

Implementation of 4R Techniques in Demolition Waste Management

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Abstract - The waste generated from every construction and demolition sites is considered one of the most irritating problems. However the traditional practice which is limited to dumping all the generated waste is still dominating. The research aims to developing a detailed procedure to evaluate the construction and demolition waste management approaches by means of 4R technique. A detailed study is introduced for the two approaches; for each approach a flow chart is developed to demonstrate its lifecycle, as well as the cost break down structure and the different stakeholders' roles. The main objective of this work is present the waste control procedures included as part of particular site management in general based on pull learning process and focusing process transparency principle based on qualitative and quantitative data collection techniques. Waste can be considered a resource, either for reuse in its original form or for recycling or energy. This paper highlights the composition of construction and demolition waste, the need for its recycling and options that can be implemented for its efficient use in the field of concrete technology in general. In this paper I am going to focus on different recycling techniques and its estimating methodology.

Keywords- Construction and demolition waste, Waste management, Strategic perspective, Cost break down, Policy maker, Decision Matrix Reduce Recycling, Reuse, Recovery, Recycling techniques, Sustainable development.

I. INTRODUCTION

India is the second fastest growing economy and the secondmost populated country in the world. The population of India is expected to increase from 1029 million to 1400 million during the period 2001–2026, an increase of 36% in 26 at the rate of 1.2% annually (Census of India, 2001). About 742 million people live in rural areas and 285 million live in urban areas. The level of urbanization of the country has increased from 17.6% to 28% in the last 50 years and is expected to rise to 38% by the year 2026. An important feature of India's urbanization is the phenomenal concentration of the population in Class I cities (metropolitan cities), urban agglomerations/cities having a population of more than 1 million, as depicted by the increase in the number of metropolitans from 23 to 35 in the last decade. Among these metropolitans, Greater Mumbai is India's largest city with a population of 16.4 million, followed by Kolkata and Delhi [1].

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In general, a really high level of waste is assumed to exist in construction. Though it's troublesome to consistently live all those wastes in construction, partial studies from numerous countries have confirmed that waste represents a comparatively giant share of production prices. A large vary of measures are used for watching waste, like excess consumption of materials [2]. Responsible management of waste is an important facet of property building. During this context, managing waste means that eliminating waste wherever possible; minimizing waste wherever feasible; and reusing materials which could otherwise become waste. Solid waste management practices have known the reduction, recycling, and utilise of wastes as essential for property management of resources.

Most construction and demolition waste presently generated within the U.S. is lawfully destined for disposal in landfills regulated underneath Code of Federal rules (CFR) forty, subtitles D and C. In some areas all or a part of construction and demolition waste stream is unlawfully deposited ashore, or in natural drainages as well as water, contrary to rules to guard human health, commerce and therefore the surroundings. Businesses and voters of the U.S. wrongfully eliminate various plenty of building-related waste in solid waste landfills annually [3, 4]. Progressively, important volumes of construction connected waste are aloof from the waste stream through a method known as diversion. Entertained materials are sorted for later employment, and in some cases reused. Volumes of building-related waste generated are considerably influenced by economics conditions touching construction, social group consumption trends, and natural and anthropogenesis hazards.

In recent years, industry awareness of disposal and utilise problems has been recognized to minimize volumes of construction and demolition waste disposed in landfills [5]. Many opportunities exist for the useful reduction and recovery of materials that will preferably be destined for disposal as waste. Industry professionals and building homeowners will educate and be educated concerning problems like useful utilise, effective methods for identification and separation of wastes, and economically viable means that of promoting environmentally and socially applicable means that of reducing total waste disposed. Organizations and governments will assume billet responsibilities for the orderly, reasonable, and effective disposal of building-related waste, promotion of public and trade awareness of disposal problems, and providing stable business-friendly environments for collection,

processing, and repurposing of wastes. Businesses will produce price through the comeback of wastes back to producing processes, promoting and seeking out opportunities for incorporation of recycled materials into merchandise, and prioritizing reduction of building-related wastes through economical jobsite practices.

