To Study Demolition of Building & it's Management for Construction Projects

Jayshri Ratlal Patil[1], Prof. Manish Mata[2]
[1]*Dr. Babasaheb Ambedkar Technological University, Lonere. For The Fulfillment of The Degree in Master of Technology (In Civil Construction Technology and Management)*
[2]*Department Of Civil Engineering, Shri Sant Gadge Baba, College of Engineering and Technology, Bhusawal-425201 2024-25*

***Abstract*—The construction industry is a driver of economic and social development in developing countries; however, it is also one of the primary sources of entropic elements such as construction and demolition waste (CDW). Since construction is expected to continue growing, it is essential to study the CDW status under these scenarios. To the best of the author's knowledge, this is the first academic research in Peru that deals with CDW. The information for the research is collected from primary and secondary sources, which includes 265 surveys, interviews, and visits to construction and disposal sites. The results are obtained from a cross-analysis of the influence of different aspects (experience and education level of the construction site manager, dimension, or socio-economical level of the site, building use, among others) on CDW management. Further, significant findings related to each stage of the CDW cycle are presented. The obtained findings provide information for effective decision making in terms of policies and regulations on CDW, which will help improve its management, reduce environmental impact, and provide economic benefits, especially in developing countries.**

I. INTRODUCTION

1.1 General

Demolition waste is waste debris from destruction of a building. Certain components of demolition waste such as plasterboard are hazardous once land filled as it is broken down in landfill conditions releasing hydrogen sulphide which is a toxic gas. Waste from individual house construction or demolition. Find its way into nearby municipal storage depots, making the municipal waste heavy. Degrade quality of municipal waste and makes it difficult for further treatment like composting. About 10-20 % finds its way into surface drains, choking them. Projections for building material requirement of the housing sector indicate a shortage of aggregates up to 55,000 million m^3. Additional 750 million m^3 would be required for achieving the targets of the road sector. Recycling of aggregate material from construction and demolition waste may reduce the demand-supply gap in both these sectors. Government or local authorities should make rules to sort the C & D waste before it is hauled away to landfills or other waste treatment facilities. Hazardous materials may not be moved before the demolition is begun or before the authorities have ascertained that safety guidelines and restrictions have been followed for handling and disposal of toxic elements as lead, asbestos or radioactive materials.

Central Pollution Control Board has estimated current quantum of solid waste genera-tion in India to the tune of 48 million Tons per annum of which waste from Construction Industry accounts for 25%. Construction waste is bulky, heavy and is mostly unsuitable for disposal by incineration or composting. The growing population in the country and requirement of land for other uses has reduced the availability of land for waste dis- posal. Re-utilization or recycling is an important strategy for management of such waste. Apart from mounting problems of waste management, other reasons which sup- port adoption of reuse/ recycling strategy are reduced extraction of raw materials, re- duced transportation cost, reduced capital investment on raw materials, improved prof-its and reduced environmental impact

Waste is generated at different stages of construction process. Estimated waste genera- tion during construction is 40 to 60 Kg. per sq. m. Waste generation during renovation/repair work is estimated to be 40 to 50 kg/square meters. Concrete appears in two forms in the waste - Reinforced concrete

(Structural elements of building) and foundations (non-reinforced concrete). Excavations produce top soil, clay, sand, and gravel. This may be either re-used as filler at the same site after completion of excavation work or moved. Large quantum of bricks and masonry mixed with cement, mortar or lime arise as waste during demolition. Stone arises during excavations or by demolition of old buildings. Metal waste is generated during demolition in the form of pipes, conduits, and light sheet material used in ventilation system, wires, and sanitary fittings and as reinforcement in the concrete. Metals are recovered and recycled by re-melting. Timber if in good condition from beams, window frames, doors, partitions, and other fittings isreused. However, wood used in construction is often treated with chemicals to prevent Termite infestation and warrants special care during disposal. Other problems associ- ated to wood waste are inclusion of jointing, nails, screws and fixings. Miscellaneous materials that arise as waste include glass, plastic material, paper, etc. In India, con- struction projects are typically carried out by contractors on a labor contract or turnkeybasis. Small housing projects, managed by owners, often generate 5-7% waste and re- quire strict supervision to control waste. Larger projects, managed by professionals, have lower material wastage at around 3%. Demolition contractors specialize in planned deconstruction to maximize material recovery, with recovery rates varying from 25% in old buildings to 75% in new ones. Recovered items are sold at a discount or as antiques. Waste disposal responsibilities primarily lie with builders or owners, with non-reusable items sent to landfill. Municipal bodies manage waste sent to land- fills. Recycling construction waste is deemed necessary due to limited landfill space and increasing demolition waste. However, waste segregation costs are incurred by mu- nicipal authorities, while transportation costs are borne by builders or owners. Lack of awareness, recycling techniques, and the non-availability of recycled products are cited as barriers to recycling in India

