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COST MANAGEMENT ANALYSIS WITH EARNED VALUE METHOD ON ROAD IMPLEMENTATION PROJECT IN UAIACA - QUELECAI TO OSSU BAUCAU CITY, TIMOR LESTE

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Abstract

Project management plays a critical role in ensuring the success of infrastructure projects like road implementations, which are essential for the development of emerging regions such as Baucau City, Timor Leste. Challenges often arise due to discrepancies between planned schedules and actual implementation, exacerbated by logistical constraints and unforeseen changes in project requirements. Effective cost management, exemplified by methods like Earned Value Management (EVM), becomes crucial in maintaining project feasibility and controlling expenditures. The purpose of this study was to analyze the cost of road implementation projects using the Earned Value Analysis Method. The method used in this study is to use the Earned Value Method with a project duration of 18 months, where the importance of the earned value analysis method is very helpful for the owner and project implementer to more easily analyze the performance of the project being carried out so as to provide benefits for the owner and project implementation. The findings revealed a project cost overrun of $205,483.12, attributed to low labor productivity and inadequate management, resulting in extended project timelines and subsequent delays in follow-up activities.

Keywords: *Cost Management, Earned Value Method, Road Implementation Project, Infrastructure Projects, Project Management*

1. INTRODUCTION

Projects are defined as a unique set of activities that are limited to a certain duration, starting and ending at a certain time with the aim of producing a specific product. Meanwhile, management is the utilization of knowledge, skills and resources to achieve a certain goal. In simple terms, project management can be defined as the utilization of science and resources to achieve project goals. In project implementation, management plays an important role as a flow and control to achieve these main objectives.

Poor management risks causing project failure (Cahyono et al., 2022). In particular, project failure is caused by several things such as failure of the contractor to complete the work (project), failure of project financing by the owner, force majeure (natural disasters, pandemics), fire and so on. From these examples, it can be analyzed that apart from disasters (force majeure), the main cause of project failure is the unsynchronization of plans with implementation. It can be concluded that a good and successful project is a project with good management and the failure of a project is the failure of project management itself.

As industrial growth and advancements in transportation infrastructure, particularly roads, accelerate, managing highway projects becomes increasingly intricate. This complexity translates to longer project timelines. To address this, effective time management is crucial. It's not just about prioritizing tasks, but also about optimizing project management as a whole to get the most out of available resources (Ayatullah et al., 2023). The ultimate aim is to deliver successful highway projects that hit the trifecta of on-time completion (schedule), within budget (cost), and meeting quality standards (Gerung et al., 2016).

In essence, cost management acts as a central information hub for organizational leaders. It helps them pinpoint areas for improvement, plan strategically, and make day-to-day choices about acquiring and using resources. This system encompasses various tools and methods working together. Notably, a well-designed cost management system connects seamlessly with other crucial systems within the organization. These include design and development, purchasing and production, customer service, and distribution and marketing.

Timor Leste is a new country that is in the process of development with inadequate facilities and infrastructure, especially in the city of Baucau and is currently in the process of development since declaring its independence in 2002. Since then the government has promoted physical and non-physical development programs, physical infrastructure development and non-physical human resources. The physical development program is the responsibility of the Ministry of Public Works (MOP/Ministerio das Obras Publicas), with infrastructure being rebuilt from scratch after being destroyed in the 1999 riots. Infrastructure development was phased in according to urgency. From 2002 to 2011 infrastructure development was built according to what was called "what the people need now", there was no clear long-term or short-term plan. Starting in 2011, a new government plan or program entitled the National Development Plan 2011-2030 was published. With the publication of the program, the development program became more focused.

