



Application of Value Engineering In Housing Apartment

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ABSTRACT : Value engineering is a powerful approach for cost saving and quality improvement, especially that the construction industry holds a significant weight with respect to the worldwide economy. Value engineering takes into consideration both the initial and life cycle costs. Measuring project success is a complex task and has traditionally been associated with criteria like time, cost and quality in the project society. Value Engineering focuses on accomplishing the required functions at the lowest overall cost. It helps in eliminating or minimizing wastage of material, time, and unnecessary cost, which improves value to the customer. The current construction practices require a great effort to balance the factors such as money, time and quality. Comparing with other industries it seemed that construction industry remains the toughest one to deal with. It is proven that certain modern techniques can be easily adapted to the project to balance the factors above said. The aim of this project is to study the effectiveness of alternatives in housing apartments and reducing the cost without affecting the quality by value engineering. Literatures are collected based on value engineering, and the required data's are collected based on the journals. Alternatives are identified by investigation on four construction sites. The various alternatives used on sites are AAC blocks, solid blocks, flush doors, Robo sand, UPVC windows etc. Then comparison between cost by using Alternative materials and Conventional materials are done by Pareto analysis. By the analysis recommendation and development has been done.

KEYWORDS: AAC blocks, solid blocks, flush doors, Robo sand, UPVC windows

Received 15 August, 2022; Revised 28 August, 2022; Accepted 31 August, 2022 © The author(s) 2022. Published with open access at www.questjournals.org

I. INTRODUCTION

The construction sector is one of the main players in economic growth. In India it is the second highest employer, after agriculture, employing over 32 million people. The construction sector in India accounts for 5% of the gross domestic product and 38% of the gross domestic investment. The construction sector is broadly divided into four areas: infrastructure (54%), industrial (36%), residential (5%) and commercial (5%). According to estimates, the construction business volume is about Rs. 2400 billion. Earlier the industry was growing at over 10%, which decelerated due to the economic slowdown. Now it is looking up again.

II. LITERATURE REVIEW

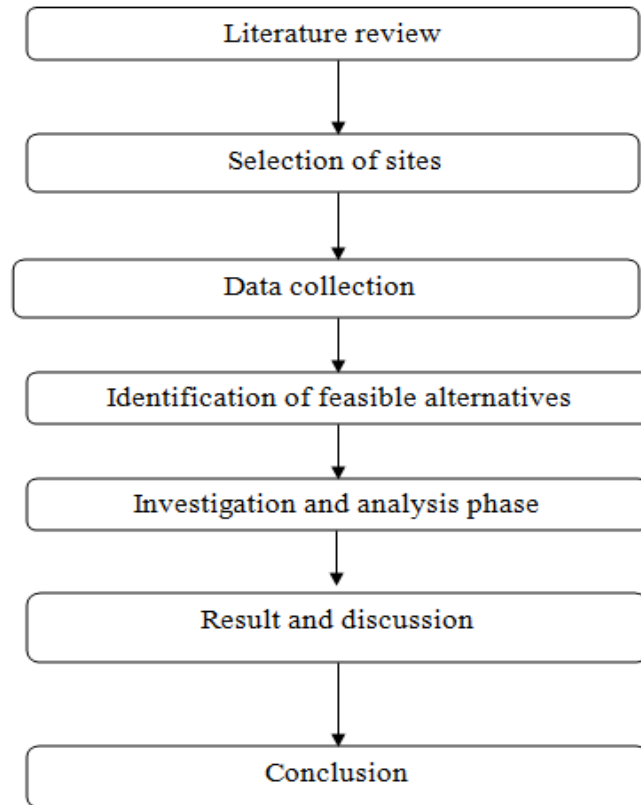
Senay, et al. (2013) had made their study on "Application of Value Engineering in Construction Projects". The satisfactory results of time and cost saving are achieved by applying value engineering principles through the VE team during the project preparation phase and project revision phase. Approximately 43,000,000\$ and 12 months of time were saved in total thanks to all these VE works. This saving provided builder company with 6% financial saving and 17% work time reduction

Surya, et al. (2015) has made his study on "Application of Value Engineering In Building Construction". The Value Engineering is an intensive, interdisciplinary problem solving activity that focuses on improving the value of the functions that are required to accomplish the goal, or objective of any product, process, service, or organization. Value Engineering is not essentially cost cutting, the main aim of value engineering is to increase the value but not to reduce cost.

Nayana, et al. (2015) had made their study on "Value Engineering in Residential House Construction". The value engineering study is carried out with analysis of basic functions of the project and based on that analysis unwanted elements in the project are scrutinized and eliminated. The function analysis is carried out with the

help of FAST tool and the projects study deals with a step by step process. This thesis deals with implementing the value engineering concepts in a residential building project in order to reach out better quality with lower cost.

