Analysis on Cost Controlling and Tracking of Residential Building by EVM method using MS Project Software

Chandrakala S, Bhavya S, Shashi Kumar N V, Kiran K M

Abstract—Most of the construction projects suffer from cost and time overruns due to amultiplicity of factors. Earned value management (EVM) project is а performance valuation technique that has origins in industrial engineering, but which has beenadapted for application in project management. Earned Value Analysis software isdeveloped in Visual studio 2008, Next Comparison of selected parameters between M.SProject 2007, Primavera P6 and developed software is done. Therefore, it can be concluded that the software could be used in a wide range of projects for Earned ValueAnalysis calculation.During the construction project it has been observed that certain causes may leadto delay in construction activities. This will result in time and cost overrun in the project.So it has become a major problem to complete the project on schedule and within theestimated cost. As a solution to this, the concept of construction project management byEarned Value Management System (EVMS) is evaluated.Earned Value Management is a powerful methodology used in monitoring and controlling of the project. EVMS is the project management technique developed tomeasure the performance and progress of the project based on the combination of schedule, cost and work performed. By using this technique, the project status can beinvestigated in ongoing project at any stage which detects whether the project is under orover budget and behind or ahead of the planned schedule. Also the estimate cost andtime required to complete the project from current situation can be investigate.

I. INTRODUCTION

Constructions activity is one of the major scaling-down sectors in India. Several construction companies possess to stand facing heaps of harms directly to over budgets cost, overtime and inopportune planning, delays in construction be short of manpower, machinery and loads of other usual tribulations during task execution. One of the major problems are overflow of cost and over budgeted expenditure of project. To over fall these problems, earned value analysis is the procedure that fills up completely the above loopholes.

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Kiran K M, Assistant Professor, Department of Civil Engineering, SJCIT-Chickballapur-kiranthribu@gmail.com Expected to implementation of EVA plan ahead administrator at their moment take part in the capability to express, and cost, schedule and mission implementation of their creation in a systematic, well-defined and understandable method to fit necessities of employees, director and customers.

Earn value management is a systematic method to be the integration and measurement of schedule, cost and technical progress of a task or project. EVM provides project managers capability to examine detailed critical program, schedule information, technical achievement and cost records. It resembles a caution for the managers to be grateful for and thorough knowledge issues by attractive opportune counteractive course of action before they ride out of the question to conquer. It operation helps in generous achievement customary to the assessment of evolution report of project and it the same operate about as a mandate device to exchange with financial statement and time.

It deals with measuring implementation of task at evident time intervals and reports that implementation to organization for method control. After being paid such monitored information, the concerned agency decides to understand more action to control the project before it grows to be insurmountable. Thus, monitoring and controlling is generally critical part procedure throughout complete life of the project. Earn value is a progress up conventional method of cost bookkeeping. It has been seen that to be responsible for protection of cost overwhelm, plan ahead organization undergoes cost attenuation each by diminishing the plan scope and quality or by giving extra. In this route with the management of earn value analysis framework, plan goals are accomplished in correct way.

II. LITERATURE REVIEW

B V. Birajdar, Amruta B. Vyas "Tracking of Construction Projects by Earned Value Management" [1].

Proficient Management of undertakings in development businesses are turning into a test with the progressing time. It has turned into a worry for the venture directors to ensure that the task is on plan and inside spending plan. EVA assesses the task execution by incorporating both cost and time perspectives consequently estimating the general advance. This paper talks about how EVA is acquainted with a continuous task on street works. It distinguishes the calendar as well as cost overwhelms already and in this manner giving a chance to directors in recognizing and controlling issues. This examination tends to both the expenses and the advantages of earned esteem. The earned esteem ideas and the related criteria are considered.

Chandrakala S ,Assistant Professor, Department of Civil Engineering, SJCIT- Chickballapur- chanducharyas@gmail.com

Bhavya S ,Assistant Professor, Department of Civil Engineering, SJCIT-Chickballapur-bhavya.s11689@gmail.com

Shashi Kumar N V, Assistant Professor, Department of Civil Engineering, SJCIT- Chickballapur- shashi02456@gmail.com

GayatriVyas "Analysis of Cost Controlling Using Earned Value Management in Construction Industries" [2].

How development tasks can be finished convenient and cost viably is the consuming issue in the development business. There have been a few examinations that are centered on this, it has been seen that the following with shut observing of the genuine advance of assignments from the earliest starting point of the task and overseeing them utilizing earned esteem idea will brings about impressive cost sparing and auspicious fruition. This paper is cantered on idea and significance of earned esteem administration (EVM). Additionally, it incorporates components and execution pointers utilized for following and anticipating the task that advantages venture and eventually brings about undertaking achievement. Current paper utilizes a contextual investigation, a case use of EVA as a cost checking instrument. This contextual investigation reaffirms the Advantages of utilizing EVA for venture income examination and anticipating.

