Implementation of Value Engineering

Miss. Snehal Salunkhe[1], Prof. R. M. Swamy[2]
[1]Dept of Civil Engineering
[2]Associate Professor, Dept of Civil Engineering
[1, 2] Jondhale College Of Engineering & Technology Asangoan , Thane

Abstract- *Infrastructure development in construction industry is a key driver in socio economic development of the country. As construction industry play a vital role in economic growth and development of the country, it is in need to have proper construction techniques which are cost effective. Various cost reduction technique are as follows- "Thinner walls or single brick thick walls", "Load bearing brick work", "Brick on edge cavity wall", "Precast stone masonry blocks", "Modular brick masonry walls", "hollow clay blocks of shell type houses", "Sundried brick walls with waterproof treatment", "precast hyperbolic shell for roofing". All these techniques comes under "Value Engineering"*

Keywords- Value Engineering, Load bearing, Precast stone.

I. INTRODUCTION

Value engineering is a systematic application of recognized techniques which identify the functions of the product or service, establish the worth of those functions, and provide the necessary functions to meet the required performance at the lowest overall cost. Value engineering concentrates on the effectiveness through stating functions, goals, needs, requirements and desires.

$$\text{Value (V)} = \text{Function (F)}/\text{Cost (C)}$$

Where, V is Value, F is sum of total function performance and C represents cost paid for it. The relation of F and C shows that lower the cost for optimum function, better the value.

1.1 History of VE

Value engineering concept was started by Mr. Lawrence D. Miles during 1940's. He worked for General Electric Company (GEC), USA which faced scarcity of strategic material needed to produce their products during world war-II. Mr. Mile was appointed in GEC in purchasing department. At that time there was shortage of steel, copper, bronze and other materials. GEC wanted to expand its production of turbo supercharger for B24 bombers from 50 to 1000 per week. Miles was assigned the task of purchasing material to permit this. Often he was unable to obtain specific material, so he thought to obtain an alternative which can perform the same function. Miles observed that many of substitutes were providing equal and better performance at the lowest cost and from this incident evolved the concept of value engineering.

1.2 Aim And Objective

Aim of study

To perform value engineering for residential and commercial building for better project tracking and cost efficiency

Objective of study

- To study value engineering and its implementation in construction industry.
- To identify cases for cost overrun and it's reduction in all construction activities.
- To compare projects cost and schedule after application of value engineering
- To check cost performance index and schedule performance index for value engineering

Advantages of Value Engineering

Value engineering is characterized by a branch of knowledge and practical methods to solve problems for other quality improvement in the following:

1. Job analysis distinctive way (function analysis).
2. Get appointed a large amount of good ideas that are applicable.
3. The action plan in place which consists of several sequential stages of a logical sequence.
4. Multi-disciplinary team working in the studies of collective values.
5. Ensure coordination between the relevant authorities in the project.

II. LITERATURE REVIEW

Amit Sharma A case study has been discussed in this paper involving a part used in the medical instruments. The material is chosen such that the cost is reduced without affecting the quality of the product. The best feasible solution from the available alternatives is chosen through the feasibility ranking table. Through the application of Value Engineering profits are maximized without hindering the reliability of the product. With the effective utilization of the technique the final outcomes comes out to be a successful showcase of value engineering.

K. Ilayaraja The essential difference between conventional cost cutting and VE is that it involves reducing the cost by improving the functionality through lesser consumption of energy in terms of manpower, materials and machines. In the initial stages VE was used by production engineers for reducing the cost of manufacture. However, it was found that the benefit of VE is much greater if multidisciplinary teams of engineers were involved which would also influence the design team that is normally the case in construction.

Li Ning Value engineering can make up for the shortcomings of these methods, for it studies allocation of product's properties and its cost based on its functions, and it emphasizes the organic combination of the improvements of products' function and the reduction of the cost. As long as the value engineering is practically popularized, the appearance of construction industry is bound to change.

Chougule Mahadeo we have selected some components from UTM i.e Hand Wheel, Range Selector Knob, Top Bearing Bracket Assembly, Dial Bracket, Recorder Gear etc. and we have applied value engineering technique for the cost reduction of these components of UTM. Therefore by Value Engineering technique, Design modification for Dial Bracket and Top Bearing Bracket Assembly, use of alternative less expensive material for Recorder Gears, Range Selector Knob and Hand Wheel is suggested in this case study and thereby which cost reduction is achieved.

