the costs that have been incurred or what is called earned value.[6] From the results of the project performance analysis using the earned value method, you will be able to find out whether the condition of the project time performance is late or in accordance with planning, even if the project time performance is faster than the predetermined plan. In cost performance, it will also be known whether the performance conditions of the East Surabaya Hospital Construction project are in accordance with the planned costs or even more economical and/or more wasteful when compared to the planned costs.

RESEARCH METHOD

Research design

This earned value method integrates cost (cost) and time (schedule) where this method measures project performance at a certain time and can predict or estimate project progress in the future. This method has 3 (three) basic indicators, namely Actual Cost of Work Performed (ACWP), Budgeted Cost of Work Performed (BCWP) and Budgeted Cost of Work Scheduled (BCWS). This research was carried out when the work progress entered the 22nd (twenty-second) week.

Figure 1. East Surabaya Hospital Construction Location
Source: Researcher's Process (2024)

Data collection

In this research, the data used is secondary data. The data collection method used was interview and documentation methods. The author collected secondary data through the Head of the Building Division of the Public Housing Service and Settlement Areas and Land of the Surabaya City Government, as the Commitment Making Officer (PPK) of the East Surabaya Hospital Construction project. The secondary data used includes: Contract Documents, Cost Budget Plan (RAB), Time Schedule, Weekly Progress Report and Actual Costs incurred by the implementer/contractor.

Table 1. Project Cost Budget Plan

No	Job description	Budget	Weight (%)
1	A. Planning / Design		
	- Planning	22.903.242.556	5,14
	- Periodic Supervision	5.703.531.220	1,28
2	B. Physical Construction		
	Preparatory work	25.755.008.166	5,78
	A. Foundation Work	23.036.919.069	5,17
	B. Earthworks	3.876.618.876	0,87
	C. Structural Work		
	- Substructure Work		
	Pile Cap & Tie Beam	17.021.475.985	3,82
	- Upper Structure Work		
	Podium		
	LG flooring	21.254.565.563	4,77
	1st floor	3.564.707.013	0,8
	2nd Floor	3.520.148.175	0,79
	3rd floor	2.718.089.097	0,61
	Tower		
	4th floor	3.208.236.311	0,72
	5th floor	2.807.206.772	0,63
	6th floor	2.807.206.772	0,63
	7th floor	2.807.206.772	0,63
	8th floor	1.648.676.993	0,37
	DAK floor	1.158.529.779	0,26
	TOP DAK floor	802.059.078	0,18
	- Steel Works	4.723.236.792	1,06
	- Other Other Jobs	1.158.529.779	0,26
	D. Architectural Work	110.639.593.904	24,83
	E. Mechanical and Electrical Work	132.740.777.382	29,79
	F. Landscape and Site Development Work	8.733.532.181	1,96
3	C. Licensing		
	C. 1 Power Connection of PLN, PDAM, Telkom, IMB	17.244.270.174	3,87
4	D. Implementation of a Construction Safety Management System	25.755.008.166	5,78
	Total	445.588.376.577	100
	PPN (11%)	49.014.721.423	
	Grand Total	494.603.098.000	

Source: Surabaya City DPRKPP, processed by the author (2023)

Based on data from the Weekly Work Progress Report, data on the weight of work realization up to the 22nd (twenty-second) week can be presented as follows.

Table 2. Weight of Work Plans and Realization

Week	Plan Progress	Cumulative Plan Progress	Realization Progress	Cumulative Realization Progress	Deviation
1	0,428	0,428	0,351	0,351	-0,077
2	0,428	0,857	0,349	0,7	-0,157
3	0,428	1,285	0,467	1,167	-0,118
4	0,428	1,713	0,642	1,809	0,096
5	1,151	2,864	0,969	2,778	-0,086
6	1,151	4,015	0,812	3,59	-0,425
7	1,151	5,166	1,244	4,834	-0,332

