EVMS for Cost Management of Residential Projects

Amitkumar R. Jamdar[1], Pranay R. Khare[2]
Department of Civil Engineering
[1,2] Savetribai Phule Pune University, Dr. D Y Patil School of Engineering, Lohegaon, Pune, Maharashtra 412105, India

Abstract- *This paper describes a qualitative study that discusses the barriers involved in implementing EVA (Earned Value Analysis) for project monitoring in Indian construction SMEs. Many major construction projects have incurred cost overruns. A cost overrun, also known as a cost increase or budget overrun, is an unexpected cost incurred in excess of a budgeted amount due to an underestimation of the actual cost during budgeting. The approach used to carry out this study is qualitative. Since this study required finding out the working and approach of construction SMEs towards project monitoring, it was necessary to adopt a qualitative approach. The findings revealed that the problem in implementing EVA is less technical and more a management working problem. A considerable professionals agreed upon changing the complete working environment and framework of the organization in order to implement EVA. The basic input factors required for the use of EVA and the factors creating barriers in implementing EVA are discussed in this paper.*

Keywords- EVA, SME, monitoring, management.

I. INTRODUCTION

The construction industry is the judging industry of the economy in India. Most small firms in construction mainly have the traditional approach towards the monitoring of their projects. A global awareness has begun increasing among the clients and consumers demanding more value for money and quality in terms of work and time. The rising competition among the construction firms also is a forcing factor for the firms to bring changes in their working system. Clients in construction industry have become increasingly dissatisfied. What they see is unpredictability and under-performance. What they receive is too often of late delivery and overpriced. The objective of this paper is to discuss the barriers or problems involved in implementing EVA in the Indian Construction SMEs. A considerable number of professionals agreed upon changing the complete working environment and framework of the organization in order to implement EVA. The basic input factors required for the use of EVA and the factors creating barriers in implementing EVA are discussed in this paper.

II. EARNED VALUE MANAGEMENT SYSTEM

The earned-value measurement concept was first introduced by the Department of Defense (DoD) of USA. Further it was adopted by the NASA, United States Department of Energy and other technology-related agencies.

Earned Value Analysis is the most widely used method for performance measurement of projects. It is a well-known project management tool that uses information on cost, schedule and work performance to establish the current status of the project (Cope 2006).

According to Czarnigowska (2008), EVA is a simple method to apply, and calculations require nothing more than four basic arithmetic operations. However, the method has been recognized as a useful tool by many practitioners and government agencies and has become a standard in project management. It proved to be versatile enough to be applied to any type of a project, ranging from defense schemes worth millions and extending on many years to minor projects. The method, if to be used efficiently, requires a disciplined approach to collection of data on project cost and progress and the findings are to be processed immediately.

III. EVA TERMINOLOGIES

1. The BCWS (Budgeted Cost of Work Scheduled) or PV (Planned Value) represents the budgets of the activities that are planned or scheduled to be completed.

2. The AC (Actual Cost) represents the actual costs spend on the activities that were completed.

3. The BCWP (Budgeted Cost of Work Performed) or EV (Earned Value) is the traditional Earned Value which is usually talked about. It represents the planned or schedule cost of the activities that are completed.

4. CV (Cost Variance) helps to measure project performance. Cost variance (CV) indicates how much over or under budget the project is. A positive value

indicates a favorable condition and a negative value indicates an unfavorable condition.
CV (Cost Variance) = BCWP – ACWP

5. SV (Schedule Variance) indicates how much ahead or behind schedule the project is**.** A positive value indicates a favorable condition and a negative value indicates an unfavorable condition.
SV (Schedule Variance) = BCWP – BCWS.

6. CPI (Cost Performance Index) is a measure of cost efficiency on a project. A value equal to or greater than one indicates a favorable condition and a value less than one indicate an unfavorable condition.
CPI = EV / AC
If CPI < 1: The project is running over budget, If CPI >1: The project is running under budget, If CPI=1: the project is running on budget.