As a newly independent country Timor-Leste faces many problems, one of which is infrastructure, including the development of roads. The problem encountered is that the highways used today, including city roads, are road implementation projects that were carried out in previous years. In the case study that the author took, Baucau city is still in the process of development in the field of construction. Limitations in logistics and resources make roads in Baucau city still relatively undeveloped. In a construction project that is being carried out, it is constrained by the delivery of construction logistics materials which causes delays in the project implementation schedule and inflates the previously planned cost budget. Problems can arise if there is a discrepancy between the planned schedule that has been made and its implementation (Sakinah, 2021).

To reduce these problems, the importance of a method or technique that can reveal all the data needed for the control process is emphasized. This means that there must be a unified relationship in analyzing a work progress with the amount of costs that have been used for it so that estimates or projections of funding needs can be made until the end of project implementation based on certain assumptions. In this case the author tries to analyze the cost management needed in a road implementation project in Baucau city by using the Earned Value Method (EVA) (Anjani et al., 2023; Sari et al., 2021). The earned value concept method is one of the methods/techniques that can reveal all the data

needed for the cost control process (Dharmawan et al., 2023). It is hoped that this will reduce project cost overruns, and in the end will provide its own benefits for contractors / consultants as the person in charge of project implementation (Wicaksono, 2021).

Based on the current issues, the author undertook the Road Implementation Project from Uaiaca - Qulecai to Ossu in Baucau City, Timor Leste. During the project implementation, numerous changes and issues have arisen, impacting the planned schedule. These issues include Mobilization under General Items, where sub-items like Facility Engineering, originally not part of the construction system (site/supervisory consultant office) in the planning stage, became necessary during implementation. Additionally, changes in drawings have introduced unforeseen structures such as retaining walls and channels, not accounted for in the initial plans, which also affect local residents' housing.

It is necessary to acquire land, which may take between 2 to 4 months. Due to these issues, there is a need for a variation order to resolve them. However, the owner considers it a technical matter, providing relief for project implementers (supervision consultants) during the VO process, while work continues in the implementation phase. Originally scheduled to commence in February 2023, the implementation must now begin in the third month after the release period due to numerous issues and obstacles.

To mitigate these challenges, the importance of effective project management is stressed, aimed at addressing any existing issues in the road implementation project, ensuring it is completed on time and within the previously planned budget. Hence, the author has titled the study: 'Cost Management Analysis Using the Earned Value Method for the Road Implementation Project from Uaiaca - Quelecai to Ossu, Baucau City, Timor Leste (Alfathan, 2021).

A technical method that can reveal all the data needed for the control process. This means that there must be a unified relationship in analyzing a work progress with the amount of cost and time that has been used for it so that estimates or projections of funding requirements can be made until the end of project implementation based on certain assumptions. In this case the author tries to analyze the time and cost management required in a project in Baucau city by using the Earned Value Method to reveal whether the progress of project work implementation is worth the use of its budget share (Permana, 2022; Winarto, 2021).

Earned Value Management (EVM) offers a powerful tool for project managers. By analyzing the relationship between completed work and budget spent, EVM reveals a project's overall health and that of individual work packages (Nufah et al., 2019; Pabalik et al., 2018). This analysis allows for predicting project completion costs and timelines. By proactively identifying potential cost and schedule overruns, EVM helps in keeping projects on track, ultimately reducing costs for contractors, the party responsible for delivering the project.

The contract implementation period is effective from the date specified in the special conditions of the contract and the completion of the entire work is 18 calendar months. With a maintenance period of 365 calendar days (1 year). At this time, the project work has stepped on the 8th month with a progress of 29.26%, and is still running according to the schedule set at the beginning of the work. The expected result obtained

in this study is a solution on how to reduce the cost of expenditure for the construction of highway projects using the method chosen by the author.

And affect the schedule that has been planned by both parties that have been approved since the contract was issued. Based on the above background, this study aims to analyze the performance of road implementation projects based on costs and cost estimates with the remaining work at the end of project implementation.

2. RESEARCH METHODS

2.1. Research Subjects

Research subjects are individuals or objects that are used as sources of information needed in data collection in a study. The subject of this research is Cost Management Analysis on Road Implementation Project using Earned Value Concept (Tangtobing & Waty, 2023). This research focuses on cost management (Nono et al., 2019).