GanapathyRamasamy N, Sandhya Suresh "Analysis of Performance Using Earned Value Analysis" [3].

Development enterprises are confronting challenges step by step. In the midst of every one of these difficulties it is exceptionally urgent to enhance the execution of an undertaking regarding Schedule and Cost. Earned Value Analysis is an essential device in investigating the execution of any development venture. It gauges the venture advance and aides in recognizing the basic exercises consequently expediting the undertaking plan. This paper demonstrates the Earned Value Analysis done on a constant task in Kerala, utilizing Microsoft Office Project. The investigation helped in distinguishing the basic regions. It guaranteed that the venture is on time and inside the financial plan.

J. Jayalakshmi, T. Subramani "Analysis of Cost Controlling In Costruction Building by Earned Value Method Using Primavera" [4].

The vast majority of the development ventures experience the ill effects of cost and time invades because of an assortment of elements. Earned esteem administration (EVM) is a venture execution assessment strategy that has starting points in mechanical designing, yet which has been adjusted for application in venture administration. The earned esteem investigation gives early signs of undertaking execution to feature the requirement for inevitable remedial activity. This investigation is to display and examine the primary parameters associated with the count of Earned Value Analysis (EVA) in the cost administration of common development ventures. The motivation behind this paper is in 3-crease. Right off the bat, Earned value analysis programming is created in MS Project 2007, server 2005, primavera P6 of a parameters, it can be inferred that the product could be utilized as a part of an extensive variety of activities for Earned Value Analysis figuring.

VaishnaviTuljapurkar "Cost Controlling and Tracking of a Construction project by Earned Value Mathod" [5].

Earned Value Management (EVM) is a method that conjectures the venture giving an early cautioning of cost and calendar. It not only measures the undertaking execution but rather likewise measure the advance of the timetable. It is a viable apparatus to gauge cost, plan and execution of the venture. The EVA is valuable in different fields, for example, IT, Industries and Construction organizations and so on. The estimation of Earned Value Analysis (EVA) is reliant on two key zones i.e. Exact Cost data and even minded advance of undertaking. In the event that these two key territories are effective at that point advantage of the undertaking will get esteemed. This paper compresses the development; essential wordings of Earned esteem Analysis and viable utilization of it in the development ventures by MS Project. There are numerous approaches to actualize EVA in the development venture. MS Project is a device to decide the EV and its parameters in an effective route with precision and inside time imperatives.

III. OBJECTIVES OF STUDY

The considerable objective of construction group is to conclude the task or project as determined on record details furthermore, inside the estimated with right manipulate of the large amount of assets like money, materials, labour and equipment and furthermore to complete the project with quality.

- 1. Project planning is done to complete the task on time and within budgeted cost.
- 2. To study Microsoft Project (MSP) software and to use the same software for the execution of the on-going project.
- 3. Analysis on schedule, cost, monitor and tracking of a project by using Microsoft project.
- 4. Work development will be estimated based on the project baseline created.
- 5. To recognize causes of potential schedule and cost overruns slackness.
- 6. Costs management is be to used EVM to give up the project activity in the estimated cost to attain elevated profits.
- 7. Creating a WBS and project schedule in the MS Project software.
- 8. Planned duration and actual duration was compared.
- 9. Co-relating the data after the WBS is prepared, with the pattern plan and finding the motive for the delay in time and rise in cost.

3.1 SCOPE OF THE STUDY

Earned value management (EVM) is a strategy that impartially impresses objective achievement of work:

- 1. The task or project will always have fixed cost and time, if the task is not completed on time which will increases the total cost of project, to over slip delay and to overthrow delay without influencing budget and cost can be utilized and project management preserve be made.
- 2. EVM is used to deduce the upcoming of the project by doing the cost analysis and tracking of the project.
- 3. EVM observe the project by using old and present progress of project by statistical methods.
- 4. By using EVM methods stakeholders will be benefited.
- 5. At different stage of project we can get earned value management calculations, actual cost and remaining cost.
- 6. Cost unfathomable can be deducted by using EVM and proper planning together smartly.

Outline of scope of study is to do proper planning, scheduling and updating of different activities, which is done by using Microsoft Project software. After scheduling is done resource will be allocated and a baseline is set and project is updated, without affecting the complete project duration. At last the tracking is done by actual start and finish.

IV. ABOUT THE CONSTRUCTION PROJECT 4.1 CONSTRUCTION SITE DETAILS

The Navanaamiplatina is located at chokkanahallithanisandra main road, YelahankaHobli, Bengaluru. It is a G+5 apartment with block named as C. it has a total of 40 flats. The apartment is comprised of premium 2.5 & 3 BHK flats. Project amenities, Swimming pool, squash court, office space Multipurpose hall, guest suite, gym and billiardsLift facilities are provided and Solar facilities are provided.

