SAE 2.03 - BACHELOR OF COMPUTER SCIENCE - GROUP 11

Cost Analysis

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1 Introduction

Cost management is an essential component of project management that ensures a project stays within its budget and is completed within the allocated financial resources. This document explores the key elements of cost management, namely Planned Value (PV), Earned Value (EV), and Actual Costs (AC), and delves into the analytical tool known as the S-Curve. Each section provides definitions, calculations, and practical examples, enhancing the understanding of their roles in the project's financial analysis.

1.1 Objective of this document

The objective of this document is to present an analysis of planned values, earned values, and actual costs for a specific project. This analysis provides insights into the project's performance indicators, identifies gaps between planned values, earned values, and actual costs, and highlights areas where corrective actions may be necessary. Additionally, an analysis of the S-Curve is presented to evaluate the project's progress over time. By analyzing these indicators, we can identify potential issues and develop a plan to mitigate or correct them, thereby improving the project's overall performance.

1.2 Document Overview

The Excel file is structured with tables that methodically present the anticipated, realized, and actual financial figures for each stage of the project, month by month. These tables segment the data according to the different project phases. "Planned values" describe the forecast of the project's timeline and budget. "Earned values" represent the actual monetary gain of the project, reflecting the progress made so far. In contrast, "actual costs" concern the total expenses incurred to date. The arrangement of these tables allows for a direct juxtaposition of projected figures against actual values and expenses, shedding light on the project's financial trajectory.

Beyond the tabular data, the Excel file includes a graph of the S-Curve, illustrating the project's development path over time. This S-Curve is constructed from the project's planned and actual gains and offers a quick visual assessment of the current situation compared to the initial plan. Furthermore, this graphical analysis provides critical evaluations regarding the projected completion date and the financial expenditure expected upon completion.

2 Planned Value (PV)

2.1 Definition of Planned Value

Planned Value (PV) is the estimated cost of the work scheduled at a specific moment during the project lifecycle. It represents the budgeted amount for the work that should have been accomplished at a given time and constitutes a fundamental basis for measuring project performance.

2.2 Explanation of Planned Value Calculation

Planned Value is calculated by multiplying the planned percentage of work completed by the project's total budget. It aligns the budget with the schedule, indicating what should have been spent on the planned work. This analysis helps establish the planned schedule, which defines the timeline for completing the project, and the planned budget, which defines the costs associated with completing the project.

2.3 Example of Planned Values in an Excel Document

In the Excel document, the forecast values are arranged in tables for each month of the project, starting in January 2025 and ending in June 2025. These tables detail the forecast values for each month as well as the total forecast values for the entire project. Each monthly forecast includes the expected cost for each task.

The tables also include a summary of the forecast values for the entire project, providing an overview of the planned timeline and budget for the complete project. The forecast values in the Excel document are based on the project's initial plan, which considers the project scope, expected deliverables, and required resources.

The planned schedule is established by analyzing the sequence of tasks needed to complete the project and determining the estimated duration of each task. The planned budget is calculated by estimating the costs associated with each task, including labor, materials, and any other expenses necessary to complete the project.

Planned Value / Budget (PV)									
Name of the task	Planned Value for the task	30-january	3-febuary	18-febuary	18-march	11-april	9-may	6-june	13-june
Needs analysis	4600	4600							
Planning / Specification	3600		3600						
Development	29712			6400	12412	12900			
Testing	10513						6300		
Deployement/Documentation	2000							4000	
Closing	1000								1213
Total	51425								

Figure 1: Planned budget for the project.

3 Earned Value (EV)

3.1 Definition of Earned Value

Earned Value (EV) is the value of the work actually completed expressed in terms of the approved budget assigned to that work for a project or a component of the work breakdown structure. It measures the work completed, regardless of the actual costs incurred.

3.2 Explanation of Earned Value Calculation

Earned Value is calculated by multiplying the actual percentage of work completed by the project's total budget. It evaluates the actual achievement against the planned schedule and budget.

