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PERFORMANCE ANALYSIS OF THE PUBLIC SAFETY CENTER (PSC) BUILDING CONSTRUCTION PROJECT IN PROBOLINGGO REGENCY

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Abstrak
The construction of the Public Safety Center (PSC) building in Probolinggo District represents a significant government initiative aimed at enhancing health emergency response services. This project, like many others, encountered various challenges, particularly concerning cost, time, and quality management. To assess the project's performance, this study applies the Earned Value Analysis (EVA) method, which is widely used for monitoring and controlling project performance. The key data used for this analysis includes the Actual Cost of Work Performed (ACWP), Budgeted Cost of Work Performed (BCWP), and Budgeted Cost of Work Scheduled (BCWS), which together provide a comprehensive overview of both cost and schedule performance. The study reveals several critical findings, including periods where the project faced significant budget and time overruns, as well as where performance was optimized. Based on these findings, strategic recommendations are proposed to improve project control and ensure that future PSC development projects are more effective and efficient. By providing actionable insights, this research aims to serve as a valuable reference for stakeholders involved in similar infrastructure projects, offering guidance on how to better manage and control cost and schedule, mitigate risks, and achieve desired project outcomes.

Keywords: Construction Project, Public Safety Center, Earned Value Analysis, Cost Performance, Time Performance.

INTRODUCTION
One of the government programs in line with the fifth agenda of Nawa Cita is to improve the quality of life of the Indonesian people. To support this, the Ministry of Health launched an integrated emergency management system (SPGDT), one of which is through the Public Safety Center (PSC) service. PSC 119 is designed as a rapid response health emergency service that provides free access to the public for medical emergencies through the code 119.

The Public Safety Center (PSC) is a mandate from Presidential Instruction No. 4 of 2013, which requires every district or city in Indonesia to establish this service. In its implementation, the PSC is planned in stages to cover all autonomous regions. This aims to strengthen the coordination of emergency services in various regions of Indonesia, especially those with a high risk of health and non-health disasters. In Probolinggo District, the PSC building was constructed to improve emergency response services to disasters such as fires, accidents and other emergencies. The facility was built adjacent to the local hospital and Health Office to ensure a quick and effective response. The building is expected to provide direct benefits to the community in emergency situations.

The high number of emergency incidents is the main reason why the government established the PSC service. By providing quick access through the 119 number, the public can contact the service center for emergency medical assistance. For example, an ambulance can be directed to the scene with organized coordination through this system. Services like this not only help accident victims, but also handle other critical medical situations. In terms of construction projects, the construction of PSC buildings involves many challenges. These include contractual risks, technical complexities, and uncertainties during implementation. The project necessitates the preparation of a detailed, rational, effective, and efficient work plan. In addition, good teamwork is indispensable to complete the project within the specified schedule and budget.

The definition of a successful construction project has evolved in the last two decades. In addition to considering time, cost, and quality constraints, project success is also measured by the ability of the project team to meet the expectations of the owner and end users. According to Kerzner (2003), project success also involves customer satisfaction with the results achieved. The Earned Value Analysis method is an important tool in evaluating the performance of this project. By using indicators such as ACWP (Actual Cost of Work Performed), BCWP (Budgeted Cost of Work Performed), and BCWS (Budgeted Cost of Work Scheduled), an evaluation can be made to identify cost and time deviations. This data then becomes the basis for decision making for corrective measures (Ernitasari, Witjaksana, & Patriadi, 2024).

The application of this method allows project managers to anticipate problems that could potentially arise during implementation. For example, delays in material delivery or lack of availability of skilled labor can be identified early. This helps in reducing the negative impact on the project schedule and budget. In addition, good project scheduling is an important element in supporting project success. With careful planning, the project can run on target without sacrificing the quality of work. The use of the Earned Value Analysis method also provides an overview of the efficiency of the costs that have been incurred compared to the results of the work achieved (Zahra, Oetomo, & Sajiyo, 2024).

This research aims to provide strategic recommendations in the management of the PSC building construction project in Probolinggo Regency. The results are expected to provide guidance for relevant parties to improve the efficiency and effectiveness of the project. Thus, this project can serve as a model for the development of emergency services in other regions in Indonesia.