4.1.1 Project Site Detailss

Land area = 29712sft , Total build up area =60263sft, G+5 Floors , 40 exclusive units, Infinity pool with deck65% of open space

4.1.2 Structural Details

Table 4.1 Structural Details of Project		
Description	Details	
Total number of footings	128 no.	
Total number of columns	145 no.	
Total floor height	18.15m	

3.15m

3.0/floor

4.1.3 Area Statement

Basement - 1st floor

1stfllor to terrace

Table 4.2 Details of Build-up Area

Sl.No	Description	No of	Area	Total
		floors	in Sft	area in
				Sft
1	Ground	1	11155	11155.00
	floor			
2	First floor –	2	9824	19648.00
	second			
	floor			
3	Third floor	2	9894	19788.00
	– fourth			
	floor			
4	Fifth floor	1	9672	9672.00
TOTAL BUILD-UP AREA 60263.00				

4.1.4 Flat Area Statement

Table 4.3 Details of Flat Area

Configuration Type	Saleable Area (Sft)
2.5 BHK : 12	1129 – 1209 Sft
3 BHK : 28	– 1554 Sft

4.1.5 Project Construction Status in Percentage of completion

Table 4.4 Status in Percentage of Completion

S1	Description	Start	Finish	% of
no	_	date	date	Completi
				on
1	Sub structure	07.06.1	06.10.17	100%
		7		
2	Super	07.10.1	20.05.18	90%
	structure	7		
3	Block work	10.12.1	13.07.18	60%
		7		
4	Plastering	06.02.1	08.09.18	38%
		8		
5	Handover		25.12.18	
	building			

4.1.6 Quantity of Material

Table 4.5 C	Duantity of	materials
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NavanaamiPlatina				
Sl.No	Descriptions	Unit	No's	Quantit
1	Concrete			У
-	PCC Concrete	M ³	1	620.00
	M20 Concrete	M ³	1	1100.00
	M25 Concrete	M ³	1	5850.00
-	M30 Concrete	M ³	1	612.00
2	Block Works			
	100mm	M^2	1	2900.00
	150mm	M ²	1	8350.00
	200mm	M ²	1	1735.00
3	Plastering			
	Ceiling	M ²	1	8500.00
	Internal Wall	M ²	1	26000.0
				0
	Externall Wall	M ²	1	9800.00
4	Waterproofing			
	Water proofing	Smt		950.00
	for terrace floor			
	Water proofing			
	works			
	Toilet, Balcony	Smt		2350.00
	and Utility			
	flooring			
	Retaining walls	Smt		1000.00
	Podium	Smt		1550.00
	STP, UG Tank,	Smt		6580.00
	Pool and OHT		_	
5	Painting	2		
	For celling	M ²	1	7550.00
	surface	2		0000.00
	Emulsion paint	M	1	9230.00
	tor external			
	surface	M ²	1	21400.0
	Emuision paint	IVI⁻		21400.0
	for internal wall			U
	Botaining wall	M^2	1	7060.00
	finish and	1/1	1	/000.00
	innsn and			

	basement celling			
6	Tilling			
	Vitrified (605*6	M^2	1	7435.00
	05) mm			
	Anti-skid	M^2	1	870.00
	(300*300) mm			
	Ceramic	M^2	1	3240.00
	(450*300) mm			
	Kitchen	M^2	1	330.00
	dado (350*250			
) mm	2		
	C block common	M^2	1	1135.00
	areas and			
	clubhouse	2		
	Lift	M^2	1	160.00
	Staircase area	M^2	1	455.00
	granite			
	Top kitchen	M^2	1	415.00
	counter			
7	Windows			
	Utility door and	M^2	1	1085.00
	UPVC windows			
	UPVC	M^2	1	195.00
	ventilators			
8	Doors			
	Main doors	M^2	1	198.57
	Bed room doors	M^2	1	373.63
	Toilet doors	M^2	1	325.35
	Balcony doors	M^2		29.00

V. FINDINGS AND OBSERVATIONS

The navanaamiplatina construction project is 517 days and 7, 14, 25,578 rupees budgeted project and estimated to complete on December 2018. This project is tracked three duration to know about project performance picture, the founded or obtained results are listed in below tables and in below figure.