2.2. Object of Research

The object used in this research is the Road Implementation Project in Uaiaca - Quelecai to Ossu Baucau city, Timor Leste.

2.3. Research Location

The research location is in Uaiaca - Quelecai to Ossu, Baucau city, Timor Leste. The researcher took the research location because Baucau is one of the cities that is in the face of development, especially in the field of roads, so the researcher wants to find information about how the project implementation process is currently running.

2.4. Data Collection Technique

Data collection techniques are the methods used to obtain data. The data is obtained from the supervisory consultants and field staff who supervise the implementation of the highway project. The data required include:

a. Construction Work Agreement Letter (Unit Price Contract)
b. Time Schedule
c. Project budget cost recapitulation
d. Project weekly/daily report

3. RESULTS AND DISCUSSION

3.1. Research Results

3.1.1. Actual Cost of Work Performance (ACWP)

Actual Cost of Work Performance (ACWP) is calculated from the sum of direct costs, indirect costs and taxes. Indirect costs for each month are obtained from the total indirect costs divided by the number of months.

13th month calculation:

Direct Costs : $ 25,461.00

Indirect Costs : $ 213,00
ACWP : Direct Cost + Indirect Cost
= $ 25,461.00+ $ 213,00
=$ 25,674.00

Table 1. Actual of Work Performance (ACWP) Value

2nd month	Direct Cost	Indirect Cost	ACWP	Cumulative ACWP
1	Rp 47,344.22	Rp 4,870.18	Rp 52,214.40	Rp 52,214.40
2	Rp 47,344.22	Rp 4,870.18	Rp 52,214.40	Rp 104,428.80
3	Rp 47,344.22	Rp 4,870.18	Rp 52,214.40	Rp 156,643.20
4	Rp 47,344.22	Rp 4,870.18	Rp 52,214.40	Rp 208,857.60
5	Rp 47,344.22	Rp 4,870.18	Rp 52,214.40	Rp 261,072.00
6	Rp 25,461.00	Rp 213.00	Rp 25,674.00	Rp 286,746.00
7	Rp 25,461.00	Rp 213.00	Rp 25,674.00	Rp 312,420.00
8	Rp 25,461.00	Rp 213.00	Rp 25,674.00	Rp 338,094.00
9	Rp 25,461.00	Rp 213.00	Rp 25,674.00	Rp 363,768.00
10	Rp 25,461.00	Rp 213.00	Rp 25,674.00	Rp 389,442.00
11	Rp 25,461.00	Rp 213.00	Rp 25,674.00	Rp 415,116.00
12	Rp 25,461.00	Rp 213.00	Rp 25,674.00	Rp 440,790.00
13	Rp 25,461.00	Rp 213.00	Rp 25,674.00	Rp 466,464.00
14	Rp 25,461.00	Rp 213.00	Rp 25,674.00	Rp 492,138.00

Source: Processed by Researchers 2024

3.1.2. Budget Cost of Work Schedule (BCWS) or PV

The budget owned by the project according to the inventory calculated on a percentage basis against the total cost according to field data for 13 Months. BCWS is calculated using the formula Result Value = (% Plan) x (budget). An example of BCWS calculation in the 13th month is as follows:

