

Construction & Demolition Waste Management Practices in Construction Industry in Vadodara

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Abstract: Construction is a vital connection to the infrastructure and growth of industry in India. Building roads, bridges and other constructed facilities play an important role in shaping country's future. Consequently, the construction Industry produces a vast quantity of waste which is environmentally unfriendly, and costly to project budgets & Affect the Project estimated cost. this thesis aimed to find out how much construction waste is affecting construction project budgets, and attempted to make recommendations to the industry on how profits can be maximized and how the waste can be minimized and carry out a methods for reduce and recycling the waste due to construction industry material wastage resulted in the huge financial setbacks to builders, contractors, regional authorities and also to the country To begin with the issue there is no proper estimate regarding the quantity of waste occurs in Vadodara.

Key Words: Waste management, Demolition, Construction, Cost overrun, Wastage

INTRODUCTION:

Development of infrastructural facilities is accompanied by construction, remodelling and demolition of buildings, roads, bridges, flyover, subways, runways, factories and other similar establishments. The waste generated mainly consists of inert and non-biodegradable materials such as concrete, plaster, wood, metal, broken tiles, bricks, masonry etc. These wastes are heavy, having high density, very often occupy considerable storage space either on road sides or communal waste bin. Waste from small generators like individual house construction or demolition; find its way into the nearby municipal bin, waste storage depots, making the municipal waste heavy and unsuitable for further treatment like composting or energy recovery. Sometimes the wastes from small projects are buried in the site itself, forming an impervious layer, which adversely affect the growth of vegetation, prevent the infiltration of surface run off into the ground water table and lead to high level of environmental imbalance.

The present waste handling practices adopted by the construction industry in India at different levels are

- Items recovered during construction /demolition is sold in the market at a discount rates.
- The feasibility of recycling is not even considered seriously in most cases Items that cannot be re-used are used for filling the land
- Landfill tax is not imposed by the municipality.
- The waste is disposed without segregation.

For the purpose of management of C&D Wastes in India, Construction and demolition waste has been defined as 'waste which arises from construction, renovation and demolition activities. Also included within the definition are surplus and damaged products and materials arising in the course of construction work or used temporarily during the course of on-site activities.

REVIEW OF LITERATURE:

Park, J.W., Cha, G.W., Hong, W.H. & Seo, H.C. 2014(1) Waste is the unnecessary depletion of the natural resources, unnecessary costs and environmental damage which can be avoided through improved waste ethics. The Waste Framework Directive has defined waste as "any substance or object the holder discards, intend to discard or required to discard". Once a material falls within this definition it will remain waste until it is fully recovered and is no longer a threat to the environment and human health. After this point, it will no longer be subjected to the controls of the directive .Construction waste can be closely defined as debris of construction and demolition. Specifically, construction waste refers to solid waste containing no liquids and hazardous substances, largely inert waste, resulting from the process of construction of structures, including building of all types (both residential and non-residential) as well as roads and bridges. The building industry consumes a considerable amount of resources. Those resources include valuable natural assets like timber and metal. Indeed, there is a large portion of

the materials being wasted because of poor material control on building sites

Job Thomas, Wilson P. M.(3) All over the world, the growth of construction industry is enormous in the past decade. The pace of generation of C&D waste is also significant. In general, there are two sources for generation of waste materials, namely, bulk generators and retail or small generators. The classification of sources is given in Fig 1. The infrastructure development sector and real estate sector are the bulk generators of waste. Construction and repair of roads, bridges, flyovers etc. are classified under infrastructure development sector. Real estate sector consists of housing, industrial, and commercial building construction, demolition of unauthorized structures etc. Small commercial enterprises and individual house building teams are considered as retail or small generators. The contributors of C&D waste in a project are given in Fig 2.

Harish. P. Gayakwad, Neha. B. Sasane 2015(4) Asian institute of technology, Thailand had conducted a survey in various Asian countries and prepared a report regarding the construction and demolition waste management in May 2015. The study includes Asian countries like Bhutan, Japan, Hong-Kong SAR, China, Thailand and others including India. The following pie chart shows the status of construction and demolition waste in Asian countries. Figure 1 shows the status of construction waste in Asian country. At the beginning it is said that there is no adequate or satisfactory data for accessing to this issue. This is because there is no separate regulatory framework for handling the construction and demolition waste management in India, as it is considered in the municipal solid waste management. Due to which it is getting difficult to access the information or to handle the construction and demolition waste management. As report prepared by the MoEF (Ministry of Environment and Forest) in 2013 estimated that 0.53 million tonnes/day of waste is generated in the country. On that basis the 210 million tonnes of MSW is produced annually, table 1 shows the estimate prepared by central government of India. But as per the world bank report says Asian countries produces around about 1000kg per capita per day, it means the figure which stated by the MoEF is very less than the world bank report figure. This shows in India is underestimating the construction and demolition waste handling. The figure 2 with graphical representation shows construction and demolition waste production per day in Indian cities.