LITERATURE REVIEW

Project Management in Construction

Project management is a process that involves planning, organizing, directing, and controlling resources to achieve project goals within specific time and budget limits. According to PMBOK (Project Management Body of Knowledge), project management includes the application of skills, tools, and techniques to project activities to meet stakeholder needs (Agatha & DANI, 2018). In construction projects, project management has an important role in anticipating obstacles that often arise, such as resource limitations, delays, and cost overruns (Agatha & DANI, 2018).

Pujoartanto explains that project management involves an integrated effort to plan, organize, direct, and supervise project activities so that they are in accordance with the established schedule and budget (Soemardi, Wirahadikusumah, Abduh, & Pujoartanto, 2007). This framework is important to identify potential problems early on and mitigate them through careful planning. In addition, the use of technology and

systematic approaches also help improve the efficiency and effectiveness of the construction process (Dewi, Abdurrahman, & Hamzah, 2015).

In this case, project management includes not only technical aspects but also the management of the human resources involved. According to Nicholas (2013), the success of a project largely depends on the project manager's ability to coordinate the team and maintain effective communication (Dumadi, 2014). Therefore, a holistic approach is required to ensure that all elements of the project run harmoniously.

Factors Affecting Cost and Time Efficiency

Cost and time efficiency are often affected by various factors, both internal and external. Internal factors include resource management, project planning, and material availability. External factors can include market conditions, government policies, and economic fluctuations (Susila & Azis, 2013). In construction projects, changes in job specifications or design revisions are often the main cause of delays and cost overruns (Kartikasari, 2017).

According to previous research, one way to overcome this problem is to conduct re-planning during project implementation (Mahapatni, Wirahaji, Artana, Pratama, & Widiantara, 2024). Re-planning allows the project to adapt to new conditions without sacrificing the quality of work. In addition, close monitoring of the schedule and budget is necessary to keep the project on track (Mahapatni et al., 2024).

Another significant factor is labor productivity. Skill limitations or lack of training are often the main obstacles in achieving project targets (Messah, Widodo, & Adoe, 2013). Therefore, a well-designed training program can improve efficiency and reduce the risk of delays.

Earned Value Analysis (EVA) Method

The Earned Value Analysis (EVA) method is an effective tool for measuring project performance through an integrated analysis of time and cost (Roring, 2020). The EVA concept involves three main indicators: ACWP (Actual Cost of Work Performed), BCWP (Budgeted Cost of Work Performed), and BCWS (Budgeted Cost of Work Scheduled). These three indicators are used to evaluate the extent to which project performance is close to the planning target (Roring, 2020).

The use of EVA helps project managers to identify deviations early and take corrective actions (Sari, Hendriyani, & Widyaningrum, 2021). For example, the cost performance index (CPI) and time performance index (SPI) can provide a clear picture of project efficiency from a budget and schedule standpoint. Thus, EVA not only monitors performance but also predicts the cost and time needed to complete the project (Sugoro et al., 2022).

Case Study and Relevance

Various case studies show the successful application of EVA in various construction projects. Research conducted by Pancaningrum (2017) on the Brothers 2 Solo Baru Hotel construction project shows that EVA can provide deep insight into cost and time deviations. In addition, research by Wahyuni and Hendrawan (2018) on the PT Asian Sealand Engineering project shows that EVA helps identify areas that need improvement.

EVA is also being used in road projects, as conducted by Bakhtiar (2018), who showed that this method can improve project efficiency by reducing cost waste. These

successes show that EVA is relevant for different types of construction projects and can be widely applied.

This chapter discusses the theoretical basis of risk and risk management, which describes the project risk management phase, namely the risk management planning process, risk identification, qualitative and quantitative analysis and evaluation, risk response and risk control. There is also a theoretical basis related to cost and time performance which is then continued with the use of the Earned Value method for cost and time measurement, then closed with references to previous research and its relationship with the research to be carried out.

Previous research is an important learning tool and can be supporting data in this research. Research methods, analysis and findings in previous research conclusions can be a reference for researchers. Some previous studies related to this research are:

The first research was conducted by Seftian Yoga Wirawan (2020) entitled "Time and Cost Analysis with the Earned Value Analysis Method on the Implementation of the Trenggalek-Pacitan Road Improvement Project"**.** This study recorded an ACWP value of IDR 16,658,710,521, BCWP IDR 16,322,210,521, and BCWS IDR 16,454,014,811 in week 11. Cost deviation (CV = -Rp336,500,000) indicates cost overrun, while schedule deviation (SV = -Rp131,804,290) indicates project delay. The cost (CPI = 0.98) and schedule (SPI = 0.99) performance indices indicate the need for risk mitigation measures to prevent further delays.

