

A Comparative Analysis of Waste Management Hierarchy combined with Scheduled labor Planning

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Abstract- Construction industry is an important indicator of the development as it creates investment opportunities across various related sectors. However, construction industry generates significant amounts of wastes. A major share of these wastes can be reused or recycled. Construction industry produces more wastes, both by volume and weight, than all industries put together. It is also true that the use of input materials is significantly higher in construction industry, more so, the use of natural materials. These wastes need to be managed, since they are not degradable. A strategic approach to manage these wastes can be termed as Waste Management Technique. One such technique that is adopted in this paper work is Value Engineering.

KEYWORDS: Value Perspective, Waste Management, Disposal, Land-filling, Recycling Process.

I INTRODUCTION

Construction method is understood to get waste because of its terribly nature of evolution of building inputs to its transformation to final type to be used. At varied stages of construction, the inputs gets deformed, discarded, is owned, discarded, discouraged, discounted, disgraced, diseased, disfigured, disintegrated and thus classified and termed as waste. Whereas it better-known that “energy can neither be created nor destroyed”. The embodied energy in such ‘waste’ materials must be used for creative thinking, creatively.

Construction is a very important side of infrastructure and growth of trade in developing countries. Building roads, bridges, and alternative infrastructure play a very important role in shaping society’s future. During this method the development trade produces an enormous amount of waste that is environmentally unfriendly and expensive to project budget.

II LABOUR SCHEDULING

Delay in completion of infrastructure comes in India, as well as industrial and residential residences, could be a common grievance. in keeping with the 12th 5

Year set up, India is concentration on infrastructure growth investment well and want for effective implementation of project management system as associate organizational-wide method is nonetheless to be accomplished by the bulk of contractors and shoppers across the country. Increase in labour price and ineffective utilization of the labour are the main sources of price and time overrun (PMI-KPMG-MOSPI-GOI 2013).

The Indian industry is labour intensive therefore labour productivity incorporates a important impact on price and time performance of the project. Till recently project performance was assessed supported price and as labour was thought-about cheap, the final contractor failed to specialize in labour productivity. In current scenario time performance has become progressively a priority and increase of labour price necessitated introduction of systems to set up careful project schedule, monitor and management labour productivity performance.

The effective coming up with, observance and management plays a crucial role in finishing the advanced project among calculable time and value maintaining the standard standards. The labour productivity observance and management depends heavily on the look of labour price and time of the project. The perform effective management system is to set up, record and report the health of labour productivity as per the planned and to perform corrective action among time.

The planning, observance and management objectives in construction are to set up the work, alter timely mobilisation of resources, set up month wise charge, budget price of construction and contribution, monitor at regular intervals the current / projected standing of the work, and determine the variances and to require corrective action. Careful schedules are essential within the development of project baselines by contractors and to attain planning objectives it's necessary to make sure a practical and doable.

Today, all leading construction contractors within the country have documented systems for project planning and productivity observance. Supported the

corporate specific necessities these systems are tailor-made and generally are noted by in-house acronyms. The planning systems for building comes are mostly supported MS Project, whereas the productivity observance system relies on custom developed spreadsheets. Thus, most companies have formally documented procedures for planning and productivity observance that are loosely aligned with world best practices.

The need for this study arose from perceptive that

(i) Though commonplace documented coming up with systems were out there, the look practices on sites varied wide,

(ii) On most comes the number of labor done enhanced dramatically near a milestone, and born when the milestone was passed,

(iii) Work sampling on web site showed that solely regarding half-hour of import additional work was being done by labor

(iv) Whereas the information for labour productivity was being collected on a commonplace, solely a number of sites were analysing this information to for productivity improvement opportunities.

This study explores the look observe and productivity on fifteen Indian building construction sites of a number one construction company. Information analysis is allotted to search out the matter in planning, analysing and rising labour productivity and its mutuality. A field study is undertaken to research the matter known of designing, observance and management of labour productivity on a pair of on-going construction sites. A framework is projected to beat the issues known. The framework is enforced on a building construction site and has been evaluated for its effectiveness and simple use.

III WASTE MANAGEMENT

Construction waste has caused serious environmental issues in several massive cities. Monumental amounts of infrastructure and building work are designed, therefore numbers of razed structures are increasing in construction work. As increasing demands of selling areas for never-ended razed waste are thrown away, there's a shortage of landfills. Therefore, reducing waste generation becomes a pressing issue round the world.

