JOURNAL LA MULTIAPP

VOL. 06, ISSUE 05 (1332-1346), 2025
DOI: 10.37899/journallamultiapp.v6i5.2456

Analysis of Implementation Time Performance Using *Earned Value* Method

Darmawan Pontan[1], Daniel[1], Pentagon[1], Manisha[1], Indrawati Sumeru[1]

[1]Civil Engineering, Trisakti University, Jl. Letjen S. Parman No. 1 West, Indonesia

**Corresponding Author: Darmawan Pontan*
Email: darmawan@trisakti.ac.id

Article Info

Article history:
Received 17 July 2025
Received in revised form 11 August 2025
Accepted 3 October 2025

Keywords:
Earned Value Method
Earned Value
Scheduling
Time
Performance

Abstract

Construction projects often face cost and time constraints, while projects are required to be completed on schedule. To overcome these problems, an accurate management system is needed in a construction project to measure time performance, which refers to the progress of the work. By applying the earned value management (EVM) method, it is possible to project progress and weekly performance indices, making it easier to evaluate when there are deviations from the schedule. This study aims to analyze schedule variations and weekly time productivity, enabling the prediction of when the project will be completed. In the construction project of the Faculty of Law Building at Samratulangi University in North Sulawesi Province, reviews were conducted in weeks 1, 5, 10, 11, 20, and 25, where each review period had different CV, SV, and CPI values, allowing to assess at which time the predicted time was closest to the actual time occurring on-site.

Introduction

The Faculty of Law building of Sam Ratulangi University is located at Jl. Campus No.1 Manado. This educational building is one of the important facilities provided by Sam Ratulangi University to support academic activities in the campus environment (Warouw et al., 2023; Edelweis et al., 2024; Werang et al., 2025). The existence of this building aims to accommodate students majoring in Law in carrying out various educational activities, both teaching and learning activities in the classroom, seminars, discussions, and other academic activities that support the improvement of the quality of education in the field of law. As the center of academic activity, the Faculty of Law building is expected to provide comfort and adequate facilities for the entire academic community. Therefore, the planning for the construction of this building must be well designed in order to be able to meet long-term needs (Adeyemi et al., 2024; Ugwu et al., 2025; Zhao et al., 2024).

The development process is not only limited to the physical provision of buildings, but must also pay attention to effective management aspects so that the project can be completed in accordance with the planned time (Tuankotta et al., 2024; Smyth & Vanclay, 2024; Joshi et al., 2024).

One of the efforts to maximize the learning and teaching process in a campus environment is to implement proper Project Management (Orieno et al., 2024; Djirong et al., 2024; Dzaiy & Abdullah, 2024). Project management becomes very important to ensure that the construction of this building runs in accordance with the objectives and does not exceed the predetermined time limit. With good project management, all resources involved can be organized and

ISSN: 2716-3865 (Print), 2721-1290 (Online)

utilized optimally, so that the project runs smoothly, efficiently, and controlled (Damij & Damij, 2021;

In the implementation of development projects, the application of time management has a very vital role (Abd-Elazeem et al., 2023; Pamuji et al., 2024; Vizeshfar et al., 2022). Time management helps in preparing a structured project schedule, determining the duration of each job, and organizing the sequence of activities so that the development process takes place as planned (Karmila et al., 2024; Jacobs & Mohammad, 2025). Delays in projects are often caused by a lack of good time management, so scheduling becomes unrealistic and leads to inaccurate completion (Gurgun et al., 2024; Kuinkel et al., 2024; Slaeat, 2024).

In addition to time management, increasing the efficiency and effectiveness of project management also needs to be maximized (Adeyemi & Ragab, 2024; Shoushtari et al., 2024; Joshi, 2024). Efficiency relates to how resources are used as optimally as possible without waste, while effectiveness focuses on achieving project goals according to predetermined standards. These two aspects must go hand in hand so that the results of the construction of the Faculty of Law building can meet the expectations of all related parties, both in terms of cost, time, and quality (Basiru et al., 2023; Roehrich et al., 2023; Shoar et al., 2023).

The results of periodic project performance evaluations are very important in the project control process. This evaluation can serve as an early warning if there are inefficiencies or potential problems in project completion. With a good monitoring system, management can immediately take the right policy and make changes to the implementation method if necessary. This step aims to prevent cost overruns and delays in project completion, so that the purpose of building the Faculty of Law building can be achieved in accordance with the initial planning (Cruz et al., 2021; Lodi et al., 2021; Bungau et al., 2022).

Objectives and Benefits of Research

To analyze the schedule variation and time productivity of each week of project work, so that it can predict when the project time can be completed from the real-time project time.

Theory

The opinion of researchers Soeharto (1995), *Earned Value* is a method of

(Project Control) that combines elements of cost, time, and project implementation performance. In its implementation, this method uses the assumption that the trend that exists at the end of the review will continue until the project is completed.

Indicator Analysis - Earned Value Concept Indicators

Earned Value (EV) or Budget Cost of Work Performance (BCWP).

Planned Value (PV) or Budget Cost of Work Schedule (BCWS).

The concept of calculating the amount of costs according to the budget according to the work that has been carried out or completed *(Budgeted Cost of Work Performanced)*.