The second research was conducted by Zakariyya (2020) entitled "Cost and Schedule Analysis of the Trenggalek Regency Health Office Building Construction Project with the Earned Value Method"**.** The results of the study recorded an ACWP value of Rp1,181,544,085, BCWP Rp1,319,204,394, and BCWS Rp1,946,626,471 in week 12. Schedule deviation (SV = -Rp627,442,077) indicates project delay, while cost deviation (CV = Rp137,660,308) indicates cost efficiency. The schedule performance index (SPI = 0.678) which is far below 1 indicates an urgent need for project management improvement.

The third research was conducted by Lucya Octafiani (2019) entitled "Earned Value Analysis on Cost and Time Control of Building Construction (Case Study of Type B Building Construction, Kalibokor Women's Building)"**.** This study noted that the SPI value was 1 and the CPI was 1.246, indicating the project was completed on time at a lower cost than budget. The final estimated cost (EAC) was Rp953,573,984, indicating high efficiency in project implementation.

RESEARCH METHOD

Research Design

This research was designed using an analytical method with a systematic approach to study the time and cost control of construction projects. A research flow chart was used to describe the research steps in a structured manner, starting from problem identification to data analysis. These stages are designed to ensure that each step is directed and supports the achievement of research objectives effectively.

Problem Identification

The initial step in this research is to identify problems related to time and cost management in construction projects. This identification is done through analyzing relevant literature and information to understand the constraints and challenges faced in project implementation. With this approach, the research can focus on the main problems that require solutions based on the Earned Value method.

Literature Study

Literature study was conducted to obtain a strong theoretical basis for this research. Data and information were obtained from various sources, such as books, journals, previous research reports, and relevant scientific articles. This literature review provides an in-depth understanding of the Earned Value method and other concepts that support integrated project time and cost control.

Data Collection

Data collection in this study was carried out through two main sources, namely primary data and secondary data. Primary data was obtained through direct observation in the field, such as the collection of implementation schedules, weekly reports, and actual project cost data. Meanwhile, secondary data was collected through literature review, related agencies, and other supporting documents, such as the Cost Budget Plan (RAB) and S-curves. This data collection process aims to ensure the completeness of the information required for further analysis.

Data Analysis

The data that has been collected is analyzed using the Earned Value Management (EVM) approach. The analysis stages include calculations of Planned Value (PV), Earned Value (EV), and Actual Cost (AC), as well as variance analysis such as Schedule Variance (SV) and Cost Variance (CV). This analysis provides important information regarding project performance and projected completion.

Subjects and Objects of Research

This research was conducted on the Health Office Building Construction Project/PSC 119 located in Probolinggo Regency. The research subject includes all relevant data and information related to project implementation. The research object focuses on time and cost analysis using the Earned Value Management (EVM) method, which provides an overview of project performance based on cost and schedule indicators.

Location and Time of Research

The research was conducted on Jl. Raya Panglima Sudirman, Probolinggo Regency, the construction site of the Health Office Building/PSC 119. It was conducted from September to November 2024, and the data used included the Cost Budget Plan (RAB), implementation schedule, and weekly project progress reports. The selection of this research time was based on the availability of relevant data to be analyzed.

Research Instruments

The instruments used in this study include primary and secondary data collected through direct observation, project documents, and literature review. Primary data was obtained from weekly reports, implementation schedules, and actual project cost data. Meanwhile, secondary data was obtained from supporting documents such as RAB, S-curves, and the results of the literature study. This instrument was designed to ensure the validity of the data used in the analysis.