% Month Plan Weight 13 = 35,09%
Project Contract Value = $452,122.00

So:
BCWS = (% Plan) x (Budget)
= 35,09% x $ 452,122.00
= $158,649.61

Table 2. BCWS/PV Value

Month Period	Planned %	Schedule Type	Contract Value	BCWP/PV	BCWP/PV Cumulative (S)
Mo 1	0.04%	S	Rp 452,122.00	S	Rp 180.85
Mo 2	0.58%	S	Rp 452,122.00	S	Rp 2,622.31
Mo 3	1.18%	S	Rp 452,122.00	S	Rp 5,335.04
Mo 4	2.22%	S	Rp 452,122.00	S	Rp 10,037.11
Mo 5	3.97%	S	Rp 452,122.00	Rp	Rp 36,124.55
Mo 6	5.81%	S	Rp 452,122.00	S	Rp 62,392.84
Mo 7	8.26%	Rp	Rp 452,122.00	S	Rp 99,738.11
Mo 8	11.65%	S	Rp 452,122.00	S	Rp 152,410.33
Mo 9	14.80%	Rp	Rp 452,122.00	S	Rp 219,324.38
Mo 10	18.36%	S	Rp 452,122.00	S	Rp 302,333.98
Mo 11	21.92%	S	Rp 452,122.00	S	Rp 401,439.12
Mo 12	27.80%	S	Rp 452,122.00	S	Rp 527,129.04
Mo 13	35.09%	Rp	Rp 452,122.00	S	Rp 685,778.65
Mo 14	44.73%	S	Rp 452,122.00	S	Rp 888,012.82
Mo 15	63.84%	S	Rp 452,122.00	S	Rp 1,176,647.51
Mo 16	79.11%	S	Rp 452,122.00	S	Rp 1,534,321.22
Mo 17	94.26%	S	Rp 452,122.00	S	Rp 1,960,491.42
Mo 18	99.96%	S	Rp 452,122.00	S	Rp 2,412,432.57
Mo 19	100.00%	S	Rp 452,122.00	S	Rp 2,864,554.57

Source: Processed by Researchers 2024

Description:
Column (4) = Column (2) x Column (3)
Column (5) = Cumulative of column (4)

3.1.3. Budget Cost of Work Performance (BCWP) or EV

The result value is the budgeted cost of the work completed by the executor. BCWP using the formula:

Result Value = (% Completion) x (Budget)

An example of BCWP calculation in Month 13 is as follows:

% Weight of 13th month implementation = 29.26%
Contract Value of the project = $452,122.00

So:
BCWP = (% Completion) x (Budget)
= 29,26%x $ 452,122.00
= $132,290.90

Table 3. BCWP/EV Value

Month Period	% Work Progress	Contract Value	BCWP/EV	BCWP/EV Cumulative ($)
1	0.04%	$452,122.00	$180.85	$180.85
2	0.74%	$452,122.00	$3,345.70	$3,526.55
3	2.71%	$452,122.00	$12,252.51	$15,779.06
4	4.79%	$452,122.00	$21,656.64	$37,435.70
5	6.30%	$452,122.00	$28,483.69	$65,919.39
6	8.36%	$452,122.00	$37,797.40	$103,716.79
7	11.34%	$452,122.00	$51,270.63	$154,987.42
8	14.18%	$452,122.00	$64,110.90	$219,098.32
9	18.71%	$452,122.00	$84,592.03	$303,690.35
10	22.21%	$452,122.00	$100,416.30	$404,106.64
11	26.13%	$452,122.00	$118,139.48	$522,246.112
12	28.11%	$452,122.00	$127,091.49	$649,337.616
13	29.26%	$452,122.00	$132,290.90	$781,628.514
14	30.85%	$452,124.00	$139,480.25	$1,060,5888.713

Source: Processed by Researcher 2024

Description:
Column (4) = Column (2) x Column (3)
Column (5) = Cumulative of column (4)

3.1.4. Schedule Variance (SV)

Schedule Variance is the difference between the value of the project performance results (BCWP/EV) and the planned budget EV (BCWP) - (BCWS) PV. with the formula:

Schedule Variance (SV) = PV (BCWS) - EV (BCWP)

with the condition that if SV:
Negative (-) = Behind Schedule
Zero (0) = On Time
Positive (+) = ahead of schedule

Example of 13th month SV calculation:
13th month BCWS value = $158,649.61
BCWP value 13th month = $132,290.90
Schedule Variance (SV) = PV (BCWS) - EV (BCWP)