Yield Value **(BCWS)= (% Plan) x (Contract Value)**…………………………………..**(1)**

Rateable Value **(BCWP)= (% Realization) x (Contract Value)**………………………….**(2)**

Notes:

% realization achieved at the time of reporting.

The budget in question is the real cost of the project.

Variance Analysis

Schedule Variance **(SV)= EV - PV** or **SV= BCWP – BCWS**………………………………**(3)**

ISSN: 2716-3865 (Print), 2721-1290 (Online)

Where SV :

EV= Earn Value (Rp)

PV =Planned Value (Rp) If:

Negative (-) = behind schedule

Zero (0) = on time

Positive (+) = ahead of schedule

Schedule Performance Index (SPI)= EV/PV or SPI= BCWP…………………………...**(4)**

Where: 1) EV= Earn Value (Rp); 2) PV= Planned Value (RP) If; 3) SPI= 1: Project on time; 4) SPI> 1: Project faster; 5) SPI< 1: Project is late

Estimated time to complete all work:

ETS= (RemainingW time)……………………………………………………………**(5)**

SPI

where:

ETS = estimate to schedule (days) Remaining time = remaining project time (days) SPI=*schedule performance index*

EAS= Finish Time+ETS…………………………………………………………..**(6)**

Where:

EAS = *estiamte at schedule (days) Time to finish= time elapsed (days) ETS= estimate to schedule (days)*

Methods

The methodology adopted in this study was carefully structured to explore how the Earned Value Management (EVM) method can be used to evaluate and predict the time performance of a construction project (Aramali et al., 2021; Sobh et al., 2024; Yang & Lai, 2024). The Faculty of Law Building at Sam Ratulangi University served as the case study, providing both the data and the context in which theoretical principles could be tested against practical realities. Rather than treating the methodology as a mechanical sequence of steps, the approach was framed as a progression of inquiry, moving from theoretical grounding to empirical data collection and finally to structured analysis. Each stage informed the next, ensuring that the study remained methodologically sound while closely connected to the actual circumstances of the project.

The first stage was a literature study, which formed the conceptual foundation of the research. Project control in construction is not simply a matter of monitoring timelines and costs; it requires an interpretive framework that can connect planned objectives with unfolding realities. Reviewing earlier studies and established references on EVM provided clarity on how this method integrates cost, time, and performance into a single evaluative system. Particular attention was paid to key indicators such as Planned Value (PV), Earned Value (EV), Schedule Variance (SV), and the Schedule Performance Index (SPI). These indicators were not only defined but also examined in terms of their practical usefulness for measuring progress and identifying deviations. By engaging with this body of knowledge, the research positioned itself within ongoing academic and professional discussions, while also laying out a clear framework for applying EVM to the case at hand.

After establishing this theoretical base, the research turned to data collection from the project site. The data were drawn from several complementary sources, including the project's S-

ISSN: 2716-3865 (Print), 2721-1290 (Online)

curve, weekly progress reports, and the detailed cost budget plan. These documents provided a structured account of both the planned trajectory and the actual progress of construction work. However, documents alone rarely capture the full story of a project. To address this, field verification was carried out through direct discussions with site engineers. These conversations offered valuable context, shedding light on challenges such as discrepancies between design drawings and site conditions, delays in material procurement, and issues in contract adjustments. By combining formal documentation with insights from practitioners directly involved in the project, the data collection process ensured that the analysis would be grounded in both quantitative evidence and the practical experiences shaping the project's progress.

The analysis stage began with the application of EVM calculations. Planned Value and Earned Value were determined at selected intervals, which then allowed the computation of Schedule Variance and the Schedule Performance Index. The weeks chosen for detailed analysis weeks 1, 5, 10, 11, 20, and 25 were not selected randomly, but because they represented important phases in the life of the project. Early weeks illustrated initial mobilization, mid-project weeks reflected periods of accelerated progress, and week 11 marked the turning point when delays began to emerge and influence subsequent progress. This approach allowed the analysis to follow the story of the project, highlighting where performance was consistent with the schedule and where disruptions began to appear.

The analysis then moved beyond measuring progress to predicting outcomes. Two further indicators Estimate to Schedule (ETS) and Estimate at Schedule (EAS) were used to forecast completion times by adjusting the remaining duration of the project with the SPI values observed at different stages. These predictions were compared against both the contractual duration of 180 days and the actual completion time of 203 days. In doing so, the study was able to test the reliability of EVM not only as a descriptive tool but also as a predictive instrument. The results showed that the accuracy of predictions varied depending on when they were made, with forecasts closer to the end of the project aligning more closely with actual outcomes than those made earlier during periods of disruption.

To make these findings more tangible, the predicted completion times were expressed in percentage accuracy. This step translated technical calculations into an evaluative measure that could be readily understood in terms of reliability. It showed, for example, that while predictions in earlier weeks diverged from reality, later assessments provided much higher levels of accuracy. This reinforced the importance of continuous monitoring: predictions must be updated regularly in order to remain meaningful, as a project's performance is shaped by conditions that shift week by week.