III. METHODOLOGY



3.1 DETAILS FOR NAVIN'S STARWOOD TOWERS

Type of building- Residential apartment, Name of the building- Navin's Starwood Towers, Place- Vengaivasal, Village- Medavakkam, Taluk- Sholinganallur, District- Kanchipuram, Extent- 9.85 acres, Estimate of project- 124 crore

Building Details

No of Blocks-11, Units-958 units, Project duration-758 days, Residential blocks-8 Basement/ Stilt + 14 Floors, Commercial block-1, Basement/ Ground + 2 Floors, Club house- Basement / Stilt + 3 Floors

Plan



Plan for PINE block

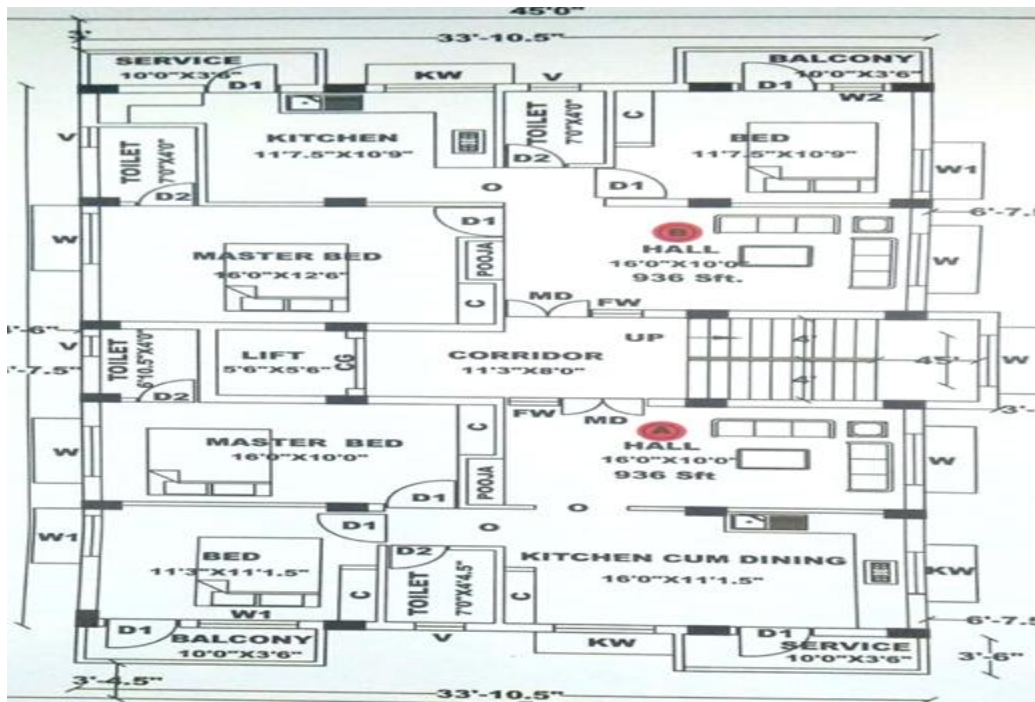


Plan for RED WOOD block

3.2 DETAILS FOR ISHWARYAM HOMES

Type of building- Residential apartment, Name of the building-Ishwaryam Homes, Place-Raja colony, Village-Cantonment, Taluk-Tiruchirapalli, District -Tiruchirapalli