II. LITERATURE REVIEW

2.1 Construction waste management in India (Job Thomas, Wilson P.M)

The construction industry worldwide generates vast amounts of waste, including inert and non-biodegradable materials like concrete, wood, metal, and bricks. This waste poses significant challenges such as traffic congestion, environmental imbal- ance, and improper waste management practices. Despite successful waste recy- cling efforts in countries like the UK, USA, France, Denmark, Germany, and Japan, India lags behind in utilizing construction waste effectively. This paper reviews the current state of waste generation in the Indian construction sector, highlighting the need for resource-efficient practices. It discusses waste disposal methods, empha- sizing the importance of the '3R' concept - Reduce, Reuse, Recycle. Additionally, it explores measurement and approval standards for green buildings, advocating for sustainable development practices in the construction industry.

2.2 Construction and demolition waste management contributing factors coupled with reduce, reuse, and recycle strategies for effective waste management:

A Review (Kamyar Kabirifar, Mohammad Mojtahedi, Changxin Wang, Vivian W. Y. Tam) Construction and Demolition Waste (C&DW) management is a critical aspect of sustainable development due to its significant environmental impacts and implica- tions for the construction industry's efficiency. This research paper aims to system- atically analyze and address the managerial issues associated with C&DW to en- hance its effective management. Through a comprehensive review of 97 relevant research papers, this study categorizes key factors affecting C&DW management into two main areas: the C&DW management hierarchy (reduce, reuse, recycle strategies) and effective C&DW management contributing factors (sustainability perspective, stakeholders' attitudes, project life cycle, management tools). By ex- amining these factors in detail, the paper provides insights into current and future practices of C&DW management from both academic and practical perspectives.

The conclusions drawn emphasize the persistent challenges of inefficient C&DW management and the need for effective strategies to preserve resources and prevent environmental degradation. The paper advocates for the simultaneous application of C&DW management hierarchy and effective contributing factors to improve C&DW management practices. Furthermore, it lays a strong foundation for future

research in C&DW management by identifying key research gaps and providing a reference for scholars and practitioners to enhance their understanding and perfor-mance in managing C&DW effectively

2.3 Construction and Demolition waste in india generation rates implications of C & D recycling:

The article delves into the emerging concern surrounding the management of Con- struction and Demolition Waste (C&DW) in India, highlighting the need for effective policies to address this issue. It utilizes a comprehensive approach, employing top-down material flow analysis to estimate the generation of C&DW across various sec- tors within the country.

Firstly, the study examines C&DW generation from three main sectors: urban build- ing, rural building, and non-building sectors. It finds that the amount of C&DW gen- erated in India in 2016 ranged between 112 and 431 million tonnes, depending on certain assumptions made during the analysis. These estimates significantly exceed official records, indicating a potentially underestimated problem.

One notable finding is the disparity in waste generation between urban and rural areas. While per capita waste generation is lower in rural regions, the sheer size of the rural population results in higher overall waste generation compared to urban areas. This insight challenges conventional assumptions and underscores the importance of ad- dressing C&DW management in both urban and rural contexts.

Furthermore, the study evaluates the potential benefits of formal C&DW recycling. Itsuggests that recycling initiatives could lead to significant savings of natural minerals, such as sand and aggregate, in urban areas, potentially ranging from 2% to 8%. How- ever, the analysis reveals a nuanced aspect of recycling: while it may conserve certain resources, it also has implications for energy consumption and emissions. Surpris- ingly, the study finds that energy and emissions savings from C&DW recycling were negative. This counterintuitive result suggests that recycled materials may require more resources and have a greater environmental impact compared to their natural counterparts. This finding underscores the need for a holistic approach to evaluating the sustainability of recycling practices, taking into account not only resource conser- vation but also energy consumption and environmental implications.