Attributable to the rise within the economic process when development and renovation comes within the country and resultant increase within the urbanization within the cities has created construction sector to extend drastically, however conjointly environmental impacts from construction and demolition (C & D) waste are progressively turning into a serious issue in urban solid waste management.

Environmental problems like increase within the flood levels attributable to the illicit selling of construction and demolition waste into the rivers, resource depletion, shortage of lowland and illicit selling on hill slopes are evident within the railroad cities. For the aim of management of C & D Wastes in Bharat, Construction and demolition waste have been outlined as 'waste that arises from construction, renovation and demolition activities. Conjointly enclosed within the definition are surplus and broken product and materials arising within the course of construction work or used briefly throughout the course of on-the-scene activities.

The various streams of wastes to be thought of can include;

- Excavated materials,
- Concrete
- Tiles, brick, ceramics, asphalt concrete,
- Plaster,
- Glass,
- Metal and steel,
- Plastics,
- Wood, asphalt, and
- Concrete rubbles, etc.

IV RECENT STATE OF ARTs

In 2016 NCICE Sawant Surendra et al. [1] proposed a paper. In this proposed paper, Construction could be an important association to the infrastructure and growth of trade in Bharat. Building roads, bridges and alternative created facilities play a crucial role in shaping society's future. currently days the magnified economic yet as urbanization in Bharat have lead into in depth construction activities that generate great amount of waste matter in construction comes resulted into environmentally unfriendly and expensive to project budgets. That the management of construction waste plays necessary role within the price of project. This paper aimed to estimate the value of construction waste and its impact on cost of project and conjointly tries to recommend recommendations to the development trade to maximize the profits and minimize the development waste.

In 2015 IRJET Harish P Gayakwad et al. [2] proposed an article. In this proposed paper, the construction business has gained in no time growth in recent decades owing to the rise within the population, increase within the IT sector and increase within the industrial enterprise and additionally introduction of latest infrastructure comes resulted within the increase of housing industry drastically. Owing to that the demand for construction materials

is big for the development activities which end within the generation of giant quantity of construction waste. Construction material wastage resulted within the immense money setbacks to builders, contractors, regional's authorities and additionally to the country. the assembly of waste owing to the demolition of structures is quite the wastage that happens throughout construction of structures, thus there's want of management of Construction and Demolition (C & D) wastes, as distinct from Municipal Solid wastes, may be a comparatively new subject in Republic of India. To start with the problem there's no correct estimate concerning the amount of waste happens in Republic of India. The first reason is being in disciplinary and fewer centered during this issue. During this drawback there's absence of restrictive framework and strict social control. Specific recommendations have created during this paper to beat the loop holes within the issue. During this paper current international standing of construction and demolition waste management is overviewed and additionally the property waste management hierarchy is studied thus to beat the waste drawback.

In 2015 JERA A A Gulghane et al. [3] presented a paper. In this proposed paper, in recent trends a good variety of building materials is accessible for the development of applied science structures. The entire value of materials could also be up to hour or a lot of the entire value incurred in construction project dependent upon the sort of project. Effective construction materials management could be a key to success for a construction project. Construction waste is another major problem in industry. An outsized and numerous forms of construction waste with totally different characteristics are created the least bit the stages of construction. Construction industries have a bigger half in contributory environmental issues. The economic and environmental advantages should be gained from construction waste step-down. This paper presents a review on consistently investigation of the management of construction materials and construction waste, material management techniques, management of construction waste and existing scenario of construction management and construction waste within the business.

V ISSUE OF WASTE MANAGEMENT

India is developing country. In Asian nation there are increasing variety of construction project these is as a result of increase within the customary of living, changes in consumption habits moreover as increase

in population and this activity resulted in accumulated construction waste. Construction waste consists of unwanted material created directly or incidentally by the development or industries.

Construction wastes in any project are within the variety of building debris kind demolition method, rubble, earth material, concrete waste, steel waste, timber waste, and mixed site clearance construction materials, arising from completely different construction activities of project as well as land excavation or formation on site, civil and building construction materials, site clearance waste, demolition activities waste, roadwork waste, and building renovation waste. The assorted waste materials from excavation, demolition and construction are assessed to see whether or not they ought to be prioritized for either waste diminution or recycling/re-use.

Material waste has been recognized as a significant downside within the trade or housing or industry that has vital implications each for the potency of the industry and for the environmental impact of construction comes.

For managing the waste there should be economical waste management system which might management the waste at supply and manage the waste at each stage or section of construction project. Waste management in construction activities has been promoted for the aim increasing cash in on project and protective the atmosphere.