Data Analysis Technique

Data analysis techniques were performed by integrating key indicators such as PV, EV, and AC to calculate variances and project performance indices. Cost and schedule

variances were calculated to measure project efficiency and effectiveness, while cost and completion time estimates were used to project remaining resource requirements. Using this approach, the research was able to provide a comprehensive overview of the project performance as well as the steps that need to be taken to improve the effectiveness of the project implementation

RESULTS AND DISCUSSION

Project Data

The project analyzed is the construction of the Health Office Building/PSC 119 with a contract amount of Rp. 1,543,018,179,-. The project is managed by CV Jagaddita Contractors and located in Kraksaan District, Probolinggo Regency, with an implementation duration of 22 weeks or 150 calendar days. The data used in the study includes various important elements. The Project Plan Time Schedule includes job descriptions, volumes, unit weights (%), and plan S curves. The Project Actual Time Schedule describes the progress of the work that has been carried out. Cost Budget Plan (RAB) is used for the calculation of Planned Value and Earned Value. In addition, daily reports provide data on materials, work volume, labor, and equipment, while weekly reports contain work progress weights for Earned Value calculations. Other data used include a recapitulation of project logistics, a list of project bills, and direct and indirect cost data.

Table 1. RAB Recapitulation

Recapitulation of Draft Budget and Costs			
WORK:	PLANNING OF PSC 119 BUILDING OF PROBOLINGGO DISTRICT HEALTH OFFICE		
LOCATION:	PROBOLINGGO DISTRICT HEALTH OFFICE IN KRAKSAAN		
FISCAL YEAR:	2024		
No.	JOB DESCRIPTION		TOTAL PRICE OF WORK AND PROFIT (Rp)
A	MANAGEMENT SYSTEM	OCCUPATIONAL HEALTH SAFETY (SMK3)	IDR 9,131,786
B	JOB	STRUCTURE & ARCHITECTURE 1ST FLOOR	
B.1	JOB	PREPARATION	IDR 13,015,006
B.2	EARTHWORKS		IDR 5,792,325
B.3	FOUNDATION WORK		IDR 31,257,012
B.4	CONCRETE WORK		IDR 294,219,253
B.5	JOB	MASONRY & PLASTERING	IDR 63,417,950
B.6	FLOOR WORK	& WALL CLADDING	IDR 115,366,028
B.7	TABLE WORK	CONCRETE PANTRY 2.55 M1 LONG 10 CM THICK	IDR 1,535,580
B.8	PARTITION WORK		IDR 14,917,031
B.9	FRAME WORK,	DOORS & WINDOWS	IDR 53,515,021

B.10	KEY WORK	& SUPPORTERS	IDR 24,733,500
B.11	SANITARY WORK		IDR 10,236,200
B.12	JOB	CHECKING	IDR 38,086,273
B.13	ROOFING WORK		IDR 14,078,496
C	JOB	STRUCTURE & ARCHITECTURE 2ND FLOOR	
C.1	CONCRETE WORK		IDR 152,991,651
C.2	ROOFING WORK		IDR 47,281,271
C.3	JOB	MASONRY & PLASTERING	IDR 75,843,735
C.4	FLOOR WORK	& WALL CLADDING	IDR 72,175,329
C.5	TABLE WORK	CONCRETE PANTRY 2.55 M1 LONG 10 CM THICK	IDR 935,224
C.6	CEILING WORK	& PARTITION	IDR 43,061,189
C.7	FRAME WORK,	DOORS & WINDOWS	IDR 51,783,718
C.8	KEY WORK	& SUPPORTERS	IDR 19,705,800
C.9	JOB	CHECKING	IDR 48,217,524
C.10	SANITARY WORK		IDR 9,591,300
D	JOB	MECHANICAL ELECTRICAL PLUMBING	
D.1	PANEL WORK	AND FEDDER CABLE	IDR 33,966,000
D.2	JOB	LT LIGHTING INSTALLATION	IDR 53,614,800
D.3	AC WORK		IDR 51,761,400
D.4	JOB	LIGHTNING ROD	IDR 13,202,400
D.5	JOB	PLUMBING	IDR 26,673,665

Data Analysis

Planned Value (PV)

Planned Value is calculated from week 1 to 22 using RAB data and cumulative planned work weights. The cumulative PV value shows the project progress planned in the project budget. The graph shows a gradual increase in PV until it reaches Rp 1,543,018,179 in week 22. Calculation of *Planned Value* (PV) in weeks 1 to 22, can be seen below:

Table 2. Earned Value in Week 1 to 22

WEEK TO	BAC	% PLAN	PV
	BUDGET	COMULATIVE	COMULATIVE
	a	b	a xb
1	1.390.106.467,03	0,68%	9.452.723,98
2	1.390.106.467,03	1,60%	22.241.703,47
3	1.390.106.467,03	1,85%	25.716.969,64
4	1.390.106.467,03	2,58%	35.864.746,85