III. METHODOLOGY

Construction projects are implemented in different countries with heavy costs and some of the projects have been relatively or absolutely unsuccessful and even faced with irreversible losses after construction. Maybe, it is due to complexities related to projects or other social-economic phenomenon. The present study revealed that value engineering can be used as a helpful tool from the beginning of studies to the end of designing, constructing, exploiting, and maintaining processes and overcome civil designs' challenges and complexities. Value engineering is a method experienced in management that has an organized approach. Value engineering has a systematic and cooperative mechanism to analyse function and systems with the aim of achieving desirable function with the least costs. This study has attempted to briefly introduce concepts and executive process of value engineering in construction projects. Also, the study has attempted to investigate conventional methods of evaluating projects function and compare them convergence with value engineering to improve projects. Based on the research findings, it can be found that if we can expect to achieve projects objectives by spending the least cost and ensure the efficacy of investment in construction projects management sector as a main challenge of development plans in the third world countries through using engineering in appropriate time periods and in different phases.

3.1 Microsoft Project

Microsoft Project is really a computer database that uses two main tables of data to keep track of your project. Project uses one table to store information about the tasks of your project and the other for resource information. By using the many views available in Project, you can display your project data from these tables in many different ways.

The Microsoft Project screen will vary depending upon the view, table, and filter that is currently active. However, you will need to become familiar with the basic components of the screen as shown below. Understanding the layout of the screen, and its components and terminology will help you in using Microsoft Project.

IV. PROBLEM STATEMENT

18 LATITUDE

SITE DETAILS

- Name of site :18 Latitude.
- Location of site : Punawale, Mulshi, Pune
- Site Engg: Manoj Gawade
- A proposed commercialbuilding having 7 floor and102shops is taken for case study location is in Punawale, Pune.
- Design Team: Sanskruti construction
- Owner and Developer :G. D. Square and Akshay Chordiya
- Architect: Rajas Designers

- Cost of project : 16 Cr
- Structural Engineer : Structural Consultants
- Builder :G. D. Squareand Akshay Chordiya
- Area: 92000 sq. ft.
- Commercial building having No. of Towers: 1, No. of Floors: 7 Floors, No. of showroom:6.
- Present condition of the project : Under construction
- No. of Towers: 1,No. of Floors: 7 Floors, No. of showroom: 6

Fig 1 3rd Eye view of actual site

STARGAZE

SITE DETAILS

- Name of site : stargaze
- Location of site : Bavdhan, West Pune zone, Pune, Maharashtra 411021
- Design Team : jw consultancy
- Owner and Developer :koltepatil
- Architect :manoj tatuskar and vikas acharikar
- Cost of project : 64.4 Lakhs Onwards
- Structural Engineer : jw consultant
- Builder :kolte patil
- Area : 1.91 acre
- Residential building having No. of Towers: 6, Towers No. of Floors: 14 Floors, No. of Units: 462 Units.
- This project is based on sustainable structure
- Present condition of the project : under construction
- No. of Towers: 6, Towers No. of Floors: 14 Floors, No. of Units: 462 Units.

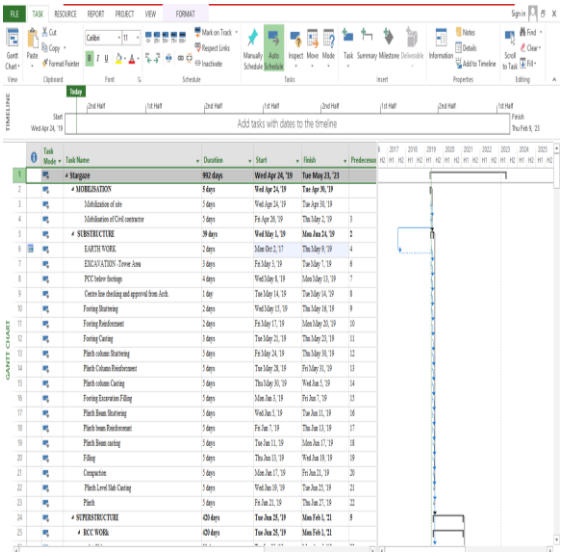
Fig 2 3rd eye view of actual site

V. RESULT AND DISCUSSION

5.1 FOR 18 LATTITUDE

Table 1 Days count for Normal Construction

Sl. No .	Description	Unit	Convention al formwork
1	Material cost	Sq.	500
		mtr	
2	Labour cost	Sq. ft	110
3	Number of repetitions		15-20 times
4	Minimum duration of slab cycle		21 days
5	Total cost per slab (Material + Labors)		=Total Area per slab*Labour cost *Material cost=966.67*10.1*500=4881683.5
6.	No. of days per tower		992