This methodological process, moving from theory to data to analysis, reflects an effort to bring clarity to the dynamic relationship between planned schedules and actual performance. By rooting the research in established concepts, enriching it with detailed project data, and interpreting the results in light of real on-site conditions, the study demonstrated how EVM can serve both as a tool for measurement and as a guide for decision-making. The methodology, therefore, was not only a means of producing calculations but also a way of interpreting how those calculations connect with the realities of construction management, offering insights that are relevant to both scholars and practitioners.

Results and Discussion

Project data

General project data on the construction of the Sidoarjo Hospital Laundry Building include: 1) Project Name : Faculty of Law Building Construction; 2) Project Location : Jl. Campus No.1 Manado; 3) Building Function: Education Building 4) Duration: 180 Days (26

ISSN: 2716-3865 (Print), 2721-1290 (Online)

Weeks) Contract Value; 5) Contract Value: IDR 32,320,503,000; 6) Project Owner: Sam Ratulangi University; 7) Contractor: PT Dayana Cipta

EVM Analysis

Earn value (EV) calculation EV = Real progress x Contract value Where;

EV = *Earn value (Rp)*

Progress= the amount of progress that has been achieved in *real-time* (%) Contract = The contract value of the project being worked on (Rp) *Earn value* calculation in week 3:

EV= 0.15% X 31,320,502,000= Rp 48,347,772

Table 1. EV of Unsrat Faculty of Law Building project

Earn Value					
Week	**Work Item**	**Progress**		**Contract**	**Acumulative Ev**
		%		Rp	Rp
1	preparation	0,06	0,06	31.320.503.000,00	19.963.924,07
2	preparation	0,05	0,11	31.320.503.000,00	34.155.848,16
3	preparation	0,05	0,15	31.320.503.000,00	48.347.772,25
4	5thfloor structure	0,74	0,90	31.320.503.000,00	280.342.906,88
5	5th & 6thfloor structure	4,14	5,04	31.320.503.000,00	1.577.101.976,73
6	6thfloor structure	4,46	9,50	31.320.503.000,00	2.975.090.441,97
7	5th & 6thfloor casting	5,35	14,85	31.320.503.000,00	4.652.009.409,92
8	7thfloor structure	4,78	19,63	31.320.503.000,00	6.148.409.996,14
9	7thfloor structure and casting	2,74	22,38	31.320.503.000,00	7.008.025.117,39
10	roof structure and architecture 2 & 3	1,42	23,80	31.320.503.000,00	7.454.182.405,07
11	roof structure and architecture 3 & 4	0,88	24,67	31.320.503.000,00	7.728.293.250,46
12	roof structure and architecture 5 & 6	0,97	25,65	31.320.503.000,00	8.033.667.264,54
13	2ndfloor roof and ceiling structure	2,17	27,82	31.320.503.000,00	8.713.353.837,85
14	roof and ceiling structure of floors 2 - 4	2,99	30,81	31.320.503.000,00	9.649.214.798,63
15	roof structure and architecture 7thfloor	2,13	32,93	31.320.503.000,00	10.315.287.288,74
16	roof and ventilation structure 1st - 3rdfloor	3,28	36,21	31.320.503.000,00	11.342.719.577,35
17	roof structure and ventilation 3 - 5	3,66	39,87	31.320.503.000,00	12.488.726.135,99
18	roof structure and architecture 1stfloor	3,68	43,56	31.320.503.000,00	13.641.936.891,58

ISSN: 2716-3865 (Print), 2721-1290 (Online)

10	roof structure and floor work 1 - 7 (toilet)	2,38	45,93	31.320.503.000,00	14.386.740.156,36
20	roof structure and architecture 1st - 7th floor (toilet)	4,85	50,78	31.320.503.000,00	15.906.088.670,59
21	floor 1 - 3 ventilation and floor 1 - 5painting	4,45	55,23	31.320.503.000,00	17.298.476.139,30
22	ventilation of floors 4 - 7, painting of floors 6 & 7 and sanitary of floors 2 and 3	4,49	59,72	31.320.503.000,00	18.703.248.023,82
23	1st-7th floor, 1st floor ceiling MEP 1st-3rd floor and sanitary 4-6thfloor	5,54	65,25	31.320.503.000,00	20.437.202.513,26
24	architectural floor 2-7, floor works 1-6 and MEP 4-5	5,81	71,06	31.320.503.000,00	22.256.633.666,82
25	architectural floor 2-7, floor work 2-6	6,43	77,49	31.320.503.000,00	24.271.229.248,08
26	6th floor architecture, 6th floor works, 5-7 floor painting and MEP 6 & 7	3,98	81,48	31.320.503.000,00	25.519.172.717,27
27	1st and 3rd floor architecture, 1st-7th floor ceiling, 6th floor MEP and deep wells	6,84	88,32	31.320.503.000,00	27.660.842.815,10
28	4th & 5th floor architecture and deep well works	5,83	94,14	31.320.503.000,00	29.486.208.984,03
29	1st and 2nd floor architecture and deep well works	5,86	100,00	31.320.503.000,00	31.320.558.476,46

Source: researcher, 2025

Planned value calculation PV= progress plan *Contract value Where;

PV= *Planned value (Rp)*

Progress= The amount of progress when making a submission proposal (%)

Contract= The contract value of the project being worked on (Rp *Planned value* calculation in week 5:

ISSN: 2716-3865 (Print), 2721-1290 (Online)