Earned Value (EV)									
Name of the task	Planned Value for the task	30-january	3-febuary	18-febuary	18-march	11-april	9-may	6-june	13-june
Needs analysis	8200	8200							
Planning / Specification	15330		7130						
Development	21867			6537	8479	2400			
Testing	32746						1000		
Deployement/Documentation	X							X	
Closing	X								X
Total	X								

Figure 2: Earned value as of May 9th for the project.

4 Actual Costs (AC)

4.1 Definition of Actual Costs

Actual Costs (AC) are the total costs incurred for the work completed to date. This includes all costs spent on the project, including labor, materials, and overheads.

4.2 Explanation of Actual Costs Calculation

To determine Actual Costs (AC) throughout the project lifecycle, a "Cost Management" approach has been used. This involves applying a predefined percentage to Planned Values (PV) to account for cost variations. For each task and at each milestone, the percentage reflects the actual expenditure relative to what was initially budgeted. This percentage can represent an overrun or underrun compared to the PV.

For example, if the PV for the Requirements Analysis phase was set at a certain amount, and "Cost Management" indicates 200

The percentages listed in the "Cost Management" column act as multipliers of the PV, offering a direct view of financial performance across the project's tasks. By continuously updating these percentages based on actual expenditure data, project managers can maintain an accurate cost forecast and promptly address any financial deviations.

4.3 Example of Actual Costs in an Excel Document

Actual costs represent the real expenditures accumulated throughout the project. The Excel document provides a detailed breakdown of actual costs for each month of the project, as well as the cumulative actual costs for the entire project. This allows for a clear comparison between budgeted costs and actual expenditures, facilitating the identification of variances that may require corrective actions. A detailed analysis of these costs can provide insights into the project's overall performance and enable the necessary adjustments to ensure its success.

Actual Cost (AC)									
Name of the task	Planned Value for the task	30-january	3-febuary	18-febuary	18-march	11-april	9-may	6-june	13-june
Needs analysis	9200	9200							
Planning / Specification	4500		4500						
Development	34883.2			7040	13653	14190			
Testing	7875						7875		
Deployement/Documentation	5600							5600	
Closing	1334.3								1334
Total	63392.5								

Figure 3: Actual costs as of May 9th, and estimated until the end of the project.

5 S-Curve Analysis

5.1 Explanation of the S-Curve and its Purpose

The S-Curve is a visual tool that represents the progression of a project over time, comparing actual performance to the planned schedule. It typically starts with a slow increase in work completed, accelerates during the project's mid-phase, and then levels off as the project nears completion and tasks become more complex. This curve helps stakeholders quickly spot potential problems or delays, assess whether the project is ahead, on time, or behind schedule, and make adjustments to resources, budget, or planning as necessary. It is crucial for project managers and stakeholders to monitor performance, identify issues, and ensure the project stays on track.

5.2 Description of S-Curve Creation

The S-Curve is constructed using the cumulative actual costs (CAC), cumulative earned value (CEV), and cumulative planned value (CPV) for each month of a project. These metrics respectively represent the total expenditures incurred, the value of work completed, and the value of planned work at specific times. To generate the S-Curve, these values are plotted on a graph with the x-axis indicating time (in months) and the y-axis showing the project value (in euros). The curve is formed by connecting these plotted points, visually representing the project's financial and completion status over time.

5.3 Analysis of S-Curve Results

The provided S-Curve illustrates the project's financial progression in terms of Budgeted Costs (BC), also known as Planned Value (PV), Actual Costs (AC), and Earned Value (EV). The cumulative view of expenditures and achievements over time is crucial for evaluating the project's health and forecasting completion costs.

- **Planned Value (PV)**: This curve represents budgeted costs over time. As indicated, the PV line is a steady and controlled ascent reflecting the project's baseline financial plan. It provides a reference point for where project costs should be if everything proceeds according to the initial plan.
- **Actual Costs (AC)**: The AC curve represents what has actually been spent on the project. Initially, this line appears below the PV, suggesting underspending relative to the plan. However, as the project progresses, AC begins to exceed PV, indicating that expenditures are surpassing the anticipated budget.
- **Earned Value (EV)**: The EV curve measures the work actually completed in monetary terms relative to the budget. The gap between the EV and PV lines suggests a delay in project progress, as the actual work completed does not match what was planned.