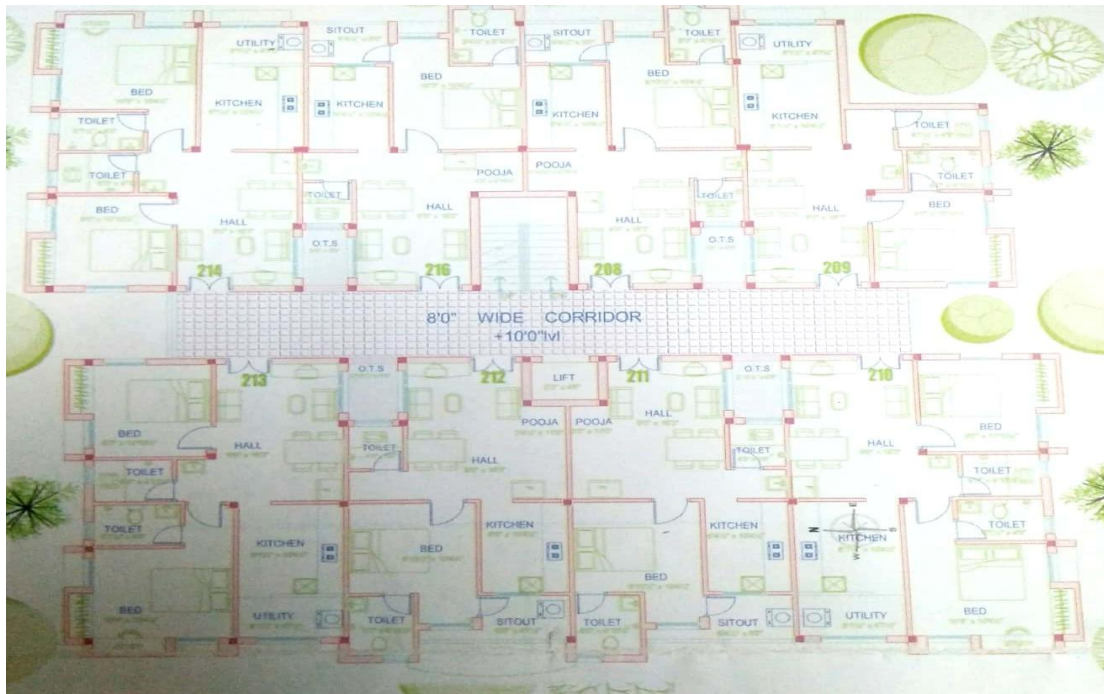
Plan



3.3 DETAILS FOR JANANI GARDEN

Type of building- Residential apartment, Name of the building- Janani garden Place-Srirangam, Village- Mathur, Taluk- Srirangam, District- Tiruchirappalli

Plan



3.4 SITE DETAILS FOR NAVIN'S SANCHUM

Type of building- Residential apartment, Name of the building- Navin's Sanchum, Place -Rajakilpakkam, Village- Medavakkam, Taluk-Sholingannallur, District - Kanchipuram

Plan



3.5 IDENTIFICATION OF FEASIBLE ALTERNATIVES

3.5.1 Autoclaved Aerated Concrete Block

AAC products include blocks, wall panels, floor and roof panels. AAC is a highly thermally insulating concrete-based material used for both interior and exterior construction. Besides AAC's insulating capability, one of its advantages is quick and easy installation, because the material can be routed, sanded, or cut to size on site using standard power tools with carbon steel cutters.

3.5.2 Solid Block

Concrete block masonry which is also known as concrete masonry unit (CMU) have advantages over brick and stone masonry. Concrete blocks are manufactured in required shape and sizes and these may be solid or hollow blocks. Solid concrete blocks are commonly used, which are heavy in weight and manufactured from dense aggregate.

3.5.3 M-sand

Manufactured sand is produced from hard granite stone by crushing. The crushed sand is of cubical shape with rounded edges, washed and graded to as a construction material. The size of manufactured sand (M-Sand) is less than 4.75mm. Manufactured sand is an alternative for river sand. Due to fast growing construction industry, the demand for sand has increased tremendously, causing deficiency of suitable river sand in most part of the world.

3.5.4 UPVC windows

UPVC OR PVCU is a form of plastic and stands for unplasticised polyvinyl chloride. It is also known as rigid PVC due to the fact that it is hard and not flexible. Unplasticized Polyvinyl Chloride or UPVC windows have shot up in popularity in recent years and are being widely used in homes.

3.5.5 Glazed vitrified Tile

Vitrified tile is a ceramic tile with very low porosity. It is an alternative to marble and granite flooring. Vitrified tiles are often used outdoors due to their water and frost resistance.

3.5.6 Matt finished Tile

A popular type of tile being used these days is matt tiles. Being durable and sturdy, matt finish tiles are very often used in both bathrooms and kitchens. One Reason why matt finish tiles are a perfect choice for bathrooms & kitchens is that, its rough texture makes it suitable for slippery floors, giving it a natural anti skid feature.

3.5.7 Ceramic Tile

Ceramic tile flooring is a type of floor covering made from ceramics e.g. earthenware and porcelain. They are made from clay which are shaped and dried then fired in a kiln at very hot temperatures.