Week	Plan Progress	Cumulative Plan Progress	Realization Progress	Cumulative Realization Progress	Deviation
8	1,332	6,498	0,807	5,641	-0,857
9	2,818	9,316	1,059	6,7	-2,616
10	2,818	12,133	0,925	7,625	-4,508
11	3,108	15,241	3,724	11,349	-3,892
12	3,108	18,349	4,252	15,601	-2,748
13	3,642	21,992	0,865	16,466	-5,526
14	1,330	23,321	2,111	18,577	-4,744
15	2,258	25,579	3,159	21,736	-3,843
16	2,390	27,969	2,23	23,966	-4,003
17	1,536	29,505	1,373	25,339	-4,166
18	1,680	31,185	1,413	26,752	-4,433
19	1,806	32,991	1,355	28,107	-4,884
20	1,932	34,923	0,777	28,884	-6,039
21	3,153	38,076	1,638	30,522	-7,554
22	3,228	41,304	0,815	31,337	-9,967

Source: DPRKPP Surabaya City, Processed by the Author (2023)

The research process was carried out in the 22nd week of work implementation or in accordance with the work progress report up to March 7 2024. In the 22nd week, the weight of planned work progress was 41.304%, while the realization of work in the 22nd week was only realized at 31.337%. , there is a deviation of almost – 9.967%.

Budgeted Cost of Work Scheduled (BCWS) Value Analysis

Budgeted Cost of Work Scheduled (BCWS) or also known as Planned Value (PV) is a planned cost that is budgeted to carry out work with a certain implementation time duration. BCWS is obtained by multiplying the % of work progress planned for a certain time duration by the total project budget plan (RAB), but does not include Value Added Tax or VAT. The project budget plan (RAB) excluding VAT is also called Budgeted at Completion (BAC).

Budgeted Cost of Work Performed (BCWP) Value Analysis

Budgeted Cost of Work Performed (BCWP) or also known as Earned Value (EV) is the actual cost or actual costs that will be obtained for work that has been completed. BCWP is obtained by multiplying the % of work progress that has been completed in a certain time period multiplied by the total project budget plan (RAB), but does not include Value Added Tax or VAT. The project budget plan (RAB) excluding VAT is also called Budgeted at Completion (BAC).

Analysis of Actual Cost of Work Performed (ACWP) Value

Actual Cost of Work Performed (ACWP) or also known as Actual Cost (AC) is the actual cost or actual costs that have been incurred by the executor/contractor for work that has been carried out. ACWP represents all project costs (direct costs and indirect costs). Researchers collect the actual costs that have been incurred by the implementer, in this case PT. PP (Persero) Tbk. and PT. Adhi Karya (Persero) Tbk through the Commitment Making Officer (PPK).

Analysis of Cost Variance (CV) and Schedule Variance (SV)

Next, calculate the Cost Variance (CV) or cost difference. CV is the difference between the actual costs obtained (BCWP/EV) and the actual costs incurred (ACWP/AC). If the CV value is positive, it can be said that the project cost performance is in good condition (economical). If the CV value is negative, it can be said that the project cost performance is in a bad condition (wasteful).

Next, calculate the Schedule Variance (SV) or schedule difference. SV is the difference between the actual costs obtained (BCWP/EV) and the budgeted plan costs (BCWS/PV). If the SV value is positive, it can be said that the project time performance is in good condition (faster than planned). If the SV value is negative, it can be said that the project time performance condition is in a bad condition (later than the planned

time). If the SV value is zero, it can be said that the project time performance conditions are in accordance with planning.

Analysis of Cost Performance Index (CPI) and Schedule Performance Index (SPI) Values

Next, calculate the Cost Performance Index or also known as the Cost Performance Index. CPI is obtained by dividing the value of actual costs or actual costs that will be obtained (BCWP/EV) by the actual costs that have been incurred (ACWP/AC). If the CPI value is greater than 1 (one) (>1) then cost performance can be concluded to be good and economical. If the CPI value is less than 1 (one) (<1) then cost performance can be concluded as poor and wasteful. If the CPI value is zero then cost performance can be concluded to be good and in accordance with the planned budget.