PV= 3.52% * 31,320,502,000= Rp. 1,101,513,224

Table 2. PV of Unsrat Faculty of Law Building project

Planned Value						
Week	**Work Item**	**Progress**		**Contract**	**Pv**	**Acumulative Pv**
		%		Rp	Rp	Rp
1		0,04	0,04	31.320.503.000,00	11.351.030,74	11.351.030,74
2		0,01	0,05	31.320.503.000,00	3.914.030,76	15.265.061,50
3		0,01	0,06	31.320.503.000,00	3.914.030,76	19.179.092,26
4		0,84	0,90	31.320.503.000,00	261.975.512,60	281.154.604,86
5		2,62	3,52	31.320.503.000,00	820.358.619,87	1.101.513.224,73
6		2,73	6,25	31.320.503.000,00	855.790.228,23	1.957.303.452,96
7		1,32	7,57	31.320.503.000,00	413.231.448,31	2.370.534.901,26
8		4,70	12,27	31.320.503.000,00	1.471.857.592,50	3.842.392.493,76
9		4,92	17,18	31.320.503.000,00	1.539.558.654,78	5.381.951.148,53
10		3,24	20,42	31.320.503.000,00	1.014.848.166,98	6.396.799.315,52
11		6,22	26,64	31.320.503.000,00	1.947.425.527,40	8.344.224.842,92
12		4,94	31,58	31.320.503.000,00	1.547.250.815,57	9.891.475.658,49
13		5,27	36,85	31.320.503.000,00	1.649.418.791,73	11.540.894.450,22
14		5,31	42,16	31.320.503.000,00	1.662.522.771,29	13.203.417.221,52
15		6,62	48,78	31.320.503.000,00	2.073.352.081,14	15.276.769.302,66
16		6,06	54,83	31.320.503.000,00	1.896.641.734,20	17.173.411.036,86
17		6,55	61,38	31.320.503.000,00	2.050.623.508,65	19.224.034.545,50
18		6,58	67,96	31.320.503.000,00	2.062.407.099,34	21.286.441.644,84
10		5,65	73,61	31.320.503.000,00	1.770.032.768,09	23.056.474.412,93
20		5,23	78,85	31.320.503.000,00	1.638.480.290,98	24.694.954.703,91
21		6,41	85,26	31.320.503.000,00	2.008.571.260,72	26.703.525.964,63
22		5,71	90,97	31.320.503.000,00	1.787.666.339,37	28.491.192.304,00

ISSN: 2716-3865 (Print), 2721-1290 (Online)

23		4,02	94,99	31.320.503.000,00	1.260.598.065,64	29.751.790.369,64
24		3,40	98,39	31.320.503.000,00	1.064.556.601,48	30.816.346.971,13
25		1,60	99,99	31.320.503.000,00	500.241.998,12	31.316.588.969,24
26		0,01	100,00	31.320.503.000,00	3.914.030,76	31.320.503.000,00

Source: researcher, 2025

After we find and process the *Earn value* and *Planned value*, then we can proceed to the next stage, namely looking for the SV whose value we need to know whether the project is delayed or not.

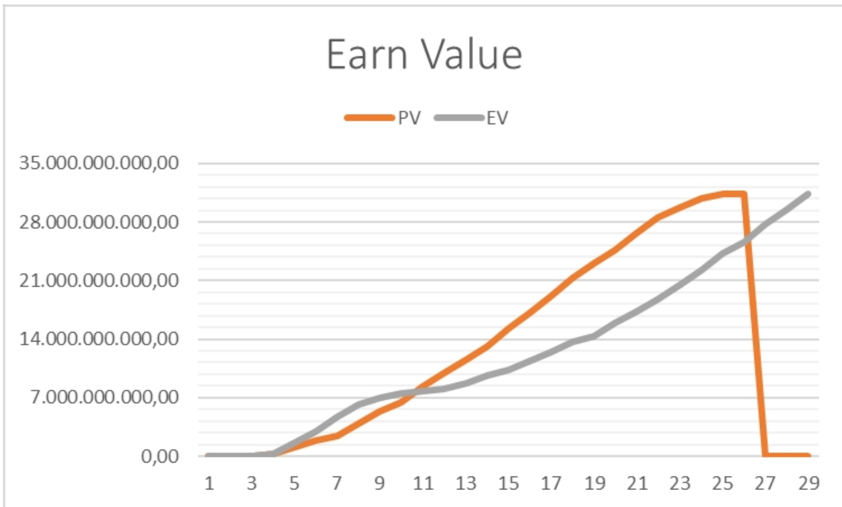

Figure 2. Chart Earn value and Planned Value

Schedule Variance

SV = EV - PV

Where;

SV= Schedule varience (Rp) EV

= Earn value (Rp)

PV= Planned value (Rp)

Calculation of SV in week 3:

SV= 48,347,772 - 19,179,072= Rp. 29,168,679 (Faster)

Table 3. *Schedule Variance*

Sv				
Week	**Ev**	**Pv**	**Sv**	**Description**
	Rp	Rp	Rp	
1	19.963.924,07	11.351.030,74	8.612.893,33	Fast
2	34.155.848,16	15.265.061,50	18.890.786,66	Fast
3	48.347.772,25	19.179.092,26	29.168.679,99	Fast
4	280.342.906,88	281.154.604,86	-811.697,98	Delayed
5	1.577.101.976,73	1.101.513.224,73	475.588.752,00	Fast
6	2.975.090.441,97	1.957.303.452,96	1.017.786.989,01	Fast

