

Identification and Analysis of Challenges Faced in the Collection, transportation and Disposal of c&d Waste Management in India

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ABSTRACT

In India, managing the garbage from construction and demolition (C&D) projects is a major logistical and environmental concern. This study looks at the various challenges that arise when C&D garbage is collected, transported, and disposed of in India. This paper explores the main obstacles to sustainable waste management techniques by identifying them through a thorough analysis of the body of research and practical evidence.

According to the report, the main barriers to efficient C&D waste management are a lack of awareness, legislative limitations, and inadequate infrastructure. Furthermore, the issue is made worse by limited recycling facilities, ineffective logistics, and the predominance of unofficial disposal techniques, which endangers human health and the environment.

The study suggests strategic interventions to solve these issues, such as better regulation enforcement, investments in cutting-edge waste processing technologies, and increased public awareness campaigns, based on case studies and expert perspectives. The study also emphasizes how crucial policy consistency and stakeholder participation are to creating a sustainable environment for C&D waste management.

This study adds to the continuing conversation on environmentally conscious urban development and sustainable urban development by illuminating the intricacies of C&D garbage management in India. It offers insightful information to practitioners, politicians, and other interested parties who are involved in developing and putting into practice plans to lessen the negative impacts that building and demolition operations have on the environment and public health.

Keyword: - C&D WASTE, RELATIVE IMPORTANCE INDEX, CHALLENGES

1. INTRODUCTION

Construction and demolition (C&D) operations have significantly increased in India as a result of the country's fast urbanization and infrastructural development. Although economic growth is fueled by this expansion, a significant amount of garbage is also produced. This garbage, sometimes referred to as C&D waste, consists of leftover materials, debris, and rubble from building, remodeling, and demolition projects.

One major issue facing Indian municipalities is the handling of construction and demolition debris. According to current estimates, India accounts for 35–40% of the world's C&D garbage creation, producing an astounding 150 million tones (MT) of C&D waste annually. India's C&D waste recycling rate is still shockingly low, at about 1%, notwithstanding current laws and measures. Numerous negative environmental effects result from this ineffective management approach, such as uncontrolled debris burning, soil and water contamination, and landfill overflow.

This study explores the intricacies involved in managing construction and demolition trash in India. We will examine how C&D waste is currently generated, examine the obstacles to efficient management techniques, and assess the frameworks and policies in place. The study will also look into possible remedies, such as encouraging waste segregation at the source, creating an effective infrastructure for collection and processing, and investigating cutting-edge technologies for the recycling and reuse of C&D waste. This article intends to provide important insights for stakeholders, industry professionals, and policymakers working towards a more sustainable C&D waste management system in India by critically assessing these factors.

1.1 NEED FOR STUDY

For a number of complex and important reasons, research on the difficulties encountered in the gathering, moving, and disposing of construction and demolition (C&D) debris in India is necessary.

Impact on the Environment: Improper management of C&D waste considerably adds to environmental deterioration. Inadequate disposal practices can cause habitat destruction, air pollution, and contamination of water and soil. Analyzing the difficulties aids in determining how to lessen these effects.

Public health concerns: Unhealthy waste management techniques may put the communities surrounding at risk for diseases. Hazardous compounds like asbestos and lead that are present in C&D trash can cause respiratory disorders, contaminate water supplies, and cause other health problems. By being aware of the difficulties, public health protection measures can be put into action.

Economic Repercussions: Businesses and the government may suffer financial losses as a result of ineffective waste management techniques. For instance, when things that could be recycled or used again end up in landfills, resources are squandered. Stakeholders can create affordable solutions that support sustainable waste management practices by recognizing obstacles.

Legal Compliance: The Construction and Demolition Waste Management Rules, 2016 are one of the policies that India has in place for the management of C&D waste. Examining the difficulties can guarantee that interested parties abide by these rules and stay out of trouble with the law.

Urban Development: The production of construction and demolition (C&D) trash is anticipated to rise sharply in India due to the country's fast urbanization and infrastructural development. In order to construct sustainable urban areas, it is essential to comprehend the difficulties in controlling this waste stream.