Next, calculate the Schedule Performance Index or also known as the Time Performance Index. SPI is obtained by dividing the actual cost value or actual costs that will be obtained (BCWP/EV) by the budgeted plan costs (BCWS/PV). If the SPI value is greater than 1 (one) (>1) then the time performance can be concluded to be good and fast. If the SPI value is less than 1 (one) (<1) then the time performance can be concluded to be bad and slow. If the SPI value is zero then time performance can be concluded as good and on schedule.

RESULT AND DISCUSSION

Budgeted Cost of Work Scheduled (BCWS) Value Analysis

BCWS Calculation	(% Plan Progress Weight) x (Total Project Budget without VAT)
Example of BCWS Calculation in Week 22	41,304 % x Rp. 445,588,376,577
Example of BCWS Calculation in Week 22	Rp. 184.044.813.823

Next, the calculation of the Budgeted Cost of Work Scheduled (BCWS) / Planned Value (PV) from week 1 to week 22 is presented in the following table.

Table 3. BCWS Calculation

Week	Cumulative Plan Progress (%)	BCWS / PV (Rp)
1	0,428	1.908.603.546
2	0,857	3.817.207.093
3	1,285	5.725.810.639
4	1,713	7.634.414.185
5	2,864	12.762.393.752
6	4,015	17.890.373.320
7	5,166	23.018.352.887
8	6,498	28.952.961.669
9	9,316	41.509.013.727
10	12,133	54.065.065.785
11	15,241	67.913.324.135
12	18,349	81.761.582.485
13	21,992	97.992.088.323
14	23,321	103.916.300.043
15	25,579	113.977.057.192
16	27,969	124.624.505.704
17	29,505	131.469.600.069
18	31,185	138.956.341.696
19	32,991	147.004.524.678
20	34,923	155.614.149.014

Week	Cumulative Plan Progress (%)	BCWS / PV (Rp)
21	38,076	169.662.757.101
22	41,304	184.044.813.823

Source: Author's Processed Data (2023)

From the table above, it can be seen that the Budgeted Cost of Work Scheduled (BCWS) / Planned Value (PV) value up to the 22nd week is IDR. 184.044.813.8

Budgeted Cost of Work Performed (BCWP) Value Analysis

BCWP calculation	(% Realization Progress Weight) x (Total Project Budget without VAT)
Example of BCWS Calculation in Week 22	31,337 % x Rp. 445,588,376,577
Example of BCWS Calculation in Week 22	Rp. 139,634,029,568

Next, the calculation of the Budgeted Cost of Work Performed (BCWP) or also known as Earned Value (EV) from week 1 to week 22 is presented in the following table.

Table 4. BCWP calculation

Week	Cumulative Realization Progress (%)	BCWP / EV (Rp)
1	0,351	1.564.015.202
2	0,7	3.119.118.636
3	1,167	5.200.016.355
4	1,809	8.060.693.732
5	2,778	12.378.445.101
6	3,59	15.996.622.719
7	4,834	21.539.742.124
8	5,641	25.135.640.323
9	6,7	29.854.421.231
10	7,625	33.976.113.714
11	11,349	50.569.824.858
12	15,601	69.516.242.630
13	16,466	73.370.582.087
14	18,577	82.776.952.717
15	21,736	96.853.089.533
16	23,966	106.789.710.330
17	25,339	112.907.638.741
18	26,752	119.203.802.502
19	28,107	125.241.525.004
20	28,884	128.703.746.690
21	30,522	136.002.484.299
22	31,337	139.634.029.568

Source: Author's Processed Data (2023)

From the table above, it can be seen that the value of the Budgeted Cost of Work Performed (BCWP) or also known as Earned Value (EV) up to the 22nd week is IDR. 139,634,0029,568.

Analysis of Actual Cost of Work Performed (ACWP) Value

Actual Cost of Work Performed (ACWP) or also known as Actual Cost (AC) is the actual cost or actual costs that have been incurred by the executor/contractor for work that has been carried out. Below is presented ACWP data up to the 22nd (twenty-second) week.