ISSN: 2716-3865 (Print), 2721-1290 (Online)

7	4.652.009.409,92	2.370.534.901,26	2.281.474.508,66	Fast
8	6.148.409.996,14	3.842.392.493,76	2.306.017.502,38	Fast
9	7.008.025.117,39	5.381.951.148,53	1.626.073.968,86	Fast
10	7.454.182.405,07	6.396.799.315,52	1.057.383.089,55	Fast
11	7.728.293.250,46	8.344.224.842,92	-615.931.592,46	Delayed
12	8.033.667.264,54	9.891.475.658,49	-1.857.808.393,95	Suspended
13	8.713.353.837,85	11.540.894.450,22	-2.827.540.612,38	Suspended
14	9.649.214.798,63	13.203.417.221,52	-3.554.202.422,89	Delayed
15	10.315.287.288,74	15.276.769.302,66	-4.961.482.013,92	Suspended
16	11.342.719.577,35	17.173.411.036,86	-5.830.691.459,51	Delayed
17	12.488.726.135,99	19.224.034.545,50	-6.735.308.409,51	Suspended
18	13.641.936.891,58	21.286.441.644,84	-7.644.504.753,27	Suspended
19	14.386.740.156,36	23.056.474.412,93	-8.669.734.256,58	Suspended
20	15.906.088.670,59	24.694.954.703,91	-8.788.866.033,32	Suspended
21	17.298.476.139,30	26.703.525.964,63	-9.405.049.825,33	Delayed
22	18.703.248.023,82	28.491.192.304,00	-9.787.944.280,18	Delayed
23	20.437.202.513,26	29.751.790.369,64	-9.314.587.856,38	Delayed
24	22.256.633.666,82	30.816.346.971,13	-8.559.713.304,30	Delayed
25	24.271.229.248,08	31.316.588.969,24	-7.045.359.721,16	Delayed
26	25.519.172.717,27	31.320.503.000,00	-5.801.330.282,73	Delayed
27	27.660.842.815,10	31.320.503.000,00	-3.659.660.184,90	Delayed
28	29.486.208.984,03	31.320.503.000,00	-1.834.294.015,97	Delayed
29	31.320.558.476,46	31.320.503.000,00	55.476,46	Completed

Source: Researcher, 2025

Schedule Performance Index

SPI = EV / PV

Where;

SPI= Schedule Performance Index

EV= Earn value (Rp)

PV = Planned value (Rp)

SPI calculation in week 5:

SPI= 1,577,101,967 / 1,101,513,224= 1.43 (fast)

Table 4. SPI value

Spi				
Week	**Acumulative Ev**	**Acumulative Pv**	**Spi**	**Description**
	Rp	Rp		
1	19.963.924,07	11.351.030,74	1,76	Fast
2	34.155.848,16	15.265.061,50	2,24	Fast
3	48.347.772,25	19.179.092,26	2,52	Fast
4	280.342.906,88	281.154.604,86	1,00	On Time
5	1.577.101.976,73	1.101.513.224,73	1,43	Fast
6	2.975.090.441,97	1.957.303.452,96	1,52	Fast
7	4.652.009.409,92	2.370.534.901,26	1,96	Fast
8	6.148.409.996,14	3.842.392.493,76	1,60	Fast
9	7.008.025.117,39	5.381.951.148,53	1,30	Fast

ISSN: 2716-3865 (Print), 2721-1290 (Online)

10	7.454.182.405,07	6.396.799.315,52	1,17	Fast
11	7.728.293.250,46	8.344.224.842,92	0,93	Late
12	8.033.667.264,54	9.891.475.658,49	0,81	Delayed
13	8.713.353.837,85	11.540.894.450,22	0,75	Delayed
14	9.649.214.798,63	13.203.417.221,52	0,73	Delayed
15	10.315.287.288,74	15.276.769.302,66	0,68	Delayed
16	11.342.719.577,35	17.173.411.036,86	0,66	Delayed
17	12.488.726.135,99	19.224.034.545,50	0,65	Delayed
18	13.641.936.891,58	21.286.441.644,84	0,64	Delayed
10	14.386.740.156,36	23.056.474.412,93	0,62	Delayed
20	15.906.088.670,59	24.694.954.703,91	0,64	Delayed
21	17.298.476.139,30	26.703.525.964,63	0,65	Delayed
22	18.703.248.023,82	28.491.192.304,00	0,66	Delayed
23	20.437.202.513,26	29.751.790.369,64	0,69	Late
24	22.256.633.666,82	30.816.346.971,13	0,72	Delayed
25	24.271.229.248,08	31.316.588.969,24	0,78	Slowest
26	25.519.172.717,27	31.320.503.000,00	0,81	Delayed
27	27.660.842.815,10	31.320.503.000,00	0,88	Delayed
28	29.486.208.984,03	31.320.503.000,00	0,94	Delayed
29	31.320.558.476,46	31.320.503.000,00	1,00	Completed

Source: researcher, 2025

In the analysis above, it was found that there was a delay in work in the 11th week to the 28th week of work time. After the researcher conducted an interview with the *site engineer* in charge directly in the field, several problems were found that made the performance of the project implementation late or not in accordance with the *schedule* plan, such as: contract drawings do not match the field, there are changes in the work contract, delays in material mobilization and differences in the quality of material orders delivered.