Effective management of building-related waste needs coordinated action of governmental, business, and skilled teams and their activities. Many non-governmental organizations and societies within the America promote coordinated action, and have known best management practices within the interest of public health and welfare (see resources.) Absent coordinated rules, realistic business opportunities, and therefore the commitment of style and construction professionals and their purchasers for continual improvement of trade practices, consistent and stable markets for recovered materials cannot be achieved or sustained. Management of building-related waste is pricey and sometimes presents unintended consequences. However, logic suggests that failure to minimize, utilize and recycle social group wastes is unsustainable. It stands to reason that economical and effective elimination and minimization of waste and utilize of materials are essential aspects of style and construction activity. Creativity, persistence, information of accessible markets and businesses, and understanding of applicable rules are vital skills for style and construction professionals [5]. The promotion of environmental management and the mission of sustainable development have exerted the pressure demanding for the adoption of proper methods to protect the environment across all industries including construction.

Construction by nature is not an eco-friendly activity. Construction, renovation and demolition activities lead to the formation of waste. Construction and demolition waste is generated whenever any construction/demolition activity takes place, such as, building roads, bridges, flyover, subway, remodeling etc. It consists mostly of inert and non-biodegradable material such as concrete, plaster, metal, wood, plastics etc. A part of this waste comes to the municipal stream. These wastes are heavy, having high density, often bulky and occupy considerable storage space either on the road or communal waste bin/container. It is not uncommon to see huge piles of such waste, which is heavy as well, stacked on roads especially in large projects, resulting in traffic congestion and disruption. Waste from small generators like individual house construction or demolition, find its way into the nearby municipal bin/vat/waste storage depots, making the municipal waste heavy and degrading its quality for further treatment like composting or energy recovery. Often it finds its way into surface drains, choking them. It constitutes about 10-20 % of the municipal solid waste (excluding large construction projects). Preservation of the environment and conservation of the rapidly diminishing natural resources should be the essence of sustainable development. So recycling of Construction Waste is the need of the day.

II. OBJECTIVES

The aim of this analysis is to check the impact on minimize, reuse, recycle and recovery technique on building construction industry. On paper, it supposes to offer a sway towards the construction building industry, however will it very provide a sway towards the waste manufacture. Moreover, many problems concerning current native trade issues are going to be mentioned to spot the basis causes that affected the waste management [6]. During this analysis studies we have following main objectives are list out accordance to the matter statement that has been known. 1. To detect foremost used minimize, reuse, recycle and recovery technique at construction project. 2. To detect the connection between reduce; recycle, recycle and recovery technique and therefore the waste manufacture in construction projects. 3. To detect the variations among minimize, reuse, recycle and recovery technique.

In the first objective, investigation will be done on reduce, reuse, recycle and recovery technique used in the waste management system on-site to identify the most used 4R techniques. Second objective can see whether or not minimize, reuse, recycle and recovery technique used provides an important impact on the accumulative waste manufacture on website. During this objective, the finding can confirm whether or not the technique used on site website will minimize or manufacture additional waste on site. In third objective that is to spot variations among minimize, reuse, recycle and recovery technique used, are going to confirm that of the techniques are economical or not in manufacturing less waste.

III. LITERATURE SURVEY

Snehalanilkumar kumbhars suggested Recycling and reuse of construction and demolition waste for sustainable development. This study has developed concepts for the reutilization of construction materials, including waste debris, by means of recycling into other components that are useful in construction. Construction and demolition waste material and categories source are identified.

Nikola Karanovic suggested by Quantitative Analysis of Construction Waste in the City of Novi Sad, Serbia. This paper introduces a method of calculating the quantities of construction materials and construction waste on site. Which is performed to calculate quantity of used construction materials per square meter of one multi family building and one single family house

Manal s.abdelhamid suggested by assessment of construction and demolition waste management approaches. A detailed study for two approaches of CDWM is provided. First CDWM life cycle flow charts for cost component of its related activities are clearly identified. Second the cost breakdown structure of CDWM life cycle is constructed and the role of different stake holder are each approach identified.