Table 5. Recapitulation of ACWP Values

Week	Cumulative Realization Progress (%)	ACWP / AC (Rp)
1	0,351	n/a
2	0,7	n/a
3	1,167	n/a
4	1,809	n/a
5	2,778	10.209.915.002
6	3,59	n/a
7	4,834	n/a
8	5,641	n/a
9	6,7	n/a
10	7,625	38.386.196.707
11	11,349	n/a
12	15,601	n/a
13	16,466	n/a
14	18,577	n/a
15	21,736	96.880.498.613
16	23,966	n/a
17	25,339	n/a
18	26,752	n/a
19	28,107	n/a
20	28,884	n/a
21	30,522	n/a
22	31,337	140.242.148.133

Source: DPRKPP Surabaya City, Processed by the Author (2023)

Comparison of BCWS, BCWP and ACWP Values

Next, the comparative values of the 3 basic indicators of the earned value method can be presented, namely Budgeted Cost of Work Scheduled (BCWS) or Planned Value (PV), Budgeted Cost of Work Performed (BCWP) or Earned Value (EV) and Actual Cost of Work Performed (ACWP) or Actual Cost (AC).

Table 6. Comparison of BCWS, BCWP and ACWP Values

Week	BCWS / PV (Rp)	BCWP / EV (Rp)	ACWP / AC (Rp)
1	1.908.603.546	1.564.015.202	n/a
2	3.817.207.093	3.119.118.636	n/a
3	5.725.810.639	5.200.016.355	n/a
4	7.634.414.185	8.060.693.732	n/a
5	12.762.393.752	12.378.445.101	10.209.915.002
6	17.890.373.320	15.996.622.719	n/a
7	23.018.352.887	21.539.742.124	n/a
8	28.952.961.669	25.135.640.323	n/a
9	41.509.013.727	29.854.421.231	n/a
10	54.065.065.785	33.976.113.714	38.386.196.707
11	67.913.324.135	50.569.824.858	n/a
12	81.761.582.485	69.516.242.630	n/a
13	97.992.088.323	73.370.582.087	n/a
14	103.916.300.043	82.776.952.717	n/a
15	113.977.057.192	96.853.089.533	96.880.498.613

Week	BCWS / PV (Rp)	BCWP / EV (Rp)	ACWP / AC (Rp)
16	124.624.505.704	106.789.710.330	n/a
17	131.469.600.069	112.907.638.741	n/a
18	138.956.341.696	119.203.802.502	n/a
19	147.004.524.678	125.241.525.004	n/a
20	155.614.149.014	128.703.746.690	n/a
21	169.662.757.101	136.002.484.299	n/a
22	184.044.813.823	139.634.029.568	140.242.148.133

Source: Author's Processed Data (2023)

Analysis of Cost Variance (CV) and Schedule Variance (SV)

Cost Variance is the difference between the actual costs obtained (BCWP/EV) and the actual costs incurred (ACWP/AC). If the CV value is positive, it can be said that the project cost performance is in good condition (economical). If the CV value is negative, it can be said that the project cost performance is in a bad condition (wasteful). If the CV value is zero, it can be concluded that the project cost performance conditions are in accordance with planning

CV calculation at Week 22 BCWP - ACWP

CV calculation at Week 22 Rp. 139,634,029,568 – Rp. 140.242.148.133

CV calculation at Week 22 - Rp. 608.118.565

Table 7. CV calculation

Week	BCWP / EV (Rp)	ACWP / AC (Rp)	CV (Rp)
1	1.564.015.202		
2	3.119.118.636		
3	5.200.016.355		
4	8.060.693.732		
5	12.378.445.101	10.209.915.002	2.168.530.099
6	15.996.622.719		
7	21.539.742.124		
8	25.135.640.323		
9	29.854.421.231		
10	33.976.113.714	38.386.196.707	-4.410.082.993
11	50.569.824.858		
12	69.516.242.630		
13	73.370.582.087		
14	82.776.952.717		
15	96.853.089.533	96.880.498.613	-27.409.080
16	106.789.710.330		
17	112.907.638.741		
18	119.203.802.502		
19	125.241.525.004		
20	128.703.746.690		
21	136.002.484.299		
22	139.634.029.568	140.242.148.133	-608.118.565

