

Role of Value Engineering in Construction Materials

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Abstract : Aim of this project is to reduce the cost of the construction by adapting the modern materials in the Construction project. As the current materials are not proven to attain the profitability, Value Engineering (VE) can be used to find the alternative materials to reduce the cost, time and also to increase the functionality of the construction projects. An attempt has been made to reduce the cost of the construction material by introducing modern materials in effective way of replacements by using VE, which seeks the best functional balance between cost reliability and performance of the project. In this project, different construction materials are compared with the traditional materials in order to analyze their functionality and cost which can give good Efficiency, Ensures Quality, and Reliability to reduce the completion time of construction project. It also involves Selection of Preferable Area of concentration, Factors Identification and Cost comparison with different materials along with its criteria. Finally, identification of possible cost reduction materials by using Ranking Method based on the questionnaire from the experts and implementing those suitable materials in Case Study of different construction work in Coimbatore region.

Index Terms : Value Engineering, Cost Reduction, Functionality, Modern Material, Ranking method.

1.0 Introduction

According to civil engineers for each and every project they used to implement new materials in construction mainly to reduce the cost of the construction projects. As these methods are not proven to attain the profitability, So VE, which is a proven method to reduce the cost and increase the functionality of the construction project can be adopted. VE was first applied tool in the process and manufacturing industry. VE was introduced in the construction industry at 1968 as the United State Armed Service ¹. VE is a systematic method to improve the "value" of goods or products and services by using an examination of function. In other words it is defined as "an organized effort directed in analyzing the functions of systems, facilities and services for the purpose of achieving the essential functions at the lowest life cycle cost of construction with the required performance, reliability, quality and safety". There are many factors which influence the profitability of a company, the technical excellence, availability and price of its products are all prime importance. The product should attain technical or functional requirements which should be available at the right time and at right acceptable price ².

2.0 Scope

To reduce the cost of construction materials without hampering the quality through identify and replace the alternative construction materials that will reduce the overall cost of the project.

3.0 Objective

- To identify modern materials.
- To reduce the overall cost of construction material by implementing modern materials.

4.0 Application of VE

- It is used to reduce cost of construction.
- It is used to improve quality, increase reliability and availability.
- VE is a powerful tool used to identify problems and develop recommended solutions.
- It can be easily identified using VE life cycle which is value search, then create and then enhance it and again the process will repeat as cycle.

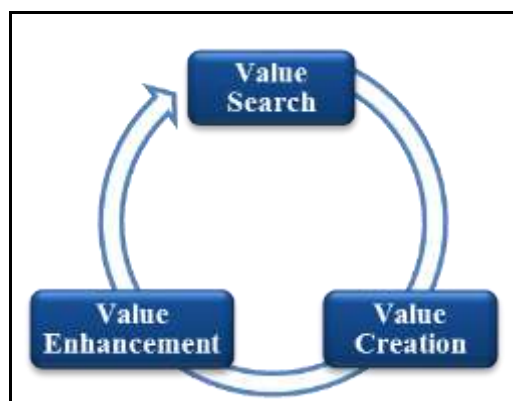


Fig: 1 VE Life Cycle

5.0 Problem Identified

- Increase of rate of traditional building materials.
- Shortage of source of traditional building materials.
- Less knowledge about modern material.
- Rate of material affect estimation cost.

6.0 Methodology

This research comprises of seven phases, the first one is to establish the objectives of the project. The second phase includes the literature review. The third phase is to identify the problems in construction. Based on the collection of data from various firms in the fourth phase. The factor includes the modern construction materials, includes the cost comparison with different materials along with its criteria ³

The fifth phase of work includes the experts suggestions, factors are identified in the materials and finalized the materials through RM.

The sixth phase of the project includes the selection of preferable area of concentration for study. The seventh phase is focused on case studies. The last phase includes the conclusions and recommendations.

