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Evaluation Of Final Project Cost And Time Estimates For The Rehabilitation Of The Segiri Sports Hall Building, Samarinda City, Using The Earned Value Method

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Abstract: Evaluation of the final project cost and time estimates is essential to measure whether the project can be completed in accordance with the previously established budget and schedule. The calculation of the final cost and time estimates for the rehabilitation project of the Segiri Sports Hall Building in Samarinda City uses the Earned Value Method (EVM). The evaluation is performed by calculating the Estimate At Complete (EAC) for cost projection and the Estimate At Schedule (EAS) for the project completion time estimate. The analysis results show that the EAC experienced fluctuations, starting from Rp 44,648,760,330.58 in the first week of July and increasing to Rp 52,630,845,855.14 in the 15th week of November. This change was influenced by the increase in the Actual Cost of Work Performed (ACWP), which reached Rp 31,173,250,000.00 in the 15th week, as well as a decrease in the Estimate To Complete (ETC), reflecting cost adjustments. Although the EAC showed an upward trend from July to October, there was a decrease in November, indicating an improvement in project cost management. In terms of time, the EAS shows that the project was running ahead of schedule from the first to the third week, with EAS values ranging between 16.57 and 16.41. However, starting from the 4th to the 6th week, the EAS increased significantly, reaching 28.80 in the 6th week, reflecting a delay. Although there was a decrease in the EAS in the 14th and 15th weeks, the project still showed a significant delay compared to the planned schedule. These findings emphasize the importance of further evaluation in time management and resource allocation to minimize delays and ensure the project is completed on target.

Keywords: Cost and Time, Earned Value Method, Building Rehabilitation

INTRODUCTION

The rehabilitation project for a sports building, especially for facilities such as the Segiri Sports Hall in Samarinda City, has the important goal of improving the quality and usability of sports facilities for the local community. In the execution of such a project, cost and time estimation are two crucial aspects that must be considered so that the project can proceed according to plan. Evaluation of the final project cost and time estimates is essential to measure whether the project can be completed in accordance with the previously established budget and schedule. Therefore, it is important for project implementers and related parties to continuously monitor and evaluate project progress so that potential constraints and risks can be detected early and minimized.

The method often used for this evaluation is Earned Value (EV), which is better known as the Earned Value Method (EVM). EVM is a technique used to measure project performance by comparing the value achieved (earned value), the costs incurred (actual cost), and the planned value. By using EVM, clearer information can be obtained regarding how efficiently time and cost have been used in project execution, as well as the magnitude of the deviation from the initial plan. In addition, EVM also provides a more accurate estimate of the final project completion time and cost.

According to Kerzner (2020), EVM is an evaluation tool useful for objectively analyzing the progress and performance of a project by measuring project achievement against the established plan. Meredith and Mantel (2020) also state that EVM is very effective in identifying project problems earlier so that corrective steps can be taken immediately to keep the project on track with the planned budget and schedule. In the context of the Segiri Sports Hall Rehabilitation project, the application of EVM will be very beneficial to ensure that the project can be completed on time and within the established budget.

The application of EVM in the Segiri Sports Hall Rehabilitation project is carried out by considering several factors, such as costs incurred for materials, labor, and other costs related to the project. In addition, the project execution time is also an important parameter that must be considered in the evaluation process. In this case, it is important to compare the planned time with the time that has been used at each project stage to find out whether the project is running according to plan or not.

The applicable laws related to construction project management in Indonesia regulate various technical and administrative aspects, including cost and time estimation in project execution. One relevant regulation is Law Number 2 of 2017 concerning Construction Services, which regulates the implementation of construction activities, from planning to execution and supervision. This law emphasizes that construction project management must be carried out efficiently, transparently, and accountably. Therefore, the use of the EVM method in project evaluation will support efforts to meet the provisions in this regulation. Furthermore, in the execution of the Segiri Sports Hall Rehabilitation project, routine supervision and evaluation are also regulated in Government Regulation Number 22 of 2020 concerning Amendments to Government Regulation Number 29 of 2000 concerning Supervision of Construction Activities. This regulation emphasizes the importance of supervision over project execution to prevent deviations from the agreed plan. Evaluation using the EVM method, which measures project performance based on cost and time indicators, can be a very effective tool to ensure that the construction project proceeds in accordance with applicable regulations.

The EVM method is also in line with engineering principles regulated in various international guidelines and standards, such as PMBOK (Project Management Body of Knowledge). In the PMBOK, project management is considered a discipline that involves planning, execution, monitoring, and completion of the project. One of the main areas emphasized is project time and cost management. The use of EVM allows for an objective evaluation of whether the project has achieved progress in line with the target time and budget set. This is consistent with research conducted by Fleming and Koppelman (2021), which shows that EVM is effective in providing a clearer picture of overall project performance.