The gap between these lines allows project managers to identify discrepancies between the project plan (PV), actual expenditures (AC), and work completed (EV). In particular, the divergence of AC from the PV and EV lines suggests budget management challenges, which may require a review and adjustment of the current spending scheme. Similarly, the position of the EV line indicates that the project is not progressing as planned, which may necessitate a reevaluation of project timelines or improvements in execution efficiency.

The analysis of S-Curve results supports strategic decision-making for course corrections and provides a forecast of potential outcomes. It is a powerful tool for communicating the project's financial status and progress to stakeholders, enabling informed and transparent management discussions.

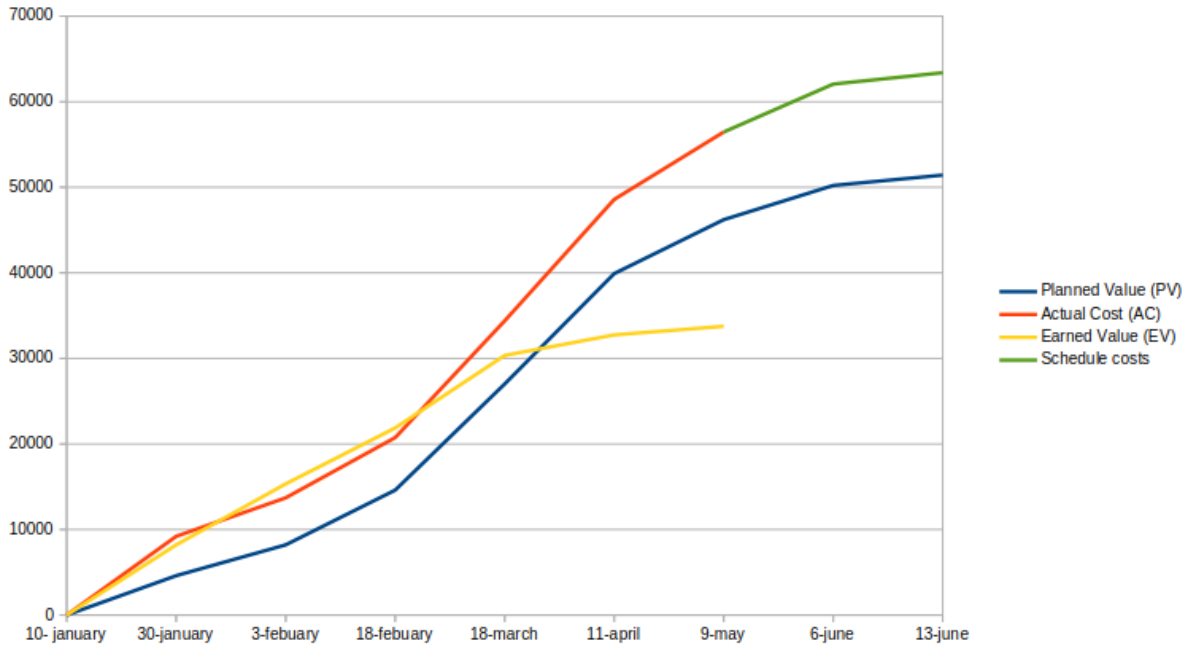

Figure 4: S-Curve as of May 9th for the project.