= $158,649.61 - $132,290.90
= -$26,358.71

Table 4. SV Value for Each Month

Bulan Ke	PV/BCWS Kom.($)	EV/BCWP Kom.($)	SV($)
1	2	3	4
1	$ 180.85	$ 180.85	$ -
2	$ 2,622.31	$ 3,345.70	$ (723.40)
3	$ 5,335.04	$ 12,252.51	$ (6,917.47)
4	$ 10,037.11	$ 21,656.64	$ (11,619.54)
5	$ 17,949.24	$ 28,483.69	$ (10,534.44)
6	$ 26,268.29	$ 37,797.40	$ (11,529.11)
7	$ 37,345.28	$ 51,270.63	$ (13,925.36)
8	$ 52,672.21	$ 64,110.90	$ (11,438.69)
9	$ 66,914.06	$ 84,592.03	$ (17,677.97)
10	$ 83,009.60	$ 100,416.30	$ (17,406.70)
11	$ 99,105.14	$ 118,139.48	$ (19,034.34)
12	$ 125,689.92	$ 127,091.49	$ (1,401.58)
13	$ 158,649.61	$ 132,290.90	$ 26,358.71
14	$ 202,234.17	$ 139,479.95	$ 62,754.23
15	$ 288,634.68	$ 139,480.25	$ 149,154.43

Source: Processed by Researchers 2024

3.1.5. Schedule Performance Index (SPI)

Project managers are interested in understanding how effectively resources are being used. The Schedule Performance Index (SPI) is a metric that helps assess this by measuring efficiency of resource use at a specific point in time. In simpler terms, SPI indicates whether a project is on track, ahead of schedule, or behind schedule. SPI is calculated using the following formula:

SPI schedule performance index $= \frac{EV(BCWP)}{PV(BCWS)}$

Example of 13th month SPI calculation:
EV(BCWP) value of 13th month = $48,717,801.76
PV(BCWS) value of 13th month = $58,424,731.31

So:

SPI $= \frac{EV(BCWP)}{PV(BCWS)}$

SPI $= \frac{\$132,290.90}{\$158,649.61}$

SPI = 0,83

In the 13th month, the SPI value is 0.83, indicating that the project implementation performance is subpar compared to the initial planning. This could be due to higher expenditures than budgeted or a slower progress in comparison to the planned schedule.

Table 6. Schedule Performance Index (SPI) Value

Bulan Ke	BCWP / EV Kom($)	BCWS / PV Kumulatif ($)	SPI($)
1	2	3	4
1	$ 180.85	$ 180.85	1.00
2	$ 3,345.70	$ 2,622.31	1.28
3	$ 12,252.51	$ 5,335.04	2.30
4	$ 21,656.64	$ 10,037.11	2.16
5	$ 28,483.69	$ 17,949.24	1.59
6	$ 37,797.40	$ 26,268.29	1.44
7	$ 51,270.63	$ 37,345.28	1.37
8	$ 64,110.90	$ 52,672.21	1.22
9	$ 84,592.03	$ 66,914.06	1.26
10	$ 100,416.30	$ 83,009.60	1.21
11	$ 118,139.48	$ 99,105.14	1.19
12	$ 127,091.49	$ 125,689.92	1.01
13	$ 132,290.90	$ 158,649.61	0.83
14	$ 139,479.95	$ 202,234.17	0.69
15	$ 139,480.25	$ 288,634.68	0.48

Source: Processed Data 2024

Notes:
Column (4) = Column (2) / Column (3)