Construction site waste contributes to the huge quantities of construction and demolition waste that are generated by the event business per annum. It's derived that on the common construction and demolition waste constitutes 15-30% of the whole amount of waste that finally ends up in low land sites in many countries.

At project level, the waste generated on site has been derived to be relating to 100 percent of the materials originally purchased. Many builders perceive that plenty of materials that are wasted on the task site finish in a pair of price factors i.e. the material acquisition price and so the waste disposal price.

In this analysis work we've a bent to stand live presenting the setup of action for the management and management of waste construction materials.

The key focus of technique foggy methodology and this method is propose waste management procedures as a part of specific site management typically supported pull learning methodology and focusing method transparency

principle supported qualitative and quantitative data assortment techniques.

The study along intends to create some contributions for the consolidation of the Lean Construction theory, through the applying of sort of its principles in apply.

Most of this waste is avoided by strict direction and management of material. The foremost causes of waste and necessary suggestion for deflate waste unit mentioned on throughout this study.

VI PROPOSED METHODOLOGY

An analysis is carried in 2 ways in which particularly quantitative and analysis.

- Quantitative analysis is outlined as a study into the human or social drawback visage by current community. It's supported questioning a hypothesis or a theory comprised of few

variables, measured with numbers and analysis with sarcastic procedures to verify these theories.

- Qualitative analysis relies on the expertise and opinion of the person, description and therefore the means of the idea that appear to be terribly subjective. Primarily, the information is collected from site audits, in addition but, procural inventories are analyzed against style drawings to see materials purchased for designed comes.

Study Approach

1. Information assortment
2. Identification of Waste
3. Improve Labour planning (productivity)
3. Eliminate / cut back Waste using value Engineering
4. Compare & Analysis