Table 5.1 Shows the Parameters Values after Tracking of

Project				
EVM	1 st tracking	2 nd tracking	3 rd	
Parameter			tracking	
Tracking	26-Aug-201	26-Dec-201	16-April	
dates	7	7	-2018	
Original	517	517	517	
duration of				
project				
Remaining	410	302	196	
durations				
Budgeted	7,14,25,578	7,14,25,578	7,14,25,	
total cost of			578	
project				
Planned	4182605	25080232	4434770	
value			3	
Earned	4125645	24858080	4331360	
value			6	

Actual cost	4230370	25104817	4816148
			6
Schedule	0.98	0.98	0.97
performanc			
e index			
Schedule	-56960	-222152	-103409
variance			7
Cost	-104725	-246737	-484788
variance			0
Cost	0.97	0.98	0.89
performanc			
e index			

The various project elements or indicators were calculated. The values were calculated by using following formulae.

SV = EV-PV= 4125645-4182605 = -56960 rupees CV = EV-AC= 4125645-4230370 = -104725 rupees SPI = EV/PV= 0.98 CPI = EV/AC= 0.97

EVM	1 st tracking	2 nd tracking	3 rd tracking
Parameter			
Tracking	26-Aug-2017	26-Dec-2017	16-Apr-2018
Date			
Planned	4182605	25080232	44347703
value cost			
Cumulative	4182605	20897627	23450076
Planned			
value cost			
Earned	4125645	24858080	43313606
value cost			
Cumulative	4125645	20732435	22581171
Earned			
value cost			
Actual cost	4230370	25104817	48161486
Cumulative	4230370	20874447	27287039
Actual cost			

The CV and CPI represent the cost performance of a project. The both vales are less than 1 means cost is overrun of project (project is uneconomical in terms of cost).

The SV and SPI represent the time performance of a project and the both values are less than 1 means project is behind schedule

VI. CONCLUSION

Earned value provides a quick fore warning suggest to managers to undertake the counteractive action. EVM allows both cost and schedule analysis against objective work performed. The client and customer are satisfied then the project is successful and it's finished within planned and planned budget. The project schedule and cost is interlinked between each other. If we expenditure more property for individual task, the task will complete within the duration. If

we expenditure less property for the task it will take more duration to complete the activity. So, properly allocate an optimum resources and duration of a construction building project to make it successful completion.

Construction management is necessity to operate the project well manageable, controllable and vision able. The different software tools are come into occupancy in that MS Project is also one of programming software package. The project can be monitored by a better way by using MS Project software. The project is tracked on 3 times from 26-April-2017 to 26-Aug-2017, 26-Aug-2017 to 26-Dec-2017, 26-Dec-2017 to 16-April-2018, by tracking we obtained earned value (EV), planned value (PV) and actual cost (AC), these 3 basic shows the performance of a project by earned value performance index.

- While on 3rd tracking 196 days are remaining to finish the task or activities, the cost performing 89% (CPI 0.89) as budgeted cost it shows the project budgeted cost is overrunning. And schedule performing 98% (SPI .98) as planned value; it shows the project is under running.
- Cost variance of construction project is -4847880 rupees the negative sign shows cost of project is overrun. If the cost variance is negative the project is overrun or behind from planned value and cost variance is positive project is underrun or ahead from planned value and some troubles will creates in the project.
- 60% of planned schedule is finished.
- Cost requires to finish remaining task is 3813783.
- To finish project on schedule time duration the project has to perform in 1.09% speed of planned value of the project.

The resource sheet will provides better information of resource estimates.

REFERENCES

- [1] B.V Birajdar, Amrutha .B Vyas, "Tracking of Construction Projects by Earned Value Manaement," IJERT, International Journal of Engineering research and Technology, Vol. 05, pp. 162-169, March 2016.
- [2] Gayatri Vyas, Sagar K. Bhosekar, "Cost Controlling Using Earned Value Analysis in Construction Industries," IJET, International Journal of Engineering and Technology, Vol. 01, pp. 164-171, April 2012.
- [3] Ganapathy Ramaswamy N, Sandhya Suresh, "Analysis of Performance using Earned Value Analysis," IJSETR, International Journal of Science Engineering and Technology Research, Vol. 04, pp. 73-82, April 2015.
- [4] Jayalakshmi, T. Subramani, "Analysis of Cost Controlling in Construction Buikding by Earned Value Method using Primavera," IJTRA, International Journal of Technology Research and Applications, Vol. 04, pp. 145-153, June 2014.
- [5] Vaishnavi Tuljapurkar, "Cost Control and Tracking of a Construction Building by Earned Value Method," IJTRA, Internal Journal of technology Research and Applications, Vol. 03, pp. 15-22, April 2015.
- [6] Taran C. Bhagat, Parag S. Mhatme, "Cost Controlling and Monitoring of Construction Project Through Earned Value Management System," IJATES, International Journal of Advanced technology in Engineering and Science, vol. 03, pp. 45-51, March 2015.

[7] Waris Ali khan, Arazi Idrus, "The Cost Monitoring of Construction Projects Through Earned value Analysis," ICEFR, International Conference on Economics and finance research, Vol. 04, pp. 251-259, 2011.