Prospects for Innovation and Research: Examining the difficulties in the management of construction and demolition waste offers chances for creativity and the creation of novel systems, procedures, and regulations. This may result in waste management techniques that are more sustainable and effective in India and elsewhere.

2. OBJECTIVES

- List and group the several difficulties that arise during the C&D waste management processes of collection, transportation, and disposal.
- Evaluate the success of the actions, rules, and policies in place now to address India's C&D waste management issues.
- Interact with stakeholders, such as governmental bodies, building firms, waste management authorities, and environmental associations, to obtain viewpoints and insights into the difficulties associated with C&D waste management.
- Make recommendations for future directions for study and policy formation to improve India's sustainable C&D waste management.

3. RESEARCH METHODOLOGY

Introduction: Construction and demolition (C&D) operations have increased dramatically in India due to the country's fast urbanization and infrastructural development; as a result, the country produces about 150 million tons of garbage annually. On the other hand, insufficient recycling practices cause serious environmental damage, such as landfill overflow and pollution from burning waste.

Qualitative Data gathering Techniques: To obtain information from professionals and industry experts with a significant amount of expertise in the construction business, use qualitative data gathering techniques like questionnaire surveys. These questionnaires ought to be made with the purpose of gathering pertinent information about cultural influences and project delays.

Secondary Data Collection: To complement the primary data gathered through surveys, collect secondary data from relevant sources such as studies and reports. Your study findings may receive further context and support from secondary data.

Likert Scale: To rank and examine the collected data, employ a 5-point Likert scale technique. This scale can be used to measure respondents' attitudes and views of the several cultural elements that cause delays in projects.

Data analysis: Examine the gathered information to find trends, patterns, and connections pertaining to the cultural aspect of project delays in the Indian building sector. To properly understand the data, use both statistical procedures and qualitative analysis methodologies.

Conclusion and Suggestions: Make judgments depending on how the information was analyzed. Provide a summary of the most important discoveries and understandings about the connection between cultural variables and project delays. Lastly, offer suggestions for resolving cultural issues and enhancing project management procedures in the Indian construction industry in light of these findings.

Table 1 ANALYSIS OF RELATIVE IMPORTANCE INDEX

S R. N O.	FACTORS	STRONGLY AGREE	AGREE	NEUTRAL	DISAGREE	STRONGLY DISAGREE	TOTAL RESPONSE	RII	RANK (IMPORTANCE)	CLASSIFICATION
1	need for stricter regulations	25	17	3	1	0	46	0.887	1	High Impacting Factors
2	Collaboration between construction companies,	22	21	1	1	0	46	0.865	2	
3	needed to promote recycling and reuse	17	27	1	1	0	46	0.861	3	
4	Strict enforcement	17	25	2	2	0	46	0.848	4	

	t of penalties									
5	Public participation is crucial	19	20	5	2	0	46	0.843	5	
6	Conducting regular waste audits	14	26	5	1	0	46	0.830	6	
7	adoption of innovative technologies	16	24	2	4	0	46	0.826	7	
8	need for capacity building and training	12	30	2	2	0	46	0.826	8	
9	Collaboration between different disciplines	16	24	1	5	0	46	0.822	9	
10	Lack of awareness	11	30	3	2	0	46	0.817	10	
11	Construction companies actively engaging in CSR initiatives	13	27	4	1	1	46	0.817	11	Medium Impacting Factors
12	valuable resource in a circular economy.	14	25	4	2	1	46	0.813	12	
13	Limited access to recycling facilities	10	30	4	2	0	46	0.809	13	
14	Local communities should actively participate	10	30	3	3	0	46	0.804	14	
15	Insufficient coordination among stakeholders	8	32	4	2	0	46	0.800	15	
16	Establishing public reporting systems	13	23	8	1	1	46	0.800	16	
17	Compliance with	8	31	5	2	0	46	0.796	17	