5	1.390.106.467,03	3,29%	45.734.502,77
6	1.390.106.467,03	5,88%	81.738.260,26
7	1.390.106.467,03	7,78%	108.150.283,13
8	1.390.106.467,03	11,25%	156.386.977,54
9	1.390.106.467,03	13,57%	188.637.447,58
10	1.390.106.467,03	16,25%	225.892.300,89
11	1.390.106.467,03	21,37%	297.065.752,00
12	1.390.106.467,03	26,86%	373.382.597,04
13	1.390.106.467,03	36,35%	505.303.700,76
14	1.390.106.467,03	47,81%	664.609.901,89
15	1.390.106.467,03	57,66%	801.535.388,89
16	1.390.106.467,03	67,13%	933.178.471,32
17	1.390.106.467,03	75,83%	1.054.117.733,95
18	1.390.106.467,03	81,92%	1.138.775.217,79
19	1.390.106.467,03	87,99%	1.223.154.680,34
20	1.390.106.467,03	94,64%	1.315.596.760,39
21	1.390.106.467,03	99,18%	1.378.707.594,00
22	1.390.106.467,03	100%	1.390.106.467,03

Source: Author's Processed Results

However, after week 18, the EV position is below the PV. This indicates that the project is experiencing significant delays compared to the original plan. This delay can be caused by various factors, such as logistical constraints, lack of labor, or unfavorable weather conditions. Therefore, time management must be improved in order to catch up with the existing delays.

Earned Value (EV)

Earned Value reflects the physical progress that has been achieved in the project based on the weight of work that has been completed. In week 15, EV was recorded at Rp 950,000,000, while PV in the same period should have reached Rp 1,100,000,000. This difference indicates that the project is delayed by Rp 150,000,000. *Earned Value* calculations for week 1 to week 15, can be seen below:

Table 3. *Earned Value* in Week 1 to 15

WEEK TO	BAC	% REALIZATION	EV
	BUDGET	COMULATIVE	COMULATIVE
	a	b	a xb
1	1.390.106.467,03	0,68%	94.527,24
2	1.390.106.467,03	0,85%	118.159,05
3	1.390.106.467,03	1,81%	251.748,28
4	1.390.106.467,03	4,28%	594.965,57
5	1.390.106.467,03	9,98%	1.387.326,25
6	1.390.106.467,03	12,84%	1.784.896,70
7	1.390.106.467,03	15,25%	2.119.912,36
8	1.390.106.467,03	16,89%	2.347.889,82
9	1.390.106.467,03	23,56%	3.275.090,84

10	1.390.106.467,03	25,37%	3.526.700,11
11	1.390.106.467,03	26,50%	3.683.782,14
12	1.390.106.467,03	30,64%	4.259.286,21
13	1.390.106.467,03	33,30%	4.629.054,54
14	1.390.106.467,03	36,50%	5.073.888,60
15	1.390.106.467,03	42,58%	5.919.073,34
16	1.390.106.467,03		
17	1.390.106.467,03		
18	1.390.106.467,03		
19	1.390.106.467,03		
20	1.390.106.467,03		
21	1.390.106.467,03		
22	1.390.106.467,03		

Source: Author's Processed Results

This condition illustrates that the realization of the work is below the plan, which can affect the smooth running of the project as a whole. With this delay, it is necessary to evaluate the work methods used to ensure the achievement of work targets. Acceleration efforts, such as adding manpower or rearranging work schedules, can be a solution to catch up.

Actual Cost (AC)

Actual Cost is calculated based on direct and indirect costs that have been incurred up to a certain week. In week 15, the AC was recorded at Rp 920,000,000, which means that the actual cost is still below the planned budget. This shows that the project has been managed efficiently in terms of cost expenditure.