Olusanjo O. Fadiya suggested by Quantitative Analysis of the Sources of Construction Waste. This paper is presented to

demonstrate the application of the contribution rates derived in this study in estimating the cost of material wastes to construction projects. Although some residual level of construction waste is unavoidable. The correlation between waste and cost minimization is substantial and provides an incentive for participants in construction projects to pursue them.

K. C. Goh suggested by Implementation on Solid Waste Reduction through 3R (NSWM Policy) and Elements to Close Gap between Policy and Contractors in Construction Industry in Penang. The implementation of solid waste reduction through 3R among contractors and reduce the construction waste dispose in landfill to achieve sustainable construction waste management. Then there represent the correlation size and correlation strength

IV. RESEARCH METHODOLOGY

Construction website waste contributes to the massive quantities of construction and demolition waste that are generated by the development business every year. It's calculable that on the average construction and demolition waste constitutes 15-30% of the entire quantity of waste that winds up in lowland sites in several countries. At project level, the waste generated on website has been calculable to be regarding 100% of the materials originally purchased. Several builders understand that a lot of materials that are wasted on the jobsite end in 2 value factors i.e. the fabric acquisition value and therefore the waste disposal value. though the waste disposal prices of construction website waste kind as very little as 0.5% of the entire budget of a typical home, contractors realizes that this value will considerably have an effect on their profit since contractors usually operate inside a good five-hitter margin of profit .

In this analysis work we've a bent to stand live presenting the plan of action for the management and management of waste construction materials. the key focus of technique logy this system this technique is propose waste management procedures as an area of specific internet site management usually supported pull learning methodology and focusing method transparency principle supported qualitative and quantitative information assortment techniques. The study together intends to make some contributions for the consolidation of the Lean Construction theory, through the applying of variety of its principles in apply. Most of this waste is avoided by strict direction and management of cloth. The foremost causes of waste and necessary suggestion for deflate waste unit mentioned on throughout this study.

A. ConstructionWaste

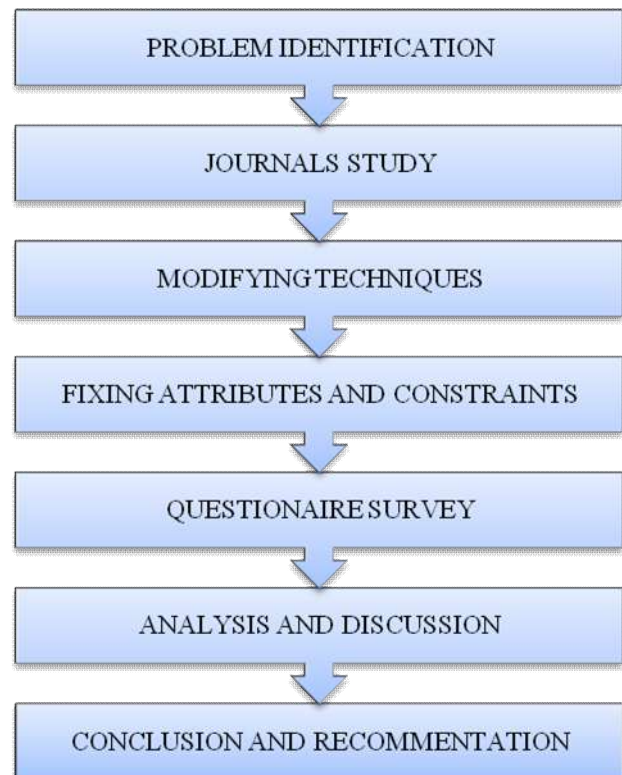
According to the origin, construction and demolotion waste is divided into the following categories:

- Waste that is allocated in the performance of newconstruction-construction waste,
- Waste generated during the renovation of existing buildings-waste from renovation,

- Waste that remains after demolition of buildingsdemolition waste.