S.No	Alternative Material	Conventional Material
1	Solid blocks	Clay bricks
2	AAC blocks or Engineered blocks	Clay bricks
3	UPVC windows	Wooden windows
4	Flush doors	Teak and wooden doors
5	M sand or Robo sand	River sand
6	Vitrified tile, glazed tile, ceramic tile and Matt finished tile	Marbles and tiles

Table 1: Alternative materials compared with conventional materials

3.6 ANALYSIS PHASE

- Step 1: Sort the cost of the work from the largest to the smallest
- Step 2: Sum total cumulative cost of work
- Step 3: Calculating the percentage of the cost of each job
- Step 4: Calculating the cumulative percentage
- Step 5: Plot cumulative percentage

IV. RESULT AND DISCUSSION

Table 2: Cost of Navin's Starwood Towers

Alternative materials	Alternative cost	Conventional materials	Conventional cost
M sand in Red	₹		₹
Wood block	247,91,403.00	River sand	360,60,223.00
AAC blocks	₹ 55,77,336.00	Clay bricks	₹ 69,30,000.00
Flush doors	₹ 27,93,000.00	Teak and wooden doors	₹ 32,92,800.00
UPVC windows	₹ 24,67,200.00	Teak and wooden windows	₹ 32,89,600.00
Glazed vitrified tiles	₹ 19,67,628.00	Marble	₹ 32,35,071.00

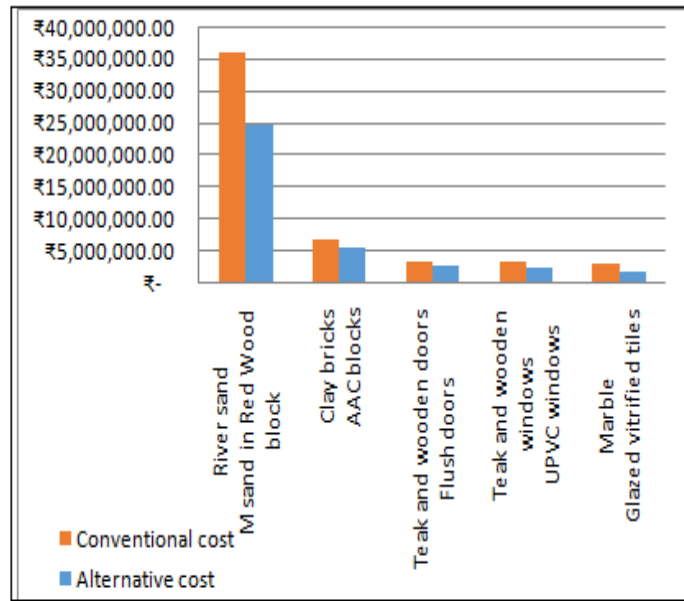


Chart 1: Comparison of Navin's Starwood towers

From the chart 1, it is shown that alternative materials are less value then the conventional materials.

Table 3: Cost of Ishwaryam Homes

Alternative materials	Alternative Cost	Conventional materials	Conventional Cost
Solid blocks	₹ 7,21,688.00	Clay bricks	₹ 14,25,368.00
Vitrified and floor finished tile	₹ 2,80,110.00	Marble and tile flooring	₹ 5,73,125.00
M sand	₹ 3,82,730.00	River sand	₹ 5,10,307.00

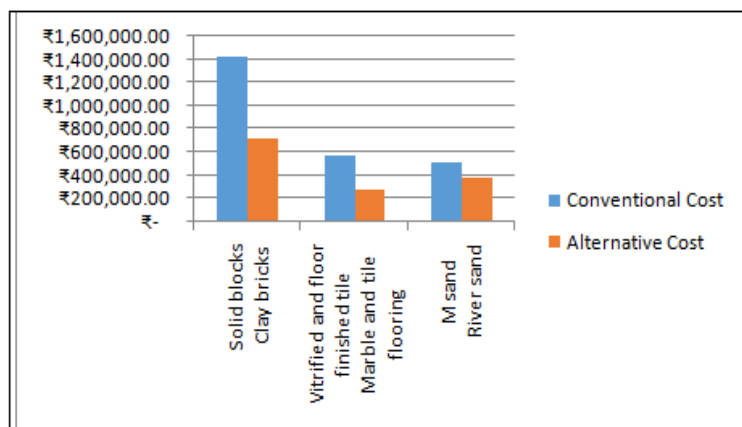


Chart 2: Comparison of Ishwaryam Homes

From the chart 2, it is shown that alternative material cost is less as compared to the conventional material.