Where each of these problems greatly affects and has a direct impact on the performance time of project implementation and results in a delay in implementation time from 180 days (contract) to 203 days (*real-time*).

Implementation Time Performance Analysis

After we find the variables needed in the EVM method, then we can predict when the project work time can be completed. Where this research aims to prove the percentage of success of time prediction with the EVM method against the real conditions that occur in the field.

Where this percentage can be the basis for concluding whether the *Earn value management* method is still relevant as a method for assessing the performance of a construction project or not. To predict the project completion time with the EVM method, we need to find several advanced variables such as ETS (project residual time) and EAS (project end time) which have an important role in predicting when the project completion time is based on weekly progress.

In this study, researchers will take samples in the 11th week of project implementation, with the consideration that this 11th week is the first week of project delays that have an impact on the following weeks. Where in this project there was a delay in time performance which should have been completed in week 26 (180 days) but there was a delay of 29 weeks (200 days) the researcher took the SPI value in week 11 which was 0.93.

ETS= Time remaining / SPI (6)

Where:

ISSN: 2716-3865 (Print), 2721-1290 (Online)

ETS= Project residual time (days)

Remaining time= remaining time left in the work contract (days) SPI = *schedule performance index (%)*

Table 5. ETS and EAS values of week 1, 5, 10, 15, 20 and 25 against plan time

Ets/Eas							
Week	**Spi**	**Plan Time**	**Complete Time**	**Remaining Time**	**Ets**	**Eas**	**Over**
		Day	Days	Days	Day	Day	Day
1	1,76	180	7	173	98	105	75
5	1,43	180	35	145	101	136	44
10	1,17	180	70	110	94	164	16
11	**0,93**	**180**	**77**	**103**	**111**	**188**	**-8**
20	0,64	180	140	40	62	202	-22
25	0,78	180	175	5	6	181	-1

(source: researcher, 2025)

Table 6. ETS and EAS values for weeks 1, 5, 10 and 11 against a completion time of 140 days

Ets/Eas							
Week	**Spi**	**Plan Time**	**Complete Time**	**Remaining Time**	**Ets**	**Eas**	**Over**
		Day	Days	Days	Day	Day	Day
1	1,76	140	7	133	76	83	57
5	1,43	140	35	105	73	108	32
10	1,17	140	70	70	60	130	10
11	0,93	140	77	63	68	145	-5

source: researcher, 2025

Calculation example:

ETS = 103 / 0.93 = 111 days

From the table above we can conclude that the prediction of time that can be calculated using the EVM method does not show *linear* results, this is due to differences in SPI values in each week of review time. Where each SPI value> 1, the estimated project completion time will be faster than the plan time and vice versa, if SPI< 1, the estimated completion time will definitely be longer than the project plan time. From the table we can also see that the closest time difference to the plan time occurs in week 25 after the project starts.

After we find the value of ETS (*Estimate to schedule*) then we need to find the value of EAS (*Estiimate at schedule*) to be able to predict when the project completion time is from week 1, 5, 10, 15, 20 AND 25.

EAS= Finish time+ ETS (7)

Where;

EAS = prediction of when the project will be completed (days) Time completed= remaining time remaining (days) ETS = project remaining time (days)

Calculation example:

EAS= 111+ 77= 188 days

ISSN: 2716-3865 (Print), 2721-1290 (Online)

From the EAS results on the 6 time variables above, it is found that each review time shows a difference in completion time that varies, for example in week 11 where the project will finish doing work on day 188 (27 weeks) or eight (8) working days late from the initial project completion plan.

To calculate the percentage of accuracy in the six time variables above against the actual project completion time, we need to compare the EAS values in the six variables above against the initial plan time (180 days).

Table 7. percentage of plan completion time against plan time

Week	Plan Time	Time Completed	Percentage
	Day	Days	
1	180	105	58,33%
5	180	136	75,56%
10	180	164	91,11%
11	180	188	95,74%
20	180	202	89,11%
25	180	181	99,45%

source: researcher, 2025

Table 8. Percentage of planned completion time against 140-day time

Week	Real Time	Time Completed	Percentage
	Days	Day	
1	140	105	75,00%
5	140	136	97,14%
10	140	164	85,37%
11	140	188	74,47%

source: researcher, 2025

Calculation example

Accuracy percentage= W. Plan/EAS (8)

Accuracy percentage= 180/188 *100%= 96% (against plan time) Accuracy percentage= 188/203 *100%= 92.6% (against actual time)

Conclusion

Based on the results of data processing conducted by researchers, by taking 6 sample calculation times in weeks 1, 5, 10, 15 and 20. It was found that the percentage of the Earn Value Management method in predicting the completion time of a construction project was in the range of 58%-99% of the planned time and real-time time that occurred in the field.