Table 4. AC in Week 1 to 15

Week to	Direct costs	Indirect costs	Actual cost
	a	b	a + b
1	IDR 7,000,000	IDR 25,000,000	IDR 32,000,000
2	IDR 8,000,000	IDR 20,000,000	IDR 28,000,000
3	IDR 8,000,000	IDR 15,000,000	IDR 23,000,000
4	IDR 17,936,000	IDR 10,000,000	IDR 27,936,000
5	IDR 16,198,000	IDR 8,000,000	IDR 24,198,000
6	IDR 34,633,000	IDR 7,000,000	IDR 41,633,000
7	IDR 28,870,000	IDR 7,000,000	IDR 35,870,000
8	IDR 91,108,000	IDR 6,000,000	IDR 97,108,000
9	IDR 125,113,000	IDR 6,000,000	IDR 131,113,000
10	IDR 157,380,000	IDR 5,000,000	IDR 162,380,000
11	IDR 198,000,000	IDR 5,000,000	IDR 203,000,000
12	IDR 80,000,000	IDR 5,000,000	IDR 85,000,000
13	IDR 48,000,000	IDR 5,000,000	IDR 53,000,000
14	IDR 55,000,000	IDR 5,000,000	IDR 60,000,000

15	IDR 50,000,000	IDR 5,000,000	IDR 55,000,000

Source: Processed Results

However, even if cost efficiency is achieved, project delays are still a major issue that needs to be resolved. Direct costs include materials and labor, while indirect costs include office and field overheads. To ensure that cost efficiency is maintained, close monitoring of resource utilization needs to continue.

Time (SV) and Cost (CV) Variance Analysis

Schedule Variance (SV) and Cost Variance (CV) provide an overview of project performance in terms of time and cost. In week 12, the SV value is -Rp 200,000,000, which indicates a significant delay to the planned schedule.In the Third month review, the following *Schedule Variance* and *Cost Variance* calculation values from week 1 to 12 are presented in the following table:

Table 5. SV and CV for Week 1 to 15

week to	PV	EV	AC	SV	CV	Description
				EV-PV	EV-AC	
	a	b	C	(b-a)	(b-c)	
1	IDR 94,527.24	IDR 94,527.24	IDR 32,000,000.00	Rp	IDR 31,905,472.76	Positive SV value indicates that the project implementation time is faster than planned
						Positive CV values indicate lower costs incurred and budget plans.
2	IDR 222,417.03	IDR 118,159.05	IDR 28,000,000.00	IDR 104,257.99	IDR 27,881,840.95	Negative SV value indicates that the project implementation time is late and planning
						Negative CV values indicate higher costs incurred and budget plans.
3	IDR 257,169.70	IDR 251,748.28	IDR 23,000,000.00	IDR 5,421.42	-IDR 22,748,251.72	Negative SV value indicates that the project implementation time is late and planning
						Negative CV values indicate

						higher costs incurred and budget plans.
4	IDR 358,647.47	IDR 594,965.57	IDR 27,936,000.00	IDR 236,318.10	-Rp 27,341,034.43	Positive SV value indicates faster project implementation time and planning. Negative CV values indicate higher costs incurred and budget plans.
5	IDR 457,345.03	IDR 1,387,326.25	IDR 24,198,000.00	Rp 929,981.23	-IDR 22,810,673.75	Positive SV value indicates faster project implementation time and planning. Negative CV values indicate higher costs incurred and budget plans.
6	IDR 817,382.60	IDR 1,784,896.70	IDR 41,633,000.00	IDR 967,514.10	-Rp 39,848,103.30	Positive SV value indicates faster project implementation time and planning. Negative CV values indicate higher costs incurred and budget plans.
7	IDR 1,081,502.83	IDR 2,119,912.36	IDR 35,870,000.00	IDR 1,038,409.53	-Rp 33,750,087.64	Positive SV value indicates faster project implementation time and planning. Negative CV values indicate higher costs incurred and budget plans.
8	IDR 1,563,869.78	IDR 2,347,889.82	IDR 97,108,000.00	IDR 784,020.05	-Rp 94,760,110.18	Positive SV value indicates faster project implementation time and planning.

						Negative CV values indicate higher costs incurred and budget plans.
9	IDR 1,886,374.48	IDR 3,275,090.84	IDR 131,113,000.00	IDR 1,388,716.36	-Rp 127,837,909.16	Positive SV value indicates faster project implementation time and planning.
						Negative CV values indicate higher costs incurred and budget plans.
10	IDR 2,258,923.01	IDR 3,526,700.11	IDR 162,380,000.00	IDR 1,267,777.10	-IDR 158,853,299.89	Positive SV value indicates faster project implementation time and planning.
						Negative CV values indicate higher costs incurred and budget plans.
11	IDR 2,970,657.52	IDR 3,683,782.14	IDR 203,000,000.00	IDR 713,124.62	-Rp 199,316,217.86	Positive SV value indicates faster project implementation time and planning.
						Negative CV values indicate higher costs incurred and budget plans.
12	IDR 3,733,825.97	IDR 4,259,286.21	IDR 85,000,000.00	IDR 525,460.24	-IDR 80,740,713.79	Positive SV value indicates faster project implementation time and planning.
						Negative CV values indicate higher costs incurred and budget plans.
13	IDR 5,053,037.01	IDR 4,629,054.54	IDR 53,000,000.00	-Rp 423,982.47	IDR 48,370,945.46	Negative SV value indicates that the project