	disposal regulations									
18	C&D waste management initiatives are essential	13	24	4	5	0	46	0.796	18	
19	lack of community involvement	10	28	4	4	0	46	0.791	19	
20	Public attitudes towards proper disposal	6	31	7	2	0	46	0.778	20	
21	Land use conflicts, such as restrictions	5	32	7	2	0	46	0.774	21	Low Impacting Factors
22	Limited financial resources	4	35	3	3	1	46	0.765	22	
23	Efforts to raise public awareness	5	32	5	3	1	46	0.761	23	
24	Tight construction project schedules	7	26	7	5	0	45	0.739	24	
25	Educational programs aimed	7	25	8	5	1	46	0.739	25	
26	Lack of designated disposal sites	5	23	8	9	1	46	0.696	26	
27	Government policies adequately support	6	14	16	8	2	46	0.661	27	
28	valuable resource rather than a burden.	1	20	10	14	1	46	0.626	28	
29	Adequate provisions for waste	2	18	8	15	2	45	0.600	29	
30	Current methods are effective	2	13	13	14	4	46	0.578	30	
31	Regulatory measures	0	11	10	21	4	46	0.522	31	

32	Transportation of c&d waste	0	11	12	14	9	46	0.509	32
33	Sufficient Infrastructure for c&d waste	1	8	8	21	8	46	0.483	33
34	Public awareness	3	6	7	15	15	46	0.457	34

There is a need for stricter regulations to ensure compliance with C&D waste management guidelines.
46 responses

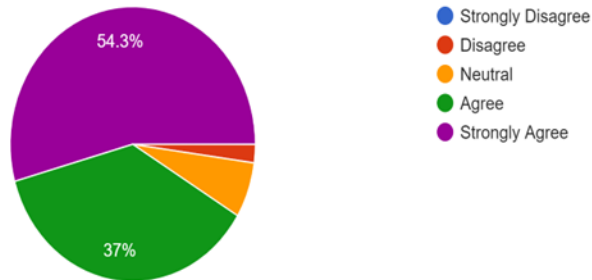


Figure 1 RESPOSE CHART 1

Collaboration between construction companies, government bodies, and waste management organizations is essential for effective C&D waste management.
45 responses

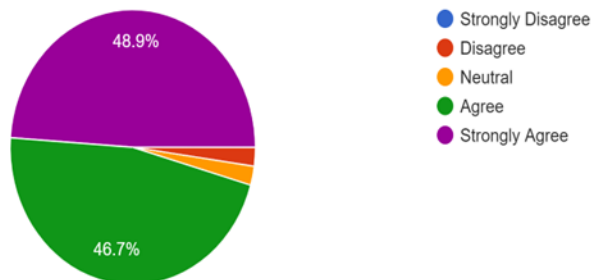


Figure 2 RESPONSE CHART 2

More initiatives are needed to promote recycling and reuse of C&D waste materials.
46 responses

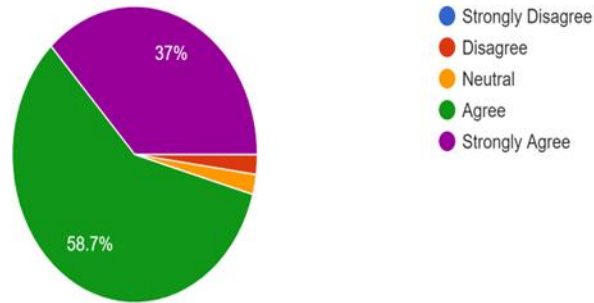


Figure 3 RESPONSE CHART 3

Strict enforcement of penalties for non-compliance with C&D waste management regulations is necessary.
46 responses

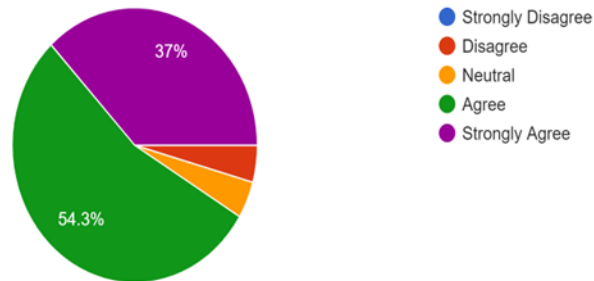


Figure 4 RESPONSE CHART 4

From RII table, we conclude that “There is a need for stricter regulations to ensure compliance with C&D waste management guidelines” has highest RII value of “0.887” with a rank of 1.