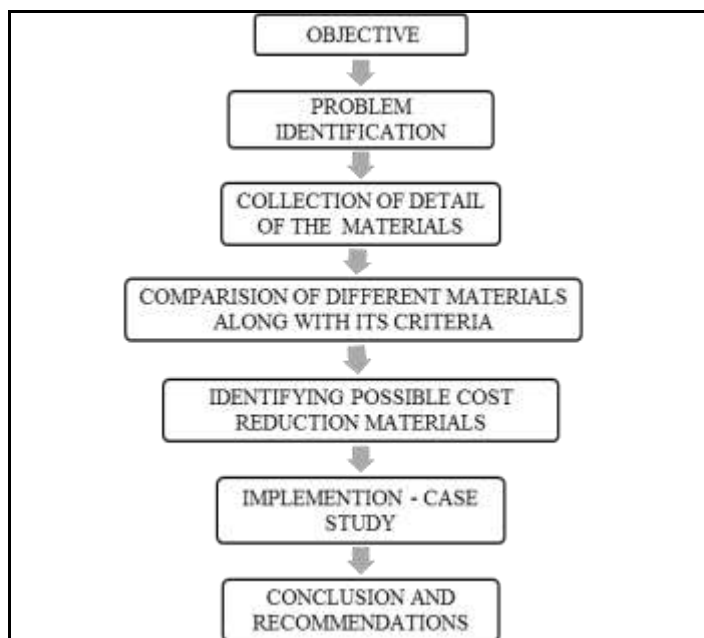


Fig 2 : Methodology Chart

7.0 Construction Activities

The outcome of work is based on the activities which carried out for it. The participation of activity is more important in the product that is outcome of those activities. So we should give major attention on this part in the construction.

In this project, we list out some of major activities which consume main part of cost of construction.

Table 1: List of Construction Activities

S.No	Activity
1	Fine aggregate
2	Masonry work
3	Plastering
4	Wall finishing
5	Windows

8.0 Construction Materials

The selection of building material is required more attention in the construction project. Because of the huge of cost of construction in it. ^{4,5}Now a days, the innovation of new material is raise and those materials are implanting in the construction under varies requirement depend on the Cost of material and that reflect in the overall cost of the project.

In the middle stage of construction work, if the cost of construction is cross the estimation value then we have to reduce the remaining work cost by replacing the building materials in less cost than traditional materials ^{6,7}. The list of materials available in Coimbatore region are

Table 2: List of Construction Materials

S.No	Material
1	River sand
2	M-Sand
3	Quarry dust
4	Clay Brick

5	AAC Block
6	Fly Ash Brick
7	Porotherm Block
8	Gypsum
9	Cement
10	Lime
11	POP Putty
12	UPVC
13	Seccolor
14	Powder Coated
15	Aluminium indow

9.0 Ranking Method

In order to arrive the best alternative materials, the fifteen factors are identified with the help of experts. In order to know the preferences for these fifteen criteria, a questionnaire survey was undertaken in which the respondents were asked to evaluate the criteria on a four-point scale. The responses obtained from the 4 respondents are shown below.

Stage I - Evaluation of criteria governing foundation selection.

Stage II - Evaluation criteria and their relative weights.

Stage III - Allocation of rank by their weightage.

Stage IV - Selection of sustainable material from experts.

Table 3: List of Finalized Materials

S.No	Materials
1	M-Sand
2	AAC Block
3	Gypsum Plaster
4	Lime Plaster
5	Aluminium window

10.0 Case Study

The finalized materials are implement in the current construction project in Coimbatore region. Those projects are in different working stage.

Case study 1: Apartment in TVS Nagar, Edayarpalayam with 80% of work completed.

Case study 2: School building in Telungupalayam with 50% of work completed.

Case study 3: Apartment in Ondipudur with 70% of work completed.

Case study 4: Apartment in Rathinapuri with 80% of work completed.

The following chart are denote the cost saving for remaining works through comparing traditional and modern materials.