III. CASE STUDY

Overview of the waste disposal and recycling in the Malaysian construction industry and the rest of the world

In the first part, an overview of the construction and demolition waste practices adopted by the world, particularly the developed countries, are presented. In the European Union territories, construction and demolition (C&D) waste constitute a significant fraction of all kinds of wastes. Therefore, the European Commission urged the member states for the reconciliation of the existing to deal with the C&D waste. It is suggested that the revised practices should consider the complete value chain [9]. For taking into consideration of the entire value chain, creating a linkage between the core principles and best practices is an important aspect. Islam et al. [13] compared the construction waste generation and management in Bangladesh with the developed countries, i.e., the European Union. According to them, the construction waste generation in Bangladesh is very high as compared to the developed world. The identified reasons for the high rate of generation are public awareness is weak, no clear policies for enforcement of the law, lack of community sensitization, and the adoption of old technologies. Islam et al. [13] mentioned that although in European countries, the construction waste generation is much lower (roughly 25–30% of solid waste); however, they managed it very well. It is estimated that by 2020, reuse, recycling, and recovery will reach 70% by weight for non-hazardous and other materials from C&D waste. Tam and Lu [23] have done a comparative analysis of the construction waste management profiles, practices, and performance in Australia, Europe, Hong Kong, and the United Kingdom. The analysis showed that Hong Kong generates about 1.3 million tons of construction and demolition waste per year, whereas, China generates more than two billion tons year, which about 40% of the total municipal solid waste, the rate of recovery of such waste is about 55%. Tam and Lu [23] introduced an indicator in the form of a ratio (CDW/CGDP defined as tons/mUS$) between the annual generation of construction waste (million tons) and the total construction GDP (million US dollars). The analysis showed that the CDW/CGDO for Australia was found between 28.48 and 44.04, for

Europe 47 to 58.89, for UK 34.29 to 51.53, and for Hong Kong 39.85 to 120.86. It can be concluded that most of the developed countries have shown a declining trend in waste generation. The main causes of such achievement are that the developed countries have done a lot for promoting a green environment that has been paid off. Currently, in Peninsular Malaysia, approximately 95–97% of solid wastes (including construction and demolition (C&D) waste) collected are dumped at the disposal sites, on the balance of 3 to 5% are treated either using incineration technique or recycled and reprocessed [1]. The rate of recycling of C&D waste is quite low as compared to the developed countries, which is most likely due to the lack of data and the culture. [6] opined that applying a fully quantitative approach in decision making in developing countries is quite challenging due to a lack of information and a variety of data, which is often being used in developing countries.

IV. CONCLUSION

1. The perception and understanding of the construction industry professionals regarding the construction waste management were assessed using questionnaires survey. The majority of respondents (>70%) believed that about 10% to 20% of the construction waste generated at their site could be reused in their project whereas about 5% of respondents thought that more than 50% of the waste generated at their site could be reused in their project. In, there is a lack of information regarding the quantity of C&D waste reused and or recycled. The responses showed that the low rate of reuse and recycling of waste is due to many issues and challenges. The dominant issues are contamination, quality of waste, challenges in collection and transportation, and difficulties in sorting, transforming, and disposing of wastes.

REFERENCES

[1] Afroz Rafia, Masud Muhammad Mehedi. Using a contingent valuation approach for improved solid waste management facility: Evidence from Kuala Lumpur, Malaysia. Waste Manage 2011;31(4):800–8.
[2] Aibinu AA, Jagboro GO. The effects of construction delays on project delivery in the Nigerian construction industry. Int J Project Manage 2002;20(8):593–9.
[3] Al-Ansari Nadhir. Locating landfills in an arid environment. J Earth Sci Geotech Eng 2013;3(3):11–24.
[4] Al-Hajj Assem, Hamani Karima. Material waste in the UAE construction industry: Main causes and minimization practices. Architect Eng Des Manage 2011;7(4):221–35.
[5] Behera Monalisa, Bhattacharyya SK, Minocha AK, Deoliya R, Maiti S. Recycled aggregate from C&D waste and its use in concrete–A breakthrough towards sustainability in the construction sector: A review. Constr Build Mater 2014; 68:501–16.
[6] Ciplak Nesli. Assessing future scenarios for healthcare waste management using a multi-criteria decision analysis tool: A case study in the Turkish West Black Sea Region. J Air Waste Manag Assoc 2015;65(8):919–29.