Source: Author's Processed Data (2023)

Schedule Variance (SV) is the difference between the actual costs obtained (BCWP/EV) and the budgeted plan costs (BCWS/PV). If the SV value is positive, it can be said that the project time performance is in good condition (faster than planned). If the SV value is negative, it can be said that the project time

performance condition is in a bad condition (later than the planned time). If the SV value is zero, it can be said that the project time performance conditions are in accordance with planning.

SV Calculation in Week 22 — BCWP - BCWS

SV Calculation in Week 22 — Rp. 139,634,029,568 – Rp. 184.044.813.823

SV Calculation in Week 22 — Rp. – 44,410,784,255

Table 8. SV calculation

Week	BCWS / PV (Rp)	BCWP / EV (Rp)	SV (Rp)
1	1.908.603.546	1.564.015.202	-344.588.345
2	3.817.207.093	3.119.118.636	-698.088.457
3	5.725.810.639	5.200.016.355	-525.794.284
4	7.634.414.185	8.060.693.732	426.279.547
5	12.762.393.752	12.378.445.101	-383.948.651
6	17.890.373.320	15.996.622.719	-1.893.750.600
7	23.018.352.887	21.539.742.124	-1.478.610.763
8	28.952.961.669	25.135.640.323	-3.817.321.346
9	41.509.013.727	29.854.421.231	-11.654.592.496
10	54.065.065.785	33.976.113.714	-20.088.952.071
11	67.913.324.135	50.569.824.858	-17.343.499.277
12	81.761.582.485	69.516.242.630	-12.245.339.855
13	97.992.088.323	73.370.582.087	-24.621.506.236
14	103.916.300.043	82.776.952.717	-21.139.347.326
15	113.977.057.192	96.853.089.533	-17.123.967.659
16	124.624.505.704	106.789.710.330	-17.834.795.373
17	131.469.600.069	112.907.638.741	-18.561.961.328
18	138.956.341.696	119.203.802.502	-19.752.539.194
19	147.004.524.678	125.241.525.004	-21.762.999.673
20	155.614.149.014	128.703.746.690	-26.910.402.323
21	169.662.757.101	136.002.484.299	-33.660.272.802
22	184.044.813.823	139.634.029.568	-44.410.784.255

Source: Author's Processed Data (2023)

Analysis of Cost Performance Index (CPI) and Schedule Performance Index (SPI) Values

The Cost Performance Index, also known as the Cost Performance Index, is obtained by dividing the value of the actual costs or actual costs that will be obtained (BCWP/EV) by the actual costs that have been incurred (ACWP/AC). If the CPI value is greater than 1 (one) (>1) then cost performance can be concluded to be good and economical. If the CPI value is less than 1 (one) (<1) then cost performance can be concluded as poor and wasteful. If the CPI value is zero then cost performance can be concluded to be good and within budget.

CPI Calculation in Week 22 — BCWP / ACWP

CPI Calculation in Week 22 — Rp. 139,634,029,568 / Rp. 140.242.148.133

CPI Calculation in Week 22 — 0,996

Table 9. CPI calculation

Week	BCWP / EV (Rp)	ACWP / AC (Rp)	CPI
1	1.564.015.202		
2	3.119.118.636		
3	5.200.016.355		
4	8.060.693.732		
5	12.378.445.101	10.209.915.002	1,212
6	15.996.622.719		
7	21.539.742.124		
8	25.135.640.323		
9	29.854.421.231		
10	33.976.113.714	38.386.196.707	0,885
11	50.569.824.858		
12	69.516.242.630		
13	73.370.582.087		
14	82.776.952.717		
15	96.853.089.533	96.880.498.613	1,000
16	106.789.710.330		
17	112.907.638.741		
18	119.203.802.502		
19	125.241.525.004		
20	128.703.746.690		
21	136.002.484.299		
22	139.634.029.568	140.242.148.133	0,996