In the context of the Segiri Sports Hall Rehabilitation project, which involves various technical and administrative aspects, EVM will provide a clearer picture of project performance. This method allows project implementers to know if there is a difference between the planned value and the value that has been achieved, as well as whether the project is experiencing delays or cost overruns. Thus, this information is very useful for decision-makers in making adjustments to the project schedule and budget.

In construction project execution, the evaluation of cost and time is also closely related to the risks faced. Every construction project has potential risks that can affect the smoothness and success of the project. Therefore, in evaluating the final project cost and time estimates, project implementers must consider potential risk factors. The use of EVM helps in identifying potential risks early, so that preventive actions can be taken immediately. Furthermore, with a more precise and accurate evaluation of project cost and time, related parties, such as contractors, consultants, and government managing parties, can have a better understanding of project progress. This will help them make more appropriate decisions in the face of changes that may occur during project execution. Therefore, it is important to conduct a deep and comprehensive evaluation of all aspects of the project, including cost, time, and associated risks, so that the project can achieve its goals with optimal results.

Evaluating the final project cost and time estimates using the Earned Value Method is a very important step in the execution of the Segiri Sports Hall Rehabilitation project. By using this method, project implementers can obtain more accurate information about project progress, as well as identify deviations that need to be corrected immediately. In addition, the application of this method also supports more efficient, transparent, and compliant project management, so that the project can be completed successfully and provide maximum benefits to the community.

METHODS

This research method aims to evaluate the final cost and time estimates for the rehabilitation project of the Segiri Sports Hall Building in Samarinda City using the Earned Value Method (EVM). This research will be conducted with a descriptive quantitative approach, which aims to describe and analyze project data objectively and measurably. The steps to be carried out in this research are divided into several main stages: data collection, data analysis, and calculation of project final cost and time estimates.

Data Collection

Data collection is the first and very important stage in this research. The data to be used in this research consists of two main sources: time data and cost data recorded in the project documents. Several types of data that will be collected include:

Time Schedule (Project Schedule): This project schedule will be obtained from the project planning documents, which include the planned time for each stage of activity in the Segiri Sports Hall rehabilitation project. This data covers the duration of work, project stages, and the target completion time for each phase in the project.

Weekly Reports: Weekly project reports prepared by the project execution team will provide information about the progress that has been achieved over a certain period. This report contains information about completed work, ongoing work, and obstacles or problems faced in the project. These weekly reports are very important for determining the earned value (EV) and for monitoring project development.

Budget Plan (RAB): The RAB will be used to determine the estimated cost that was prepared at the beginning of the project and compared with the actual cost incurred. This data will be used in the calculation of project costs during the evaluation with the EVM method. The RAB also provides a reference for seeing if there is a significant difference between the planned cost and the cost already spent.

Data Analysis with Earned Value Method (EVM)

In this research, the calculation of the project final cost and time estimates will be performed using several EVM calculations that can provide a projection of the final project cost and time based on the performance already achieved. The calculations to be performed are the Calculation of Total Final Project Cost (Estimate At Complete) and the Calculation of Final Project Time (Estimate At Schedule).

RESULT AND DISCUSSION

The analysis results are taken from the collected data in the form of the Time Schedule, Project Work Plan and Realization Reports, Budget Plan, and Project Financial Reports. The Segiri Sports Hall Rehabilitation Project is located in Samarinda City, East Kalimantan Province. The project duration is 20 weeks with a project cost of Rp 36,250,000,000 in the 2024 budget year. The following presents the calculation for the total final cost and time of project completion, and the data details can be seen in the tables.

1. Calculation of Total Final Project Cost (Estimate At Complete))

   EAC = ACWP + ETC

   EAC = (Rp. 540.250.000) + (Rp. 44.108.510.330,58)

   EAC = Rp. 44.648.760.330,58

Tabel 1. *Estimate At Complete*

Month	Period	BAC	ACWP	ETC	EAC
July	Week 1	36.250.000.000,00	540.250.000,00	44.108.510.330,58	44.648.760.330,58
	Week 2		1.881.625.000,00	71.907.590.686,27	73.789.215.686,27
	Week 3		3.861.000.000,00	104.594.056.179,78	108.455.056.179,78
August	Week 4		5.666.375.000,00	113.125.553.721,17	118.791.928.721,17
	Week 5		7.352.125.000,00	136.244.066.406,25	143.596.191.406,25
	Week 6		8.374.500.000,00	143.337.456.521,74	151.711.956.521,74
	Week 7		10.266.875.000,00	118.552.133.782,94	128.819.008.782,94
September	Week 8		10.459.125.000,00	104.224.263.157,90	114.683.388.157,90
	Week 9		11.260.375.000,00	77.056.291.666,67	88.316.666.666,67
	Week 10		12.728.625.000,00	61.232.008.352,70	73.960.633.352,70
	Week 11		14.483.250.000,00	60.404.288.779,73	74.887.538.779,73
October	Week 12		21.131.625.000,00	71.146.213.427,95	92.277.838.427,95
	Week 13		24.339.875.000,00	58.618.117.501,70	82.957.992.501,70
	Week 14		27.406.750.000,00	25.893.036.075,46	53.299.786.075,46
	Week 15		31.173.250.000,00	21.457.595.855,14	52.630.845.855,14
November	Week 16				
	Week 17				
	Week 18				
December	Week 19				
	Week 20				