3.1.6. Estimate All Completion (EAC)

Table 7. Indicators of The Concept of Cumulative Result Value

Bulan Ke	BCWS / PV Kom($)	BCWP / EV Kom($)	SV($)	SPI($)	ETS(Bulan)	EAS(Bulan)
1	2	3	4	5	6	7
1	$ 180.85	$ 180.85	$ 1.00	1.00	0.00%	0.04%
2	$ 2,622.31	$ 3,526.55	$ 723.40	1.28	-0.13%	0.61%
3	$ 5,335.04	$ 15,779.06	$ 6,917.47	2.30	-0.67%	2.04%
4	$ 10,037.11	$ 37,435.70	$ 11,619.54	2.16	-1.19%	3.60%
5	$ 17,949.24	$ 65,919.39	$ 10,534.44	1.59	-1.47%	4.83%
6	$ 26,268.29	$ 103,716.79	$ 11,529.11	1.44	-1.77%	6.59%
7	$ 37,345.28	$ 154,987.42	$ 13,925.36	1.37	-2.24%	9.10%
8	$ 52,672.21	$ 219,098.32	$ 11,438.69	1.22	-2.08%	12.10%
9	$ 66,914.06	$ 303,690.35	$ 17,677.97	1.26	-3.09%	15.62%
10	$ 83,009.60	$ 404,106.64	$ 17,406.70	1.21	-3.18%	19.03%
11	$ 99,105.14	$ 522,246.12	$ 19,034.34	1.19	-3.53%	22.60%
12	$ 125,689.92	$ 649,337.62	$ 1,401.58	1.01	-0.31%	27.80%
13	$ 158,649.61	$ 781,628.51	$ (26,358.71)	0.83	6.99%	36.25%
14	$ 202,234.17	$ 921,108.46	$ (62,754.23)	0.69	20.12%	50.97%
15	$ 288,634.68	$ 1,060,588.71	$ (149,154.43)	0.48	0.00%	0.00%
16	$ 357,673.71	$ -	$ -	0.00	0.00%	0.00%
17	$ 426,170.20	$ -	$ -	0.00	0.00%	0.00%
18	$ 451,941.15	$ -	$ -	0.00	0.00%	0.00%
19	$ 452,122.00	$ -	$ -	0.00	0.00%	0.00%

Source: Processed Data 2024

Notes:
Column (5) = Column (3) / Column (2)
Column (7) = Column (6) - Column (3)

Table 8. All Completion Calculation (EAC)

Bulan Ke	BAC	BCWP Kom.	ACWP Kom.	CPI	EAC
1	2	3	4	5	6
1	$ 452,122.00	$ 180.85	$ 52,214.40	0.00	$ 1,565.96
2	$ 452,122.00	$ 3,345.70	$ 52,214.40	0.06	$ 28,970.28
3	$ 452,122.00	$ 12,252.51	$ 52,214.40	0.23	$ 106,093.87
4	$ 452,122.00	$ 21,656.64	$ 52,214.40	0.41	$ 187,523.85
5	$ 452,122.00	$ 28,483.69	$ 52,214.40	0.55	$ 246,638.88
6	$ 452,122.00	$ 37,797.40	$ 25,674.00	1.47	$ 665,616.41
7	$ 452,122.00	$ 51,270.63	$ 25,674.00	2.00	$ 902,881.59
8	$ 452,122.00	$ 64,110.90	$ 25,674.00	2.50	$ 1,129,000.08
9	$ 452,122.00	$ 84,592.03	$ 25,674.00	3.29	$ 1,489,675.00
10	$ 452,122.00	$ 100,416.30	$ 25,674.00	3.91	$ 1,768,342.16
11	$ 452,122.00	$ 118,139.48	$ 25,674.00	4.60	$ 2,080,449.38
12	$ 452,122.00	$ 127,091.49	$ 25,674.00	4.95	$ 2,238,095.37
13	$ 452,122.00	$ 132,290.90	$ 25,674.00	5.15	$ 2,329,657.44
14	$ 452,122.00	$ 139,479.95	$ 25,674.00	5.43	$ 2,456,257.38
15	$ 452,122.00	$ 139,480.25	$ -	$ -	$ -
16	$ 452,122.00	$ -	$ -	$ -	$ -
17	$ 452,122.00	$ -	$ -	$ -	$ -
18	$ 452,122.00	$ -	$ -	$ -	$ -
19	$ 452,122.00	$ -	$ -	$ -	$ -