						implementation time is late and planning
						Negative CV values indicate higher costs incurred and budget plans.
14	IDR 6,646,099.02	IDR 5,073,888.60	IDR 60,000,000.00	-IDR 1,572,210.41	IDR 54,926,111.40	Negative SV value indicates that the project implementation time is late and planning
						Negative CV values indicate higher costs incurred and budget plans.
15	IDR 8,015,353.89	IDR 5,919,073.34	IDR 55,000,000.00	-IDR 2,096,280.55	IDR 49,080,926.66	Negative SV value indicates that the project implementation time is late and planning
						Negative CV values indicate higher costs incurred and budget plans.

Source: Processed Results

Meanwhile, the CV in week 15 was positive at IDR 30,000,000, indicating good cost efficiency. The combination of a negative SV and a positive CV shows that the project is managed efficiently in terms of cost but requires more attention to time management. To improve time performance, measures such as speeding up the decision-making process and improving coordination between teams are required. Thus, the project can get back on track according to the original plan.

Table 6. TE in Week 1 to 15

WEEK TO	TOTAL TIME	WEEK TO	TIME LEFT	SPI	TE
	a	b	a - b = C	d	c/d
1	22	1	21	1,00	21,00
2	22	2	20	0,53	37,74
3	22	3	19	0,98	19,39
4	22	4	18	1,66	10,84
5	22	5	17	3,03	5,61
6	22	6	16	2,18	7,34

7	22	7	15	1,96	7,65
8	22	8	14	1,50	9,33
9	22	9	13	1,74	7,47
10	22	10	12	1,56	7,69
11	22	11	11	1,24	8,87
12	22	12	10	1,14	8,77
13	22	13	9	0,92	9,78
14	22	14	8	0,76	10,53
15	22	15	7	0,74	9,46
16	22	16	6	0,75	8,01
17	22	17	5	0,83	6,02
18	22	18	4	0,82	4,91

Source: Author's Processed Results

However, TE at week 15 showed that the project required an additional 9.46 weeks for completion, while the remaining project time was only 7 weeks. This indicates the need to accelerate work to pursue the project completion target. Measures such as overtime work or additional resources are options that can be considered.

Calculation Result Chart

The calculation graph shows the comparison between the EV, PV, and AC values, as well as the variance and index performance. The graph of EV against PV shows that EV is below PV after week 18, indicating a delay in work. The EV versus AC graph shows that the project is running more cost-efficiently, with EV above AC in most weeks.

The variance graph shows that CV started to be positive from week 4, reflecting the continuously improving cost efficiency, although SV remained negative until week 22. Meanwhile, the SPI graph shows values below 1 since week 8, indicating poor time performance. In contrast, the CPI was mostly above 1, signaling that the project was managed with good cost efficiency. In conclusion, focus needs to be put on improving time performance to complete the project on target.