Table 1 shows the Estimate at Complete (EAC) as the estimated total cost required to complete the Segiri Sports Center Building rehabilitation project in Samarinda, based on actual performance and remaining work. The EAC value shows fluctuations, starting from Rp 44,648,760,330.58 in the first week of July and reaching Rp 52,630,845,855.14 in the 15th week of November. This change was influenced by an increase in the Actual Cost of Work Performed (ACWP) which reached Rp 31,173,250,000.00 in the 15th week, as well as a decrease in the Estimate to Complete (ETC), which reflects efficiencies or changes in cost requirements. The increase in EAC occurred between July and October, reflecting increased project expenditures. However, a decrease began to be seen in November, indicating improvements in project cost management and better adjustments to the estimated remaining costs. This provides a positive picture related to efficiency efforts undertaken during project implementation.

2. Calculation of Final Project Time (Estimate At Schedule)

   Using the calculation from the first week of July as an example:

   EAS = Reporting Time+ ETS

   EAS = 15,00 + 1,56

   EAS = 16,56

Tabel 2. *Estimate At Schedule*

Month	Period	Reporting Time	ETS	EAS
July	Week 1	15,00	1,57	16,57
	Week 2	15,00	1,41	16,41
August	Week 3	15,00	1,19	16,19
	Week 4	15,00	3,19	18,19
	Week 5	15,00	7,50	22,50
September	Week 6	15,00	13,80	28,80
	Week 7	15,00	14,17	29,17
	Week 8	15,00	20,88	35,88
	Week 9	15,00	19,14	34,14
October	Week 10	15,00	14,31	29,31
	Week 11	15,00	14,28	29,28
	Week 12	15,00	12,56	27,56
	Week 13	15,00	11,16	26,16
	Week 14	15,00	7,73	22,73
	Week 15	15,00	6,53	21,53
November	Week 16			
	Week 17			
	Week 18			
December	Week 19			
	Week 20			

Table 2 shows that in the first to third weeks, the Estimate at Schedule (EAS) values ranged from 16.57 to 16.41, indicating that the project was running ahead of the planned schedule. However, starting from the fourth to the sixth week, the EAS value increased significantly, reaching 28.80 in the 6th week, reflecting an increasing delay compared to the established schedule. Although there was a slight decrease in the 14th and 15th weeks, with EAS values of 22.73 and 21.53 respectively, the project still shows a considerable difference between the progress achieved and the planned time, indicating a significant delay in project execution. Overall, the project has not shown optimal progress and still requires effort to reduce delays. This indicates the need for further evaluation regarding resource allocation and time management so that the project can be completed in accordance with the desired schedule.

The data analysis results obtained from the application of the Earned Value Method (EVM) to the Segiri Sports Hall rehabilitation project include an evaluation of project performance in terms of cost and time, focusing on the projection of final project cost and time through the calculation of Estimate At Complete (EAC) and Estimate At Schedule (EAS). This evaluation process aims to identify whether the project is proceeding according to the established budget and schedule, and to obtain more accurate predictions regarding the final project cost and time. In addition, these analysis results will provide deeper insight into project performance, both in terms of cost efficiency and speed of execution, which can ultimately serve as a basis for taking corrective steps to ensure the smooth running and timely completion of the project within budget.

CONCLUSION

From the results of the analysis and discussion, the following conclusions can be drawn regarding the final cost and time estimates in the review of the Segiri Sports Hall Rehabilitation project in Samarinda City:

a. The estimated cost at the end of the project review (EAC) showed a value ranging from Rp 44,648,760,330.58 in the 1st week of July to Rp 52,630,845,855.14 in the 15th week of November. This change was influenced by the increase in ACWP, which reached Rp 31,173,250,000.00 in the 15th week, and a decrease in ETC, reflecting cost efficiency or adjustments. The EAC showed an increase from July to October, then experienced a decrease in November, which indicates an improvement in project cost management.

b. The estimated time at the end of the project review showed that in weeks 1 to 3, the total project completion time (EAS) was between 16.57 and 16.41, indicating the project was ahead of schedule. However, starting from week 4 to week 6, the EAS increased significantly, reaching 28.80 in week 6, reflecting a delay. Although there was a decrease in weeks 14 and 15, with EAS values of 22.73 and 21.53, respectively, the project is still behind schedule. This indicates the need for further evaluation in resource allocation and time management to reduce delays and achieve the target according to the schedule.

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