Source: Processed Data 2024

Example of 13th Month Calculation:

$$= \frac{BCWP\ Kom.}{ACWP\ Kom.}$$

$$= \frac{3{,}616.98}{2{,}622.31}$$

=1,38

EAC = Total project cost x CPI
= $452,122.00 x 1.38
= $623,616.55

Comparison of Calculation Results on the Road Implementation Project in Uaiaca - Quelecai to Ossu Baucau city, Timor Leste with the benchmarks used are as follows:

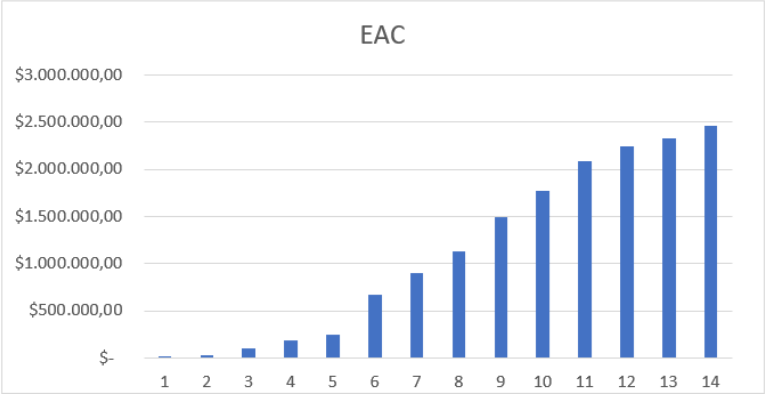

Figure 1. Histogram of EAC by Month
Source: Data Processing 2024

Description:
Vertical Axis: Cumulative All Complicated Estimate Value () Horizontal Axis: Duration of work execution (month)

The Cumulative EAC graph in month 14 has the highest value than the following months because the actual costs incurred are greater than the plan budget, so the estimated cost to complete the project is large. From month 5 there is a significant decrease in value, which indicates the cost to complete the project is starting to approach the plan value. months 3 to 5 the EAC value moves steadily between $106,093.87 to $246,638.88, indicating the final cost of the study period. From the calculation results, the costs that must be available to complete the project are:

Remaining funds = Contract Cost – EAC
= $ 452,122.00 - $246,638.88
= $205,483.12

So, the Project Completion Estimate suffered a loss of $205,483.12.

3.1.7. Handling of Delays Caused

From the results of the data analysis above, it was found that there were delays in the 3rd to 5th months. Possible handling to reduce the negative appearance of the delay is by increasing the number of workers or workers' working hours so that the productivity of work implementation increases. This may affect the cost of project implementation but the consultant has calculated the additional material costs before the project is run so that it does not have a labor impact on project financing.

4. CONCLUSION

After analyzing the data, it is evident that the project's cost performance index (CPI) of 1.38 shows that the actual project cost is lower than the budgeted cost. If the current conditions persist until project completion, the estimated total cost will be $205,483.12. It is crucial to monitor project time and cost performance daily, followed by weekly or monthly reports to summarize the monitoring results. This will help in addressing any issues promptly and ensuring effective project management.

To avoid delays, it is recommended to expedite the work progress by increasing labor resources. The 7-month delay has resulted in a cost loss of $205,483.12 for the owner, out of the total contract value of $452,122.00. The final cost of the project, if completed on time, would have been $246,638.88, leaving the supervisory consultant with a profit margin of 45%.

For future studies, it is suggested to conduct a comparative analysis between the Earned Value method and other project management techniques for time and cost management in highway projects. This research will shed light on the strengths and weaknesses of each method, aiding in better decision-making for construction projects.

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