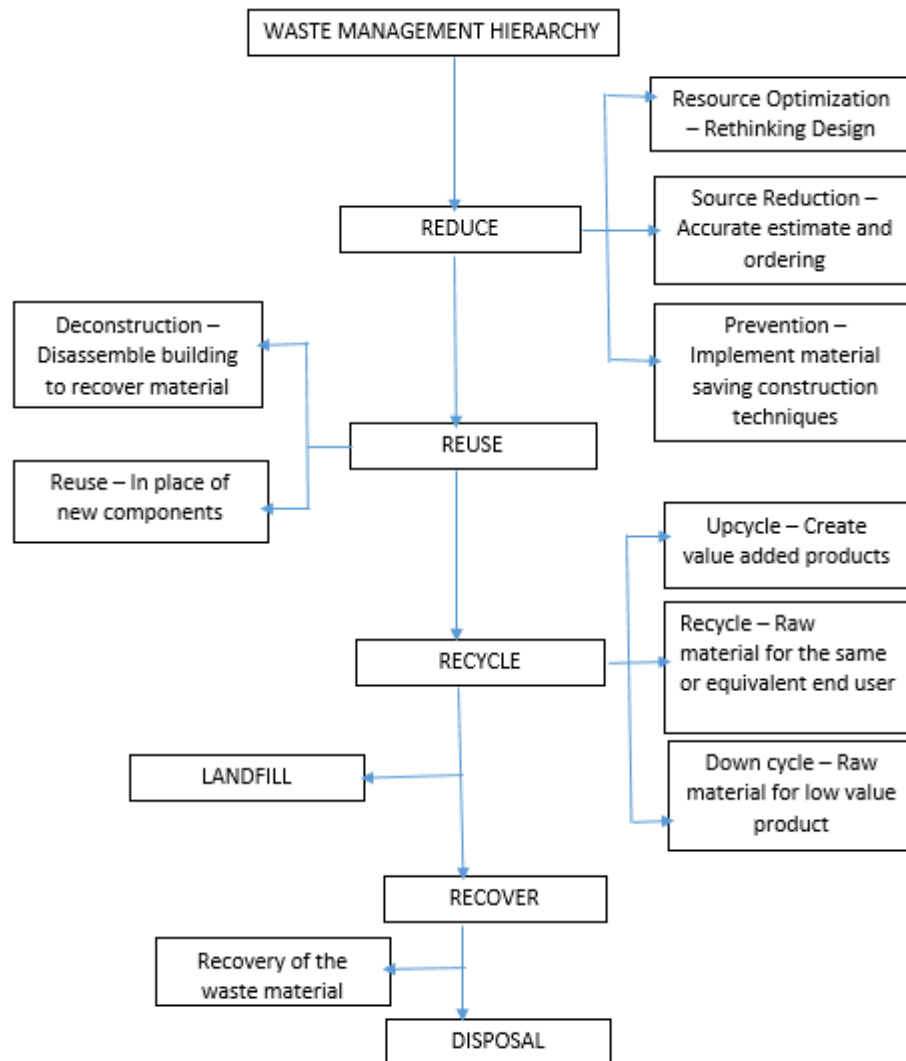


Figure 1 Flow Chart of Waste Management Hierarchy

Value engineering (VE) may be a systematic methodology to boost the "value" merchandise} or products and services by exploitation an examination of function. Value, as defined, is that the quantitative relation of function to price. Value will so be raised by either up the operate or reducing the cost. Its primary creed of value engineering that basic functions be preserved and not be reduced as a consequence of following value enhancements.

Value = Function/Cost

VII RESULTS & DISCUSSION

Case Study 1: The study of waste management base on value engineering was carried out at the construction site of M/s VRS Construction & Engineering Pvt. Ltd. The construction project was for a Large Volume Divisional School Building.

The project is conceived in the 10 acres. The basic and detailed Architectural packages were derived by M/s. Mangalam Associate Consultants (India) Private Limited and the project management consultancy (PMC) for the project were provided by V N Asoka Construction Project Management Consultants Private Limited.

1. Foundation Pit Excavation

The practice for foundation design of the structure is initially designed based on the site characteristics such as soil color, soil coarseness, etc... During the study, the soil bearing capacity (SBC) was established and the result prompted us to redesign the foundation the structure. Generally 4ft-5.5ft depth or until we get the hard strata excavation depth will be provided. When we found the hard strata at the lower

depth which intern reduced the depth of the foundation, thus saving lot of time and money?



Figure 2 showing the Foundation pit showing soft rock at Site

Table 1 Comparative value between Pre & Post Value Engineering of Earth Excavation.

Computation Base	Volume/Pit (m ³)	No. of Pits	Total
Pre Value Engineering	27.18	125	3397.50
Post Value Engineering	18.67	125	2333.75

Saving	1063.75 m ³
Rate Per m ³	Rs425.00 / m ³
Total Saving	Rs 452093.75

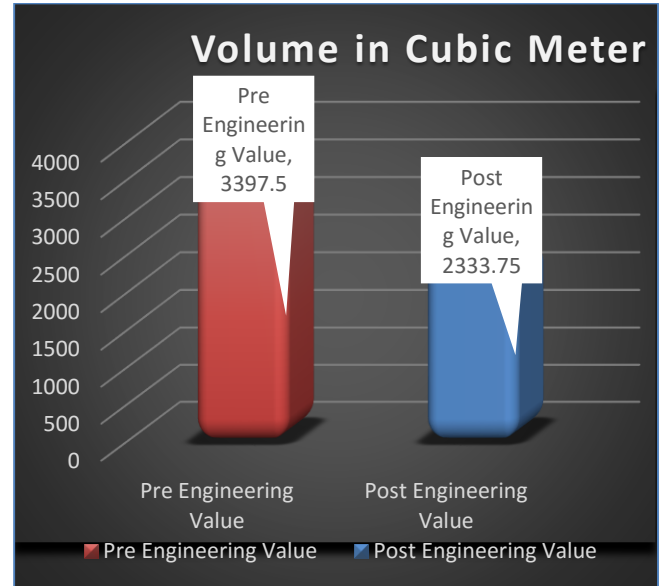


Figure 3 Chart showing comparison between Pre & Post Value Engineering of Foundation pits (Pre Value = 3397.50, Post Value = 2333.75) in cubic meter

2. Footing – PCC

The general practice, PCC is provided to give an even surface for footing and to prevent water percolation to the footing, in our case study hard strata was found at shallow depth and it can be levelled even without PCC. This prompted us to eliminate the use of PCC in some of the pits where the hard strata were found.



Figure 4 showing the Foundation without PCC

Table 2 Comparative value between Pre & Post Value Engineering of PCC

Computation Base	Volume/Pit (m ³)	No. of Pits	Total
Pre Value Engineering	1.90	125	237.50 (m ³)
Post Value Engineering	0.82	125	102.50 (m ³)
Saving	135 m ³		
Rate Per m ³	Rs3787.50 / m ³		
Total Saving	Rs511312.50		