1) Construction Waste Categories

- Concrete, bricks, tiles and ceramics, Aluminum, Lead, Zinc, Iron and steel, Tin,
- Mixtures of metal, Soil, stone,
- Asbestos, Construction waste contaminated with mercury and polychlorinated biphenyls – PCB, Other construction waste.



2) Waste Materials Treatment Hierachy

- Reduction: always ordering the quantity of material that is really needed,
- Reuse: to use those materials-products that can be used several times in its original form and purpose, providedthat it is safe.
- Recycling: applied when reusing the same purpose is not possible.
- Revitalization: to extend its life span.

3) Reducing the Construction Waste

Proper materials management practices may result in cost savings. Assure that precise estimates are made prior to purchase of materials, and that accurate measurements are made prior to cutting materials so that excess scrap and endcuts can be avoided.

4) Reuse of Construction Waste

Encouraging the reuse of products and materials that are suitable for it shall never be interrupted, because there is no more direct way of preventing the generation of waste.

In cases where construction and demolition sites are located on a small mutual distance, it should be insisted on the revitalization and then their use as suitable building materials and elements. If not, an acceptable option may be to consider storage of reusable materials until their resale or redistribution. Installation of reusable materials can be significantly facilitated if they managed during the construction of the modular principle.

5) Recycling of Construction Waste

All the attention is focused on recycling of inert materials from construction waste. The main stages in the process of recycling are sorting, crushing and screening, and the final product is a unit that can be used in construction. There are at least two benefits of recycling process, with the engine as its final product:

- Significant reducing the amount of construction waste.
- Saving natural resources.

B. Estimating Methodology

In this study is presented analysis of construction waste in Novi Sad, which is city in Serbia with 280000 inhabitants, zones, and 10 multi family residence zones [1].

Experimental test which is performed to calculate quantity of used construction materials per square meter of one multi family building and one single family house shown that quantity of used construction materials for one multi family building was 2812 kg/m² and the quantity of used construction materials for one single family house was 2087 kg/m². Quantity of used construction materials for each zone of Novi Sad is calculated as:

- single family houses: $osfh\ QCM = TAF \cdot QCM\ (1)$

QCM – Quantity of used construction materials

TAF – Total area of flats in zone

QCM_{osfh} – Quantity of used construction materials for one single family house (2087 kg/m²)

- For multi family buildings: $omfb\ QCM = TAF \cdot QCM\ (2)$

QCM – Quantity of used construction materials

TAF – Total area of flats in zone

QCM_{omfb} – Quantity of used construction materials for one multi family building (2812 kg/m²).

C. Effects of construction and demolition waste Environment effects

(a) The disposal of C&D waste in landfills has led to contamination of groundwater & Surface water. (b) Damage of ecological resources. (c) As in the production of cement emission of CO₂ is more it leads to air pollution and many other problems.

1) Economic effects

(a) As there is loss of primary resources it will affect the economic. (b) It will affect the nations GDP. (c) It takes more consumption of fuel, so transportation cost also increases. (d) It also affects on tourism and international reputation.

2) Social effects

Due to contamination of water it affects on the health of people.

V. CONCLUSION

This study is used to analyze the construction and demolition waste management system through the 4R techniques. To find the construction debris and demolition quantities by adopting quantitative analysis. Recycling, reusing salvaged building materials and minimizing materials and packaging reduces waste disposal costs and material expenses. It will help to reduce the landfills and resource wastages.

The introduced procedure helps to decision maker such as the C&D contractor or Transportation Company as well as the policy maker on strategic level to take into account the different influencing attributes. And the information provided for is very useful when planning, changing or implementing C&D waste management systems and approaches.

This study is used to improve the preventing and recycling wastes measures such as (a) Reduces depletion of natural resources such as trees, oil and minerals. (b) Creates less pollution by reducing manufacturing and transportation-related emissions. (c) Uses less energy and water compared to many virgin material product manufacturing processes. (d) Reduces greenhouse gasses by using less energy for manufacturing and transportation.

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