From these results it can be concluded that project control using the Earn Value Management method is quite accurate and still relevant as an instrument in controlling construction project management. With a fairly high level of accuracy both on the planned and actual schedules, it is hoped that the Earn Value Management method can be the basis for a project management to make decisions and be able to identify problems that can, will and may occur in the future so that it can make decisions that have the smallest risk.

Suggestions

Researchers have several points of advice that can be a comparison, improvement or refutation for related research in the future, such as: 1) Further research can include Actual

ISSN: 2716-3865 (Print), 2721-1290 (Online)

Cost (AC) variables that function to be able to develop this research into an analysis for cost and time; 2) The calculation to predict when a project is completed is strongly influenced by the schedule performance index (SPI) value and the remaining project completion time. Therefore, in-depth analysis is needed in analyzing the SPI value in the progress of the project under review; 3) The importance of having weekly or daily reports during project work.

The importance of analyzing projects directly and in *real-time* using the Earn Value Management method.

References

Abd-Elazeem, A. M., & Farouk, A. (2023). The Efficiency of time management during the design process for residential buildings to achieve sustainable project management. *International Journal of Architectural Engineering and Urban Research*, *6*(2), 320-337.

Adeyemi Bode, T., & Ragab, Z. B. (2024). Adoption of Project Management Strategies and Minimization of Time and Cost in Project Execution. *American Journal of Economics and Business Management*, *7*(3), 23-23.

Adeyemi, A. B., Ohakawa, T. C., Okwandu, A. C., Iwuanyanwu, O., & Ifechukwu, G. O. (2024). Advanced Building Information Modeling (BIM) for affordable housing projects: Enhancing design efficiency and cost management. *J. Build. Inf. Model*, *12*, 45-60.

Aramali, V., Gibson Jr, G. E., El Asmar, M., & Cho, N. (2021). Earned value management system state of practice: Identifying critical subprocesses, challenges, and environment factors of a high-performing EVMS. *Journal of Management in Engineering*, *37*(4), 04021031. https://doi.org/10.1061/(ASCE)ME.1943-5479.0000925

Basiru, J. O., Ejiofor, C. L., Onukwulu, E. C., & Attah, R. U. (2023). The impact of contract negotiations on supplier relationships: A review of key theories and frameworks for organizational efficiency. *International Journal of Multidisciplinary Research and Growth Evaluation*, *4*(1), 788-802.

Bungau, C. C., Bungau, T., Prada, I. F., & Prada, M. F. (2022). Green buildings as a necessity for sustainable environment development: dilemmas and challenges. *Sustainability*, *14*(20), 13121. https://doi.org/10.3390/su142013121

Cruz Rios, F., Grau, D., & Bilec, M. (2021). Barriers and enablers to circular building design in the US: An empirical study. *Journal of construction engineering and management*, *147*(10), 04021117. https://doi.org/10.1061/(ASCE)CO.1943-7862.0002109

Damij, N., & Damij, T. (2021). An approach to optimizing Kanban board workflow and shortening the project management plan. *IEEE transactions on engineering management*, *71*, 13266-13273.

Djirong, A., Jayadi, K., Abduh, A., Mutolib, A., Mustofa, R. F., & Rahmat, A. (2024). Assessment of student awareness and application of eco-friendly curriculum and technologies in Indonesian higher education for supporting sustainable development goals (SDGs): A case study on environmental challenges. *Indonesian Journal of Science and Technology*, *9*(3), 657-678. https://doi.org/10.17509/ijost.v9i3.74385

Dzaiy, A. H. S., & Abdullah, S. A. (2024). The use of active learning strategies to foster effective teaching in higher education institutions. *Zanco Journal of Human Sciences*, *28*(4), 328-351.

ISSN: 2716-3865 (Print), 2721-1290 (Online)

Edelweis, G. K., Tulung, G. J., & Sigarlaki, S. J. (2024). The Role of Teacher and Peer Relationships on Improving Students' Motivation in English Department at Sam Ratulangi University. *Innovative: Journal Of Social Science Research*, *4*(1), 2100-2113.

Gurgun, A. P., Koc, K., & Kunkcu, H. (2024). Exploring the adoption of technology against delays in construction projects. *Engineering, Construction and Architectural Management*, *31*(3), 1222-1253. https://doi.org/10.1108/ECAM-06-2022-0566

Jacobs, R. L., & Mohammad, J. (2025). Developing employee expertise through structured on-the-job training (S-OJT): an introduction to this training approach and the KNPC experience. In *Andragogy in Practice* (pp. 135-155). Routledge.

Joshi, A., Singh, R., Kumar, V., & Rani, S. (2024). Net zero strategy: Exploring opportunities, confronting challenges for developing countries. In *Transition Towards a Sustainable Future: Net Zero Policies and Environmental Sustainability* (pp. 233-252). Singapore: Springer Nature Singapore. https://doi.org/10.1007/978-981-97-5756-5_11

Joshi, H. (2024). Artificial intelligence in project management: A study of the role of ai-powered chatbots in project stakeholder engagement. *Indian Journal of Software Engineering and Project Management (IJSEPM)*. https://doi.org/10.54105/ijsepm.B9022.04010124

Karmila, T., Romauli, R., Rahmawati, R., & Hakim, A. (2024). The Influence of Organizational Culture on the Performance Efforts of Pusdatin Employees to Support the Main Tasks of Pusdatin Kemhan. *Dinasti International Journal of Management Science (DIJMS)*, *5*(3).