Table 4: Cost of Janani garden

Alternative materials	Alternative Cost	Conventional materials	Conventional Cost
Solid blocks	₹ 8,87,640.00	Clay bricks	₹ 21,85,820.00
M sand	₹ 13,97,466.00	River sand	₹ 18,63,287.00
Ceramic & glazed tile flooring	₹ 8,15,788.00	Marble and tile flooring	₹ 13,23,435.00
UPVC windows	₹ 3,71,400.00	Wooden windows	₹ 4,95,200.00

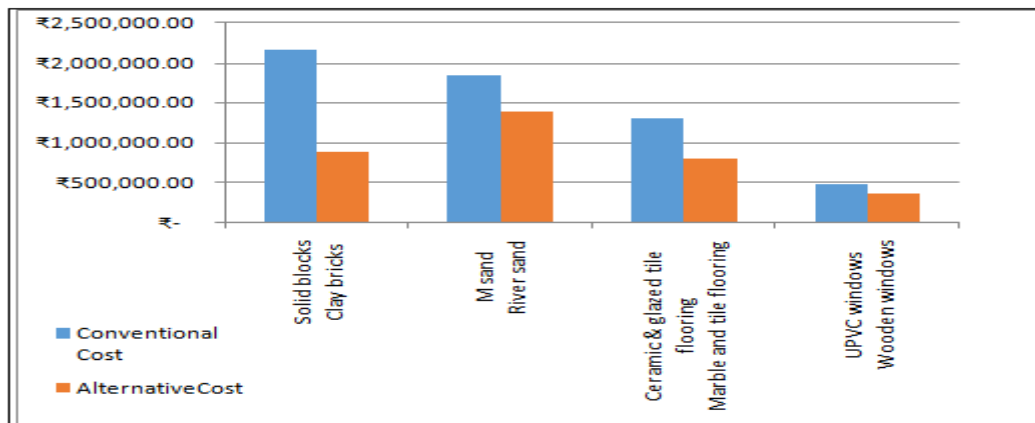


Chart 3: Comparison of Janani garden

From the chart 3, it is shown that alternative material cost is less as compared to the conventional material.

Table 5: Cost of Navin's Sanchum

Alternative material	Alternative Cost in Rs	Conventional materials	Conventional Cost in Rs
Matt finished & ceramic tile	₹ 55,60,400.00	Marble and ceramic tile	₹ 91,45,300.00
AAC blocks	₹ 62,05,567.00	Clay bricks	₹ 76,63,492.00
UPVC windows	₹ 13,76,400.00	Wooden window	₹ 18,35,200.00

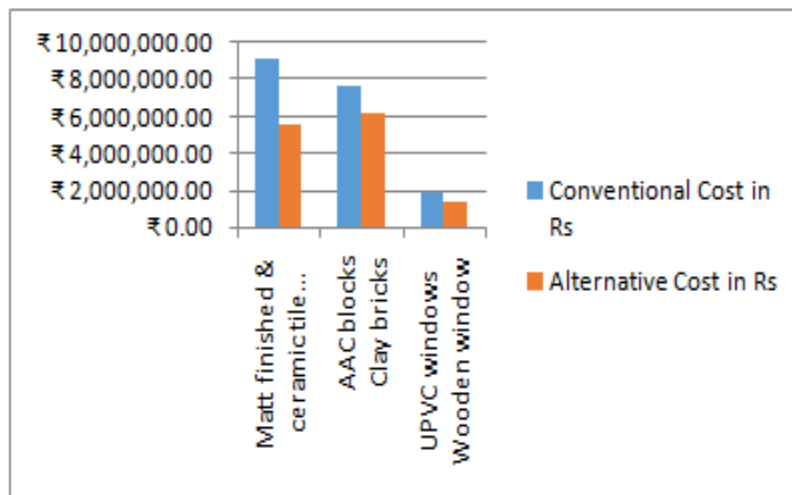


Chart 4: Comparison of Navin's sanchum

The above result shows that by using alternative materials the cost of the project reduced. Competition among the companies increases day by day. Companies in competition are addressing their customers with innovation, conveniences, low prices and quality to compete with each other. In the above project the cost is saved and quality is also improved.

V. CONCLUSION

Value engineering is a powerful approach for cost saving and quality improvement. From the result it is clear that without affecting the quality, cost of the construction can be reduced. These are some of the value-engineered elements that are believed to provide more comfort to the ultimate user without compromising on the quality, time or cost. This proves the scope and application of value engineering in building construction is tremendous, from both the developers and buyers point of view. Following things can be concluded from the result obtained. Cheaper alternative materials are available in the market which satisfies the functions and requirements of the work. Reducing the cost of the construction is only possible when new materials are being invited and accepted in the construction. Quality is maintained at desired level because there is no question to reduce cost at the expense of quality. People thinking must change to accept the change in construction materials, ultimately leading to cut down the increasing construction costs without compromising in quality leading to increase in the construction value. The alternative materials used in the projects like M- sand, AAC blocks, Solid blocks, glazed vitrified Tiles, UPVC windows, Ceramic tiles etc. proved that they can reduce the cost of the project.

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