7. SPI (Schedule Performance Index) is a measure of schedule efficiency on a project. An SPI equal to or greater than one indicates a favorable condition and a value of less than one indicate an unfavorable condition.
SPI = EV / PV
If SPI < 1: The project is running behind planned schedule, If SPI >1: The project is running ahead of planned schedule, If SPI=1: the project is running on planned schedule.

Implementation of EVMS

I. IMPLEMENTATION

A. Introduction

Construction of a Basement+Parking+2 floors residential building of 1673 Sq.m. The residential building has parking in the basement and at the ground floor. At the first and second floor four flats; each of 94 sq.m area are designed. The budget of the building is around 95 lakhs. The duration for completion of the work is 10 months. The work commenced on August 15, 2014.

Table 1.Earned Value Factors of the project

Sr No	Reporting Periods	Planned Value (PV)	Earned Value (EV)	Actual Cost (AC)
1	16/8/2014 to 30/8/2014	217500	191912	250920
2	31/8/2014 to 15/9/2014	469903	383718	479397
3	16/9/2014 to 30/9/2014	603744	494784	494784
4	01/10/2014 to 15/10/2014	620429	525934	620429
5	16/10/2014 to 30/10/2014	705762	577442	705762
6	31/10/2014 to 13/11/2014	705762	611661	705762

1. The physical implication of this behavior can be stated that the actual expenditure to complete the activities has been as per the planned value till September 15 while the actual work completed was much less than planned.

2. After Sept 18, the actual cost dropped for a period from Sept 18 to October 18 after which the actual cost became equal to planned value.

3. The Earned value behavior displayed underperformance than planned value throughout the reporting periods. It can be stated that the actual physical progress accomplished is considerably less than planned.

Table 2. EVA performance factors

Sr No	Reporting Periods	Cost Variance (CV)	Schedule variance (SV)	CPI	SPI
1	16/8/2014 to 30/8/2014	-59008	-25588	0.764	0.88
2	31/8/2014 to 15/9/2014	-95679	-86185	0.8	0.816
3	16/9 /2014 to 30/9/2014	0	-108960	1	0.819
4	01/10 /2014 to 15/10/2014	-94495	-94495	0.847	0.847
5	16/10 /2014 to 30/10/2014	-128320	-128320	0.818	0.818
6	31/10/2014 to 13/11/2014	-94101	-94101	0.867	0.867

The SPI declined from the August 31 till September 15 which implies that the performance of the project activities in term of following the schedule declined. The value of SPI less than unity states that the completion of activity is not taking place according to the schedule. The decline in the SPI further shows that the activities were lagging from their planned schedule resulting in delay of the activity completion.

1. After October 15, the activities showed an improvement in terms of schedule till around November 15 where the SPI was 0.867.
2. The CPI in the first fifteen days of project commencement shows a continuous growth till August 15 2014 but underperformed since the value of CPI remained less than 1. This implies that the spending of the planned cost not up to the mark .After August 30,the CPI showed a slight growth till Sept 15 and further escalated to become unity on Sept 30.
3. The CPI shows a recession after Sept 30 till it becomes 0.847 on October 15. It implies that the consumption of the planned cost declined and the amount of work accomplished is less than the planned amount.

IV. CONCLUSION

1. The necessary administrative approvals were not obtained before commencing of actual execution of activities. The firm had planned originally to construct the building with Basement Parking+ Ground Floor Parking + 4 Floors. But only the approval for the Basement, Ground Floor, First and second Floor was obtained. This affects the project planning.

2. The detailed estimation of the project activities was not done by the firm. Till date the procedure followed in the firm was rate fixing with the Sub-contractors. The subcontractor quoting the lowest rates was awarded the work. Thus it was difficult to obtain a final estimation sheet of the as the rates of activities to be completed later were not finalized.

3. The proper sequencing of the activities was not pre-planned. Hence the management of resources was not planned. In some cases, the material was ordered on the site just before commencing of an activity.

4. The monitoring system used by the firm is the field inspection reporting system. Actually the monitoring of the completed was done after the submission of bills by the subcontractors. The quantity of the work mentioned in the bills is verified on the actual site

measurements. No condition for the compensation for delays was present in the working of the project contract conditions.

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