Kuinkel, M. S., Zhang, C., Felton, G., Demirkesen, S., & Li, H. (2024). Compromise or problem solve: Conflicts in construction schedule updates. *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction*, *16*(1), 04523056. https://doi.org/10.1061/JLADAH.LADR-1048

Lodi, E., Perrella, L., Lepri, G. L., Scarpa, M. L., & Patrizi, P. (2021). Use of restorative justice and restorative practices at school: A systematic literature review. *International Journal of Environmental Research and Public Health*, *19*(1), 96. https://doi.org/10.3390/ijerph19010096

Orieno, O. H., Ndubuisi, N. L., Eyo-Udo, N. L., Ilojianya, V. I., & Biu, P. W. (2024). Sustainability in project management: A comprehensive review. *World Journal of Advanced Research and Reviews*, *21*(1), 656-677. https://doi.org/10.1097/MD.0000000000041279

Pamuji, S., Baharuddin, K. M., Novianto, A. Y., Kasmin, K., & Wibowo, E. P. (2024). Time Management: The Key to Success in Managing Complex Projects. *Journal Markcount Finance*, *2*(3), 361-370.

Roehrich, J. K., Kalra, J., Squire, B., & Davies, A. (2023). Network orchestration in a large inter-organizational project. *Journal of Operations Management*, *69*(7), 1078-1099. https://doi.org/10.1002/joom.1237

Shoar, S., Yiu, T. W., Payan, S., & Parchamijalal, M. (2023). Modeling cost overrun in building construction projects using the interpretive structural modeling approach: a developing country perspective. *Engineering, Construction and Architectural Management*, *30*(2), 365-392. https://doi.org/10.1108/ECAM-08-2021-0732

ISSN: 2716-3865 (Print), 2721-1290 (Online)

Shoushtari, F., Daghighi, A., & Ghafourian, E. (2024). Application of artificial intelligence in project management. *International journal of industrial engineering and operational research*, *6*(2), 49-63. https://doi.org/10.22034/ijieor.v6i2.89

Slaeat, F. (2024). The Impact Of Poor Planning On The Duration And Cost Of The Projects: The Implications Of Poor Planning On The Projects. *Mesopotamian Journal Of Civil Engineering*, *2024*, 60-81. https://doi.org/10.58496/MJCE/2024/009

Smyth, E., & Vanclay, F. (2024). Social impacts of land acquisition, resettlement and restrictions on land use. In *Handbook of Social Impact Assessment and Management* (pp. 355-376). Edward Elgar Publishing. https://doi.org/10.4337/9781802208870.00033

Sobh, A., Darwish, S., Etman, M., & Elfar, A. (2024). Using Earned Value Management and Value Engineering tools to enhance system's productivity, A proposed Framework. *Engineering Research Journal*, *183*(4), 1-23.

Tuankotta, S., Zacharias, T., & Laurens, S. (2024). Analysis of Project Supervision Performance in the Water Resources Sector of the Public Works and Spatial Planning Service of Central Maluku Regency. *Journal of Social Science*, *5*(4), 1085-1098. https://doi.org/10.46799/jss.v5i4.867

Ugwu, C. N., Ugwu, O. P. C., Alum, E. U., Eze, V. H. U., Basajja, M., Ugwu, J. N., ... & Uti, D. E. (2025). Sustainable development goals (SDGs) and resilient healthcare systems: Addressing medicine and public health challenges in conflict zones. *Medicine*, *104*(7), e41535. https://doi.org/10.1097/MD.0000000000041535

Vizeshfar, F., Rakhshan, M., Shirazi, F., & Dokoohaki, R. (2022). The effect of time management education on critical care nurses' prioritization: a randomized clinical trial. *Acute and critical care*, *37*(2), 202. https://doi.org/10.4266/acc.2021.01123

Warouw, D. M., Himpong, M. D., & Onsu, R. R. (2023). Motives for Participating in the Social Humanities Research Student Creativity Program at Sam Ratulangi University. *Journal La Edusci*, *4*(6), 488-499. https://doi.org/10.37899/journallaedusci.v4i6.901

Werang, B. R., Margunayasa, I. G., Suarjana, I. M., Wibawa, I. M. C., Rati, N. W., Putu, N., ... & Leba, S. M. R. (2025). The Impact of Parental Support and School Environment on Student Academic Achievement. *IRASS Journal of Arts, Humanities, and Social Sciences*, *2*(6), 143-151.

Yang, J. B., & Lai, T. H. (2024). Selecting EVM, ESM and EDM (t) for managing construction project schedule. *Engineering, Construction and Architectural Management*, *31*(12), 4988-5006. https://doi.org/10.1108/ECAM-02-2023-0115

Zhao, J., Uhde, E., Salthammer, T., Antretter, F., Shaw, D., Carslaw, N., & Schieweck, A. (2024). Long-term prediction of the effects of climate change on indoor climate and air quality. *Environmental research*, *243*, 117804. https://doi.org/10.1016/j.envres.2023.117804

ISSN: 2716-3865 (Print), 2721-1290 (Online)