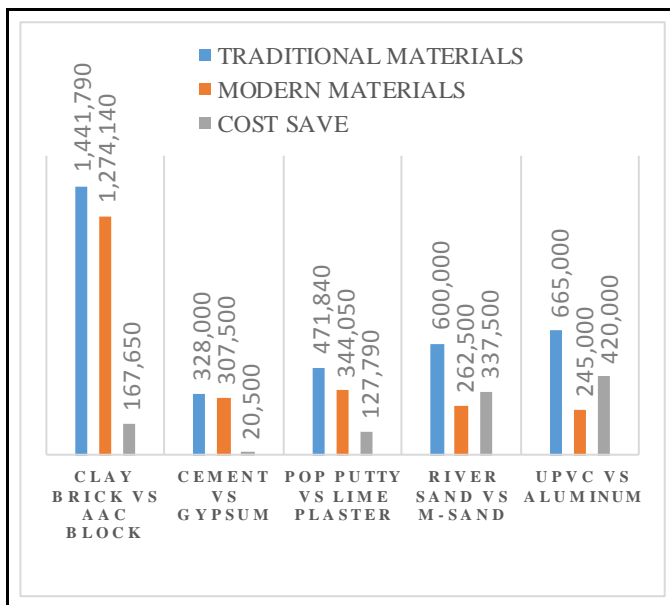


Fig 3: Cost Comparison Chart for case study 1

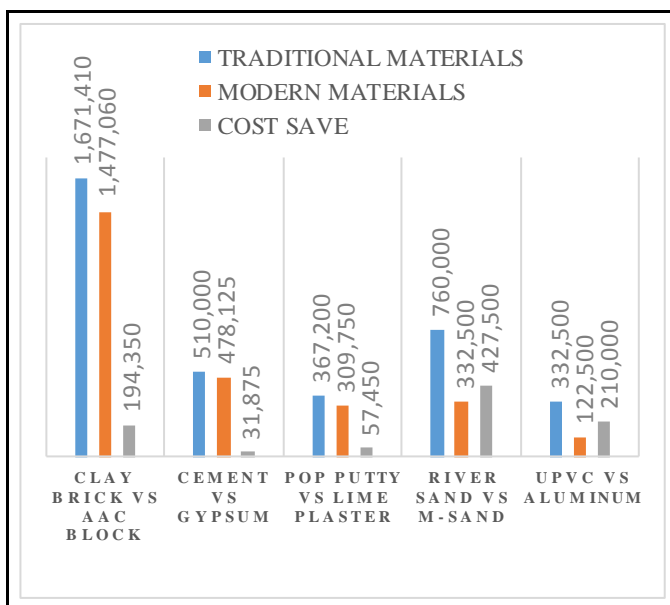


Fig 4: Cost Comparison Chart for case study 2

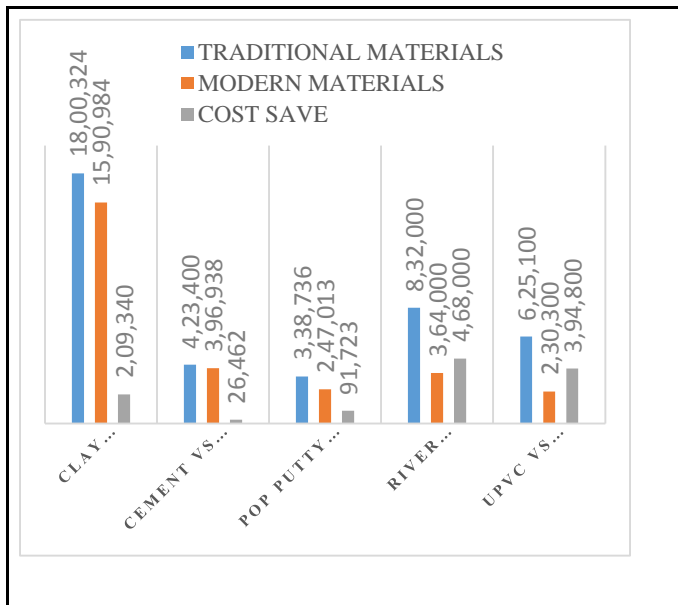


Fig 5: Cost Comparison Chart for case study 3

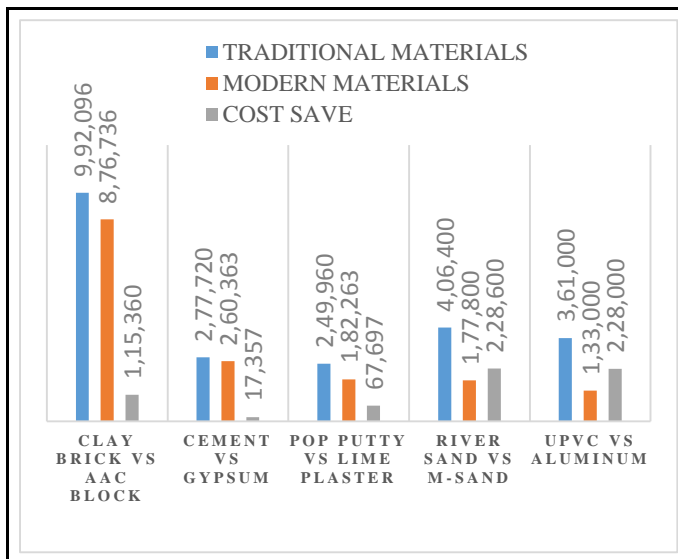


Fig 6: Cost Comparison Chart for case study 4

11.0 Conclusion

In this project, different modern construction materials are compared with the traditional materials.

1. By analyze their functionality to reduce the overall cost of the project.
2. It done through questionnaire survey on field.
3. By Ranking Method, the materials of construction compared with the experts.
4. Shortlisted materials are implement in various construction project.
5. It results, the cost reduction in the outcome of the construction.

11.1 Recommendation

The Masonry work has been recommended for the light weight AAC blocks because as it provides more comfort to the user of the building as they are thermal resistant, thereby maintaining the temperature inside a constant as compared to external temperature. By using the AAC block the wall undulation will be reduced thereby allowing gypsum plastering. By using the gypsum plaster the POP Putty work is not necessary hence

allowing us to go for painting directly. As far as fine aggregate is considered river sand is replaced by M-Sand because of the cost increase for river sand thereby ground water table is saved. For Joineries comparing to UPVC, and Electrical Powder coated, Aluminum window is more economical and efficient, so it is recommended.

12.0 References

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