6 Analysis of Results

6.1 Overview of Project Performance Indicators

The project's health and progress are monitored through a series of performance indicators that include Cost Variance, Schedule Variance, Cost Performance Index, Schedule Performance Index, and Estimate at Completion. These indicators provide a snapshot of the project's current status relative to its budget and schedule:

- **Cost Variance (CV)**: Reflects the amount of budget overrun or underrun as the project progresses, with values ranging from -1,000 € in January to -22,712 € in June.
- **Schedule Variance (SV)**: Indicates how much the project is ahead or behind, starting at 0 € in January, implying an on-time start, and moving to -12,466 € in June.
- **Cost Performance Index (CPI)**: This ratio shows the efficiency of budgeted spending, peaking at 1.11 in February and fluctuating to 0.59 in June.
- **Schedule Performance Index (SPI)**: Measures the efficiency of the project schedule, which started perfectly on time (SPI of 1) but decreased to 0.73 in June, signaling a delay.
- **Estimate at Completion (EAC)**: The total projected cost of the project at completion has been adjusted from an initial 71,227 € in March to 107,444 € in June, based on the CPI.

Cost variance (CV)	-1000	1630	1127	-4047	-15837	-22712
Schedule Variance (SV)	3600	7130	7267	3334	-7166	-12466
Cost Performance Index (CPI)	0,89	1,11	1,05	0,88	0,67	0,59
Schedule Performance Index (SPI)	1,78	1,86	1,49	1,12	0,82	0,73
Estimate at Completion (EAC)	71227	57109	60373	72036	94614	107444

Figure 5: Summary table of project data.

6.2 Explanation of Gaps Between Planned, Earned, and Actual Values

Analyzing the gaps helps identify differences between what was planned, what was earned, and what was actually spent. Key gaps include:

- **Schedule Variance (SV)**: Calculated as EV minus PV. A positive value indicates being ahead, while a negative value suggests a delay.
- **Cost Variance (CV)**: Calculated as EV minus AC. A positive value means underspending, and a negative value indicates an overrun.

These gaps are crucial for evaluating project performance and determining if the project is on track in terms of time and budget. Initially, the project started on time, but over time, it accumulated delays, as indicated by the negative schedule variances and decreasing SPI.

6.3 Discussion of Corrective Actions That May Be Necessary

Based on the analysis of gaps and performance indices, corrective actions may be necessary to bring the project back on track. If the SPI is less than 1, it may suggest the need to accelerate project work to meet deadlines. Similarly, a CPI less than 1 indicates a need for cost control measures. Possible corrective actions include:

- Revising the project schedule to allocate more resources to critical tasks.
- Negotiating cost adjustments or seeking alternatives to reduce expenditures.
- Implementing more frequent project reviews to closely monitor progress and make adjustments more dynamically.
- Improving communication and coordination among team members to enhance efficiency and effectiveness in task execution.

In this case, given that both the project's CPI and SPI are less than 1, corrective actions are crucial. The deteriorating CPI suggests that the project is not cost-effective, and the SPI indicates a significant delay in progress.

To mitigate these gaps:

1. Reevaluating resource allocation and procurement strategies could address cost overruns.
2. Revising the project schedule or accelerating certain activities could counter schedule delays.
3. Reestimating the remaining work and updating the EAC accordingly can provide a more accurate forecast of the total cost at completion.

Changes in the EAC over time highlight the project's response to these gaps, with a significant reduction in estimated costs, suggesting that corrective actions are having a positive effect on the project's financial health. Continuous monitoring and adapting to the project's CPI and SPI will be essential for maintaining control over the budget and schedule, ensuring successful completion within the new forecasted parameters.

7 Conclusion

Effective project management relies on dynamic analysis of key performance indicators such as Planned Values (PV), Actual Costs (AC), Earned Values (EV), and forecasting tools like Estimate at Completion (EAC). This analysis provides a clear picture of the project's current status, identifies budget and schedule variances, and proposes corrective actions.

The introduction of EAC enhances our ability to predict and manage financial outcomes, ensuring proactive adjustments to the project's budget and schedule. The recommended corrective actions, such as revising schedules and improving communication, emphasize a proactive approach that adapts to changes and challenges.

As the project progresses, continuous monitoring and robust project management tools will be crucial. By implementing the described strategies and maintaining flexibility in management, the project is well-positioned to achieve its goals efficiently and effectively, ensuring success within the planned budget and schedule.