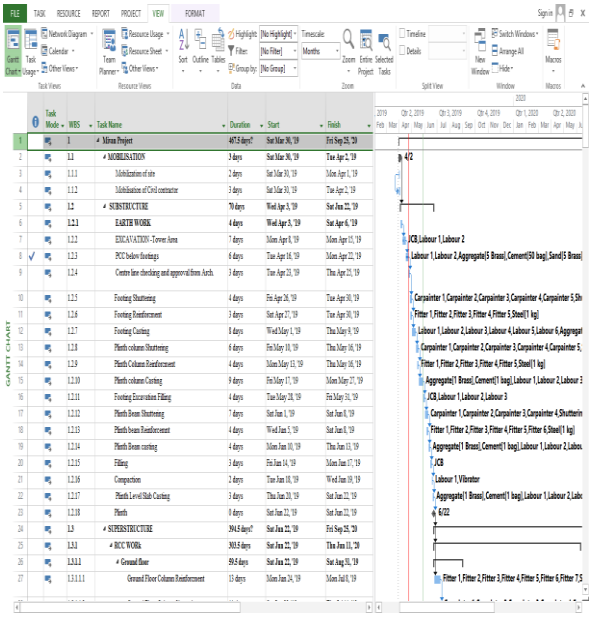
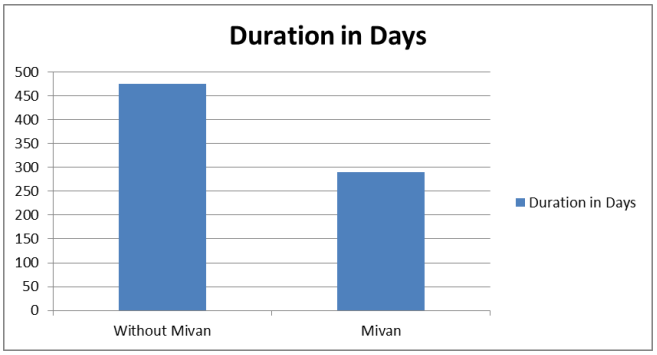
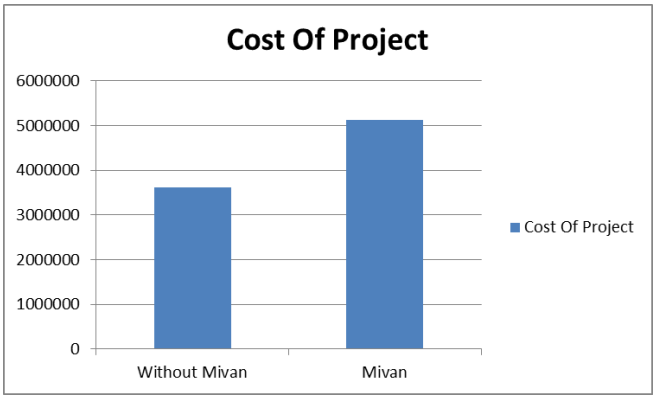