Source: Author's Processed Data (2023)

Schedule Performance Index or also known as the Time Performance Index. SPI is obtained by dividing the actual cost value or actual costs that will be obtained (BCWP/EV) by the budgeted plan costs (BCWS/PV). If the SPI value is greater than 1 (one) (>1) then the time performance can be concluded to be good and fast. If the SPI value is less than 1 (one) (<1) then the time performance can be concluded to be bad and slow. If the SPI value is zero then time performance can be concluded as good and on schedule.

SPI calculation for Week 22 BCWP / BCWS

SPI calculation for Week 22 Rp. 139,634,029,568 / Rp. 184.044.813.823

SPI calculation for Week 22 0,76

Table 10. SPI calculation

Week	BCWS / PV (Rp)	BCWP / EV (Rp)	SPI
1	1.908.603.546	1.564.015.202	0,82
2	3.817.207.093	3.119.118.636	0,82
3	5.725.810.639	5.200.016.355	0,91
4	7.634.414.185	8.060.693.732	1,06
5	12.762.393.752	12.378.445.101	0,97
6	17.890.373.320	15.996.622.719	0,89

Week	BCWS / PV (Rp)	BCWP / EV (Rp)	SPI
7	23.018.352.887	21.539.742.124	0,94
8	28.952.961.669	25.135.640.323	0,87
9	41.509.013.727	29.854.421.231	0,72
10	54.065.065.785	33.976.113.714	0,63
11	67.913.324.135	50.569.824.858	0,74
12	81.761.582.485	69.516.242.630	0,85
13	97.992.088.323	73.370.582.087	0,75
14	103.916.300.043	82.776.952.717	0,80
15	113.977.057.192	96.853.089.533	0,85
16	124.624.505.704	106.789.710.330	0,86
17	131.469.600.069	112.907.638.741	0,86
18	138.956.341.696	119.203.802.502	0,86
19	147.004.524.678	125.241.525.004	0,85
20	155.614.149.014	128.703.746.690	0,83
21	169.662.757.101	136.002.484.299	0,80
22	184.044.813.823	139.634.029.568	0,76

Source: Author's Processed Data (2023)

CONCLUSION

1. Obtained a Cost Variance (CV) value of Rp. - 608,118,565 and the Schedule Variance (SV) value is IDR - 44,410,784,255. The CV minus (-) and SV minus (-) values indicate that the project is late and costs more than the planned cost allocation.
2. The Cost Performance Index (CPI) value was 0.996 and the Schedule Performance Index (SPI) value was 0.76. A CPI value < 1 (less than one) and an SPI value < 1 (less than one) indicates that the cost and time performance of the project in the 22nd (twenty-second) week is not good or the costs incurred have exceeded the cost allocation planned and project implementation is delayed from the planned time.

REFERENCES

[1] Surabaya City Central Statistics Agency, "Surabaya in Numbers," 2024.
[2] Faculty of Public Health, Airlangga University, "Feasibility Study Document for Establishing a General Hospital (RSU) in East Surabaya," 2022.
[3] Surabaya City Government, "Surabaya Mayor Regulation Number 69 of 2023 Concerning Surabaya City Regional Government Work Plans for 2024," 2023.
[4] Surabaya City Government, "Surabaya City Regional Regulation Number 8 of 2023 concerning Regional Revenue and Expenditure Budget for Fiscal Year 2024," 2023.
[5] Surabaya City Government, "Construction Work Agreement/Contract Number: 000.3.3/26525/436.7.2/2023," 2023.
[6] Suharto I, *Imam S 1999 Project Management Volume 1*, Second Ed., vol. 1. Jakarta: Erlangga Publishers, 1999.