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Application of Earned Value Analysis to Determine Labour Productivity and Suggestions for Corrective Actions to Reduce Decreased Labour Productivity

Amruta Chavan[1], Neha Deshmukh[2], Ranjitsing Gaikwad[3], Harsha abhichandani[4]
1 Assistant Professor, APCOER, Pune patilamruta911@gmail.com
2 Assistant Professor, APCOER, Pune nehadeshmukh18@gmail.com
3 Assistant Professor, APCOER, Pune ranjitsinggaikwad22@gmail.com
4 Assistant Professor, APCOER, Pune harsha.abhichandani@abmspcoerpune.org

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Abstract
Employing project management, one may boost both material and human resource production. The project performance assessment method known as EVM (Earned Value Management) has been modified for use in project management. The analysis compares the number of hours scheduled, actual, and earned. The scheduling, monitoring, and forecasting of projects are the topics of the current study. In addition, it covers the key factors that determine how Earned Value Analysis is determined for schedule and cost management of civil construction projects. About 33% to 50% of the total project cost is thought to be the labour expenses in the construction business. It is important to understand and study the effects of labour because it is more inconsistent and unpredictable than other project-cost components.

Keywords: Labour Productivity, Labour Cost Performance Index (LCPI), Labour Schedule Performance Index (LSPI), Earned Value Analysis (EVA)

I. Introduction

India's second-largest economic driver after agriculture is the building industry. It contributes significantly to the country's economy because it gives a great deal of people employment chances. A considerable increase in productivity would be beneficial for any size construction company. It would be wise for a business to do research into the causes of low productivity, pinpoint the culprits, and implement solutions if it wants to get the most out of its employees' output. Earned value management is a technique used in project management that involves calculating and summarizing the value created by a project's efforts. It is able to integrate all three KPIs that make up the project management triangle, which are as follows:

- Scope
- Schedule
- Costs

Earned Value is one of the primary factors contributing to management's importance as a project manager is the reliability of the performance concerns that are forecasted. Initial studies on the application of EVM showed positive effects in the areas of planning and control; additionally, the method improved scope definition and project performance analysis. According to recent studies,

projects that follow the EVM tenets have a much higher chance of succeeding. In recent years, EVM's reputation has expanded outside of the government contracting industry, one of the areas where its continued applicability is in jeopardy. This is because EVM could potentially be useful in and contribute to proving contract disputes.

The construction industry encompasses a vast array of different procedures. As a consequence of this, the effective organization and administration of labor is essential to the completion of successful construction projects. Labor productivity is of the utmost significance in less developed countries, where the majority of building work is still completed by hand.

II. Materials And Method

Due to a lack of transparency into the project's real units of labour, measuring productivity might be difficult at times. Hours of labour may be estimated using a streamlined version of the earned value analysis method in cases like these.

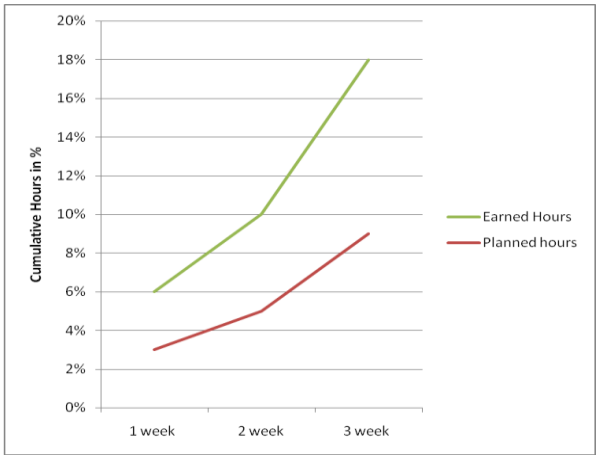
- Planned Hours (PH): The total number of hours allocated to finish a task within a certain time frame. Time spent working that is paid for out of a certain amount.
- Earned Hours (EH) are the projected time required to finish the task successfully accomplished within a certain time frame.
- Actual Hours (AH): This is the sum of the time it took to finish the task in a certain time frame. For tasks that were done within a certain time frame, AH is equal to that time.
- The formula for calculating the labour cost performance index (LCPI) is: LCPI=EH/AH
- The formula for calculating the labour schedule performance index (LSPI) is as follows: LSPI= EH/PH
- Time, money, and resource requirements are all gathered together with an estimate of the cost.
- Developing a job description hierarchy diagram
- An estimate of the total amount of time spent doing each activity that requires human effort.
- A comparison of the actual time spent on each task to the anticipated amount is made every week.
- LSPI and LCPI computations stand for the Labor Schedule Performance Index and the Labor Cost Performance Index, respectively.

III. RESULT

Week	**1**	**2**	**3**
Planned hour	97.27	57.27	105.32
Cumulative	4%	6%	10%
Actual hour	65	46.5	84.4
Cumulative	**3%**	**5%**	**9%**
Earned hour	52.9	47.45	94.86
Cumulative	2%	4%	8%
LCPI	0.81	1.02	1.12

LSPI	0.54	0.83	0.9

3.1 Table indicating general labour performance



3.2 Comparison of Earned and Planned Hrs in Graph

We can observe from the previously mentioned graph 3.2 and table 3.1 that the LCPI and LSPI ratios in the first week are both less than 1, which suggests that the crew underperformed expectations and underperformed the plan, respectively.

- The second week's LCPI was more than 1, indicating that the crew had exceeded the expectations.
- In the third week's situation, the project is delayed by (1-0.9) x 21 or 2.1 days or 2 days.
- In First week, Planned productivity of labours = Output / Work-hour = 5138.3 / 23 or 230 / 29.9 = 223.4sqm/hr or 7.87 cum/hr Actual productivity of labours = Output / Work-hr = 5138.3 / 40 or 440.55 / 57.27 = 128.5 sqm/hr or 7.69 cum/hr

IV. Discussion

• After three weeks of observation on site, the basic reason behind the low performance by crew is Work Area Access Restrictions. So that should be carefully analyzed and resolved by Project Manager to get better result.

• Resources should be effectively allocated in accordance with site requirements to maximize the amount of usable space**.**

V. Conclusion

1. The estimate at accomplishment can be forecasted using actual productivity as a parameter.
2. Real building projects can easily and rapidly use earned value analysis.
3. Provide a framework for recording work progress evaluations in comparison to the initial plan.
4. Increased visibility and control make it easier to quickly and pro-actively address problems, which helps contractors meet budget and schedule goals.
5. Consumer advantages include assurance in the contractor's capacity to handle the project, early detection of issues and provision of objective as opposed to subjective information, and contractor cost and schedule updates.

6. It is a powerful and practical project tool that enables both the client and the contractor to evaluate the success of the project.

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