Table 2 Days count for Mivan Technology

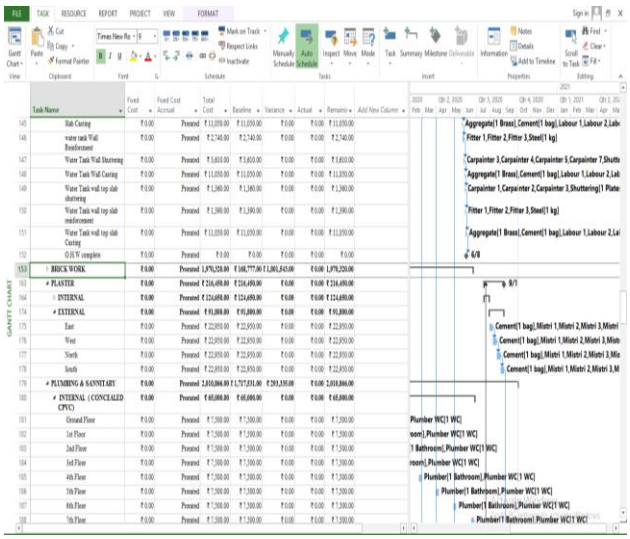
Sl. No	Description	Unit	Mivan technology
1	Material cost	Sq. mtr	9000
2	Labour cost	Sq. mtr	37.1612
3	Number of repetitions		200-300 times
4	Minimum duration of slab cycle		10 days
5	Total cost per slab (Material + Labors)		=Total Area per slab*Labour cost *Material cost=966.67*37.1612*9000= 323293115
6.	No. of days per tower		467