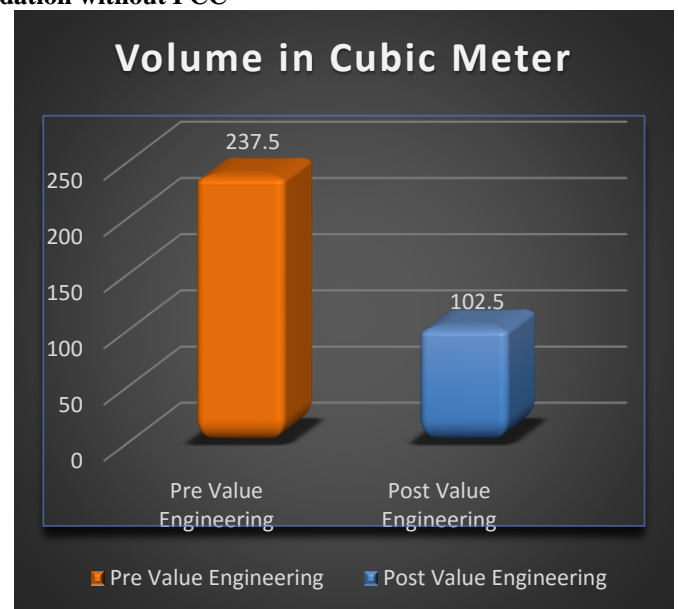


Figure 5 Chart showing comparison between Pre and Post Value Engineering of PCC

3. Shuttering for Footing

Usually in footing foundation once the pit are excavated the soil on the side walls tend to collapse, to prevent this condition shuttering is provided. In this project the soil condition of the side walls of the excavated pit was found to be stable which helped to eliminate the shuttering in many places where the soil was hard.



Figure 6 Showing the Foundation with partial Shuttering

Table 3 Comparative value between Pre & Post Value Engineering of Shuttering

Computation Base	Area Pit (m ²)	No. of Pits	Total
Pre Value Engineering	13.39	125	1673.75(m ²)
Post Value Engineering	0.97	125	121.25(m ²)
Saving	1552.50m ²		
Rate Per m ³	Rs320.50 / m ²		

Total Saving	Rs497576.25
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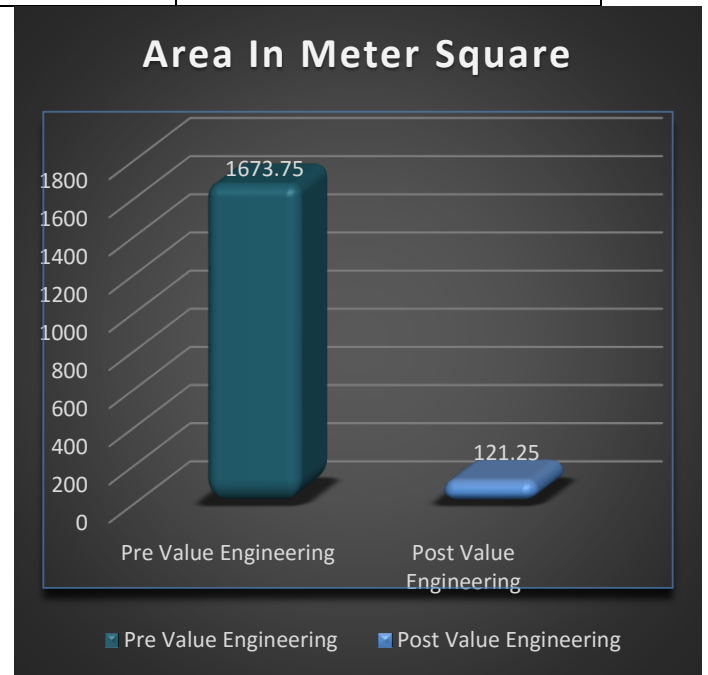


Figure 7 Comparisons between Pre and Post Value Engineering of Shuttering

VIII CONCLUSION

Waste management is very important in any construction industry, which helps in reducing unnecessary waste which is generated in site.

Value engineering is a technique, through which we can reduce waste and cost by improving the functionality of the material or product.

By proper soil bearing capacity (SBC) report the design can be changed and unnecessary excavation of soil can be avoided.

By the proper study of the soil, the shuttering and PCC of the footing can be avoided in some areas.

Studying the functions of the material or product which are used in the project and improving the functionality for example using frameless doors or using low cost partition wall.

Knowing the exact properties of the material we are using can cut down the waste and construction cost for example steel (fe415, fe500), concrete grade and blocks etc...

The following percentages of cost reduction have been achieved in the construction elements after the implementation of Value Engineering Technique.

1. Foundation Pit Excavation – 34.4%
2. Footing - PCC – 62.5%
3. Shuttering - Footing – 95.22%

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