From the RII table, the factor i.e., “Public awareness about proper C&D waste disposal is high.” has scored lowest RII value of “0.457” with a rank of 18.

All these ranks are being calculated from the responses received from the industry professionals spread across in different organizations working in Indian projects.

Classification has been made on the basis ranking by considering both values RII.

4. RECOMMENDATION AND BEST PRACTICES

Make a thorough survey: To find out the present situation of C&D waste management in different parts of India, start by performing a comprehensive survey. This should involve evaluating the amount and kinds of waste produced, the infrastructure currently in place for collection and transportation, disposal locations, and regulatory frameworks.

Engage stakeholders: Participate in the identification and analysis process with all pertinent parties, such as government agencies, local governments, construction companies, waste management authorities, and the general public. This guarantees a cooperative approach and facilitates gaining support for putting proposals into practice.

Use technology: Accurately mapping the hotspots for the development of construction and demolition trash, streamlining collection routes, and keeping an eye on disposal locations can all be facilitated by implementing cutting-edge technologies like Geographic Information Systems (GIS), remote sensing, and data analytics.

Investing in capacity building programs can help staff members involved in the management of construction and demolition waste learn best practices, safety procedures, and how to operate machinery and equipment correctly. This enhances productivity and lowers the possibility of mishaps and environmental dangers.

Encourage garbage to be separated into recyclable and non-recyclable materials at the source by directing construction sites and demolition projects to do so. This makes processing simpler and lightens the load on disposal locations.

Put in place regulatory measures: Strictly enforce rules and regulations for the management of construction and demolition waste, including obligatory reporting obligations, penalties for non-compliance, and rewards for embracing sustainable techniques. This guarantees adherence to standards and establishes accountability.

Promote public awareness: Educate the broader public on the significance of appropriate C&D waste management and the risks to the environment and human health that come with inappropriate disposal. Community outreach initiatives, workshops, and educational campaigns can all help achieve this.

Encourage recycling and reuse: In new building projects, encourage the recycling and reuse of C&D waste materials including metal, concrete, and bricks. This decreases the impact on the environment and saves resources by lowering the requirement for virgin materials.

Dedicated facilities should be established for the recycling and disposal of construction and demolition waste. These facilities should be outfitted with cutting-edge technologies to enable the efficient sorting, processing, and recycling of a wide range of waste materials. This supports a circular economy strategy and helps remove garbage from landfills.

Constant monitoring and assessment: Make use of performance metrics and feedback systems to keep an eye on and assess the success of C&D waste management programs. This enables prompt modifications and enhancements in response to lessons discovered and evolving situations.

Managing construction and demolition wastes requires adherence to the Construction & Demolition Waste Management Rules, 2016 and waste segregation at the source. In order to be used in municipal and government contracts, the CDWMR also outlines the obligations to purchase and employ 10–20% items made from building and demolition waste.

Use of C&D trash, along with pick-up locations, should be included in the RFP as BOQ items for road construction, fill section use, landscaping, and other uses. Contractors implementing C&D waste in situ/in project are eligible for incentives.

5. CONCLUSIONS

The complicated issues of C&D waste management in India have been illuminated by this study, which also highlights the major obstacles to the adoption of sustainable techniques in garbage collection, transportation, and disposal. The recognized flaws—such as insufficient awareness, weak laws, and poor infrastructure—lead to a system that depends on unofficial dumping and is devoid of adequate recycling facilities. These actions seriously endanger both the environment and human health.

A multifaceted strategy is recommended by the research to solve these issues. A more effective and ecologically friendly C&D waste management system may be achieved by investing in cutting-edge waste processing technologies and enforcing current rules more strictly. Campaigns for public awareness are essential to encouraging stakeholders to manage garbage responsibly. Building a sustainable framework for C&D waste management also requires promoting policy coherence and motivating active engagement from all stakeholders, including governmental organizations, building firms, and individuals.

By giving policymakers, practitioners, and other stakeholders useful insights, this study adds to the ongoing conversation about sustainable urban development. By putting the recommended interventions into practice, India can take a step toward a more sustainable future in terms of managing construction and demolition waste, reducing the detrimental effects of these activities on the environment, and protecting public health.

6. REFERENCES

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