18 LATITUDE	Duration in Days
Without Mivan	475
Mivan	290

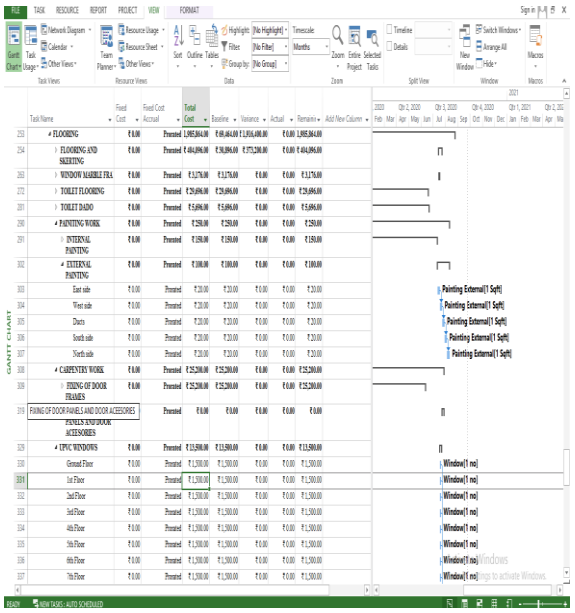




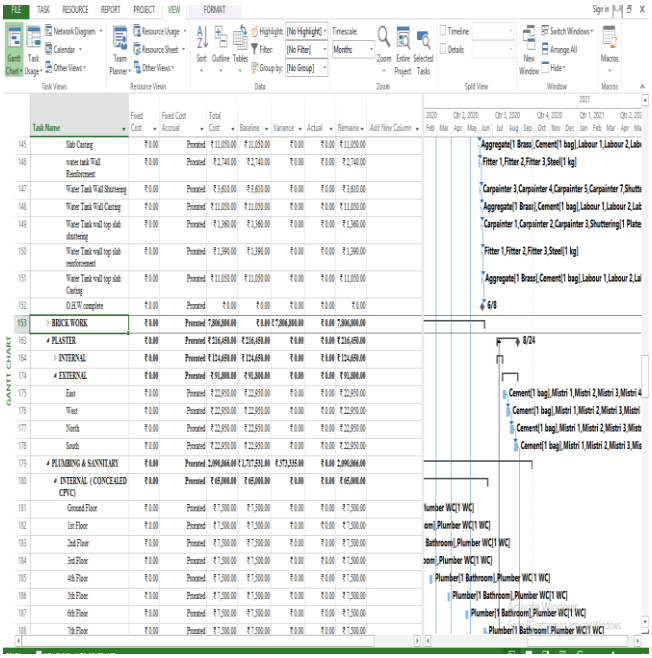
FOR STARGAZE



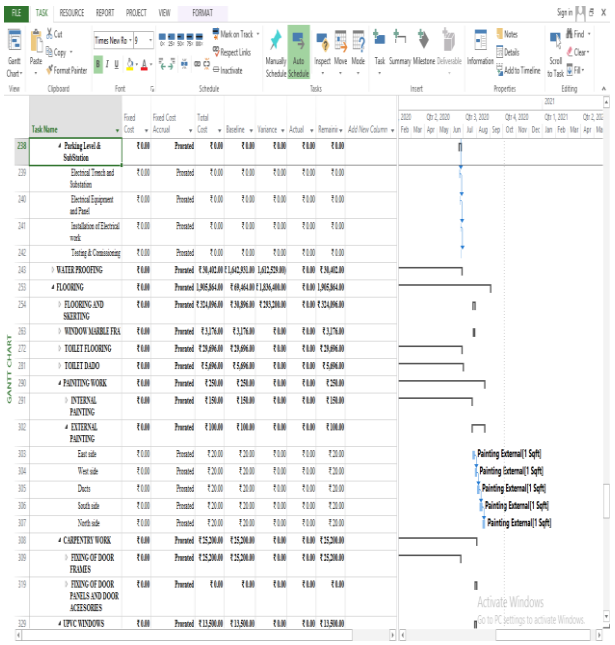
CLC Brick Work takes less Cost but take more Duration



600 x 600 Flooring increase Cost and Duration too



4'' (Conventional)Brick Work takes less Cost but take more Duration



800 x 800 Granite tile use Flooring takes more Cost but less Duration

In Above the MSP Scheduling we have use CLC Bricks to reduce time and cost of the project as compare to Mivan Technology in Mivan we can reduce brick work time but it take more cost than brickwork

In Above the MSP Scheduling we have use Granite having Size 800 mm X 800 mm to reduce time of the project as compare to 2nd Project we use tile having size 600 x 600 It reduce cost but it take more time As compare to 1st project

VI. CONCLUSIONS

It was discussed that using VE methods by multidisciplinary team, value and economy are improved through study of alternative design concepts, material and construction methods without compromising functional requirement and quality. In this paper the various methods of

formwork and materials are used for implementation of value engineering

- **CLC Bricks**

We can replace CLC bricks with conventional for following reasons it reduces overall weight of building by 20% due to lower density its size is 40% higher than conventional bricks hence it increase the speed of masonry works

- **Granite Tiles**

We can replace regular tiles by granite it has more finishing and strength than regular tiles its rate is comparatively cheaper than regular size its size is larger than verified tiles hence increase in speed of masonry work.

- **Mivan Formwork**

In this method the formwork is replaced by present case study and it's observed that the total days reduced by 65% but cost will increased by 2.5 times to achieve this time function of value

REFERENCES

[1] Amit Sharma, R.M. Belokar "Achieving Success through Value Engineering: A Case Study" Member, IAENG Proceedings of the World Congress on Engineering and Computer Science 2012 Vol II (http://www.iaeng.org/publication/WCECS2012/WCECS2012_pp1330-1333.pdf)

[2] K. Ilayaraja and MD. ZafarEqyaaba "Value Engineering in Construction" Department of Civil Engineering, Bharath University, Chennai Indian Journal of Science and Technology, Vol 8 (file:///C:/Users/File/Downloads/87285-154763-2-PB.pdf)

[3] Li Ning "Cost Control Application Research of Value Engineering in the Design Phase of Construction Project" Beijing Institute of Economic & Management, Beijing,China(file:///C:/Users/File/Downloads/25840807.pdf)

[4] ChouguleMahadeo Annappa1 and KallurkarShrikantPanditrao "Application Of Value Engineering For Cost Reduction – A Case Study Of Universal Testing Machine" A.G. Patil Polytechnic Institute, Vijapur Road, Solapur (Maharashtra), India.(http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.667.8337&rep=rep1&type=pdf)

[5] Sesmiwati , Wahyudi Putra Utama, FieldaRoza "A Critical Review of Value Engineering Development in Indonesian Construction Industry" ivil Engineering and Planning, University of Bung Hatta (https://www.researchgate.net/publication/317380991_A_Critical_Review_of_Value_Engineering_Development_in_Indonesian_Construction_Industry)

[6] Venugopal Sharma, rajesh Kumar "Analysis To Reduce Cost Through Value Engineering Of Furniture Product In Furniture Industry – A Case Study" Department of Mechanical Engineering,CSIT, Durg, Chhattisgarh, India (http://www.iraj.in/journal/journal_file/journal_pdf/2-416-151549323316-23.pdf)

[7] Amit Sharma , Dr.R.M.Belokar "Implementation Of Value Engineering - A Case Study" PEC University of Technology, Chandigarh, India (http://indianresearchjournals.com/pdf/IJMFSMR/2012/March/6.pdf)