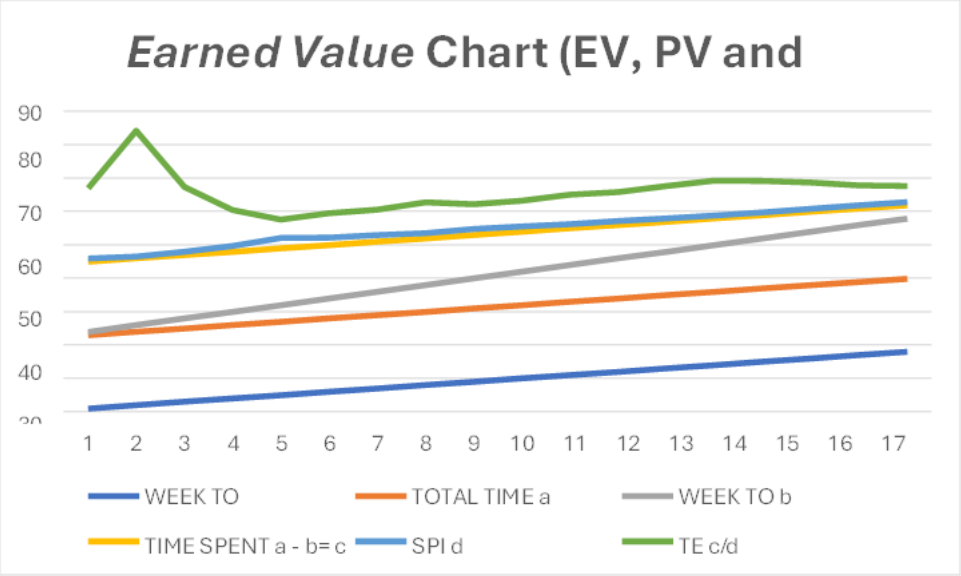

Figure 2. Earned Value Comparison Chart

DISCUSSION

The results indicate that the Earned Value Analysis (EVA) method has provided a comprehensive evaluation of cost and time efficiency in the implementation of the 119 Health Office Building / Public Safety Center (PSC) construction project in Probolinggo Regency. The application of EVA, using the Cost Performance Index (CPI) and Schedule Performance Index (SPI) indicators, offers a clear picture of the project's performance throughout the implementation period. The CPI value, which remains mostly below 1, suggests that the project has been experiencing cost overruns, where actual costs are exceeding the value of work completed. Similarly, the SPI values below 1 during most weeks indicate that the project is delayed compared to the original schedule. The graphs of Planned Value (PV), Earned Value (EV), and Actual Cost (AC) further reinforce the observation that the project's work is proceeding more slowly than planned, while expenditures continue to rise, creating a widening gap between the target and the reality.

These delays and cost overruns stem from a range of interconnected root causes. First, inadequate project planning emerged as the primary issue affecting both time and cost efficiency. The lack of a comprehensive forecast of material and resource requirements hindered the smooth execution of tasks. Second, external factors such as adverse weather conditions and delays in material procurement compounded the scheduling issues. Third, suboptimal project management, particularly in managing both direct and indirect costs, led to budget inefficiencies. Direct costs, such as materials and labor, were not effectively controlled, and indirect costs like office overheads and field-related expenses continued to increase, exacerbating the overall budget strain.

To address these challenges, it is crucial to implement a well-structured risk mitigation strategy. An important first step is enhancing supervision and control during project execution by utilizing the EVA method as a monitoring tool. Through EVA, deviations in cost and time can be identified early, enabling corrective actions to be taken before issues escalate. Additionally, creating a flexible and realistic alternative schedule can help manage external disruptions such as weather delays or procurement challenges. Detailed re-planning can minimize the impact of such delays on the project’s overall timeline.

Furthermore, the adoption of modern construction technologies and digital tools can serve as long-term solutions to improve resource efficiency. Technologies like Building Information Modeling (BIM) can significantly enhance planning accuracy, while project management software can facilitate real-time tracking of work progress. Moreover, investing in workforce training to boost competencies can lead to greater productivity, ensuring that work is executed in line with the established quality standards. These strategies, combined with improved resource management, will help construction projects meet their time, cost, and quality objectives more effectively.

This research confirms that the success of construction projects heavily depends on effective time and cost management. Despite encountering several challenges, the implementation of appropriate risk mitigation strategies can mitigate delays and cost overruns. By integrating efficient resource management, leveraging technology, and enhancing workforce skills, future projects can achieve greater success. Additionally, these findings are directly related to the study's second and third research questions—evaluating the effectiveness of time and cost control strategies and providing recommendations for improvements. The use of EVA is critical in identifying potential

issues early on, offering a clear pathway for enhancing project management practices in the future

CONCLUSION

The results of the evaluation using the Earned Value method show that in week 15, the project requires an additional 9.46 weeks to complete all work, bringing the total implementation time to 24.46 weeks from the original plan of 22 weeks. The realized cost at week 15 only reached Rp. 5,919,073.34 compared to the plan of Rp. 8,015,353.89. To achieve the work target, an additional budget of Rp. 1,181,590,496.97 is required. If completion is made within the remaining 7 weeks, the project will require an additional cost of Rp. 2,096,280.55, causing a loss of the same value

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