Mr. Abhimanyu Sing (2014) has studied the waste management status & health effects in Agra city, according to his study, Increasing urbanization and industrialization in Agra city are responsible to increase the generation of

waste. Proper management of waste by the government organization has not been operative and is a bit poor in the urban center. The amount of uncollected waste is likely to increase day-to-day with increasing urbanization. Among the possible consequences, it is clear that the two clear options for effective solid waste management is either centralized or decentralized. However, to achieve financial solid waste management, so there is a need to systematically analyse through the strengths and weaknesses of the community as well as the municipal corporation founded on which an effective decentralized system can be progressed with the contribution of various stakeholders in Agra city. Sensitization of the community is also vital to achieve the above objective. The public can be altered by awareness campaigns and educational measure. We need to act fast as the city is already a breeding ground of many infectious diseases most of which are caused by inefficient waste management. To avoid any epidemic, to make the city healthy, economic, and environmentally sustainable, there is an urgent need for strategic waste management plan and a strong implementation for the same (Abhimanyu Singh *et al.*, 2014).

M.N. Akhtari (2014) Solid waste management is certainly not a stand-alone system. Systems analysis is one of the ways for looking at its complexity and linkages with surrounding. In this study, an approach has been tried by control point defining the basic complications in waste disposal. This resulted in a broad analysis that primarily, identified the links between the solid waste streams and their surroundings, and moreover, illustrated the magnitude of environmental consequences related with the whole system. Another important issue is the large impact of untreated waste on the environment. In few cases, this impact is more dominating the total picture of an enhanced waste management system. The decrease of untreated waste through better measures and an improved waste collection system was identified to be the key if significant change is attempted to. It has found that, utilizing of solid waste in CEC Industry helps full in reducing the impact of solid waste on environment. There is a remarkable scope for setting up industries for recycling and using such huge quantity of solid wastes as resources in the production of construction materials. Already, Fly Ash has become significant raw material for various industrial applications. Also it widely used in manufacturing of cement, bricks, cement products and roads construction etc. The alternative building materials obtained from industrial, and mining solid wastes have plenty of scope for introducing new building components that will also satisfy economical aspect of construction to some extent. Finally, the way of looking at solid waste management with a broader perspective, is a prospective

approach to achieve more just analysis and introduce a rational, operative and integrated policies and programs; systems in developing countries (Akhtari 2014).

Sara/Bergqvist (2006) According to his study there is a plan for waste controlling in Industrial division, Mable. The current plan is basic & but the implementation is not up to the mark; the waste is not collected on a regularly and there is no sufficient of waste workers. Some of The main reasons for the reduced waste management are a poor practice among the people, lack of priority among, politicians, & corruption, poverty. The main health problems caused due to poor waste management are diarrhea, malaria and injuries. The society needs to take responsibility for the people by prioritizing the common properties. Sustainable and long lasting solutions on this area are grounded in fighting poverty & corruption. Common goods like infrastructure & education is a requirement for an operative health promotion work. Health promotion work should be based upon authorization with regards taken to the people’s economic and social conditions. Respect must be given for individual and cultural means. A

Highlight wants to be put on educating women to fight the inequalities and to improve the hygiene. If investments are done in these areas then there will be great improvements to attain people’s health and in development of the nation.

Major Finding:

- The study suggests that design stage has the most decisive impacts on construction waste minimisation.
- It tells about the factors that are leading to the increase in wastage in construction.
- The importance of reduce, reuse and recycle (3R) concept for managing the construction waste in India.
- Current global status of construction and demolition waste management is overviewed and also the sustainable waste management hierarchy is studied so to overcome the waste problem.

Table-1: Identified Factors Affecting Construction & Demolition Waste in Construction Project

Construction & Demolition Waste Factors In Construction Project	
1.Design	
1)	Frequent design changes
2)	Design errors
3)	Lack of design information
4)	Poor design quality
5)	Slow drawing distribution

6)	Complicated design
7)	Inexperience designer
8)	Interaction between various specialists
2.Handling	
1)	Wrong material storage
2)	Poor material handling
3)	Damage during transportation
4)	Poor quality of materials
5)	Equipment failure
6)	Delay during delivery
7)	Tools not suitable
3.Worker	
1)	Worker’s mistakes
2)	Incompetent worker
3)	Poor attitudes of workers
4)	Damage caused by workers
5)	Insufficient training for workers
6)	Lack of experience
7)	Shortage of skilled workers
8)	Inappropriate use of materials
9)	Poor workmanship
10)	Worker’s no enthusiasm
11)	Abnormal wear of equipment
12)	Too much overtime for workers
4.Management	
1)	Poor planning
2)	Poor site management
3)	Poor controlling
4)	Poor supervision
5)	Inappropriate construction methods
6)	Lack of coordination among parties
7)	Poor information quality
8)	Late information flow among parties
9)	Scarcity of equipment
10)	Resources problem
11)	Rework
12)	Waiting periods
13)	Communication problems
14)	Outdated equipment
15)	Lack of waste management plans
16)	Non availability of equipment
17)	Lack of environmental awareness
5.Site condition	
1)	Leftover materials on site
2)	Poor site condition

3) Waste resulting from packaging
4) Congestion of the site
5) Lighting problem
6.Procurement
1) Ordering errors
2) Error in shipping
3) Mistakes in quantity surveys
4) Ignorance of specifications
5) Waiting for replacement
7.External
1) Effect of weather
2) Accidents
3) Pilferage
4) Vandalism
5) Damages caused by third parties
6) Festivities
7) Unpredictable local conditions
8) Unpredictable local conditions
9) Lack of legislative enforcement

Table -2: Waste Identification for the Construction waste Management as per the Literature Review

Sr. No	Representatives	Findings
1	Job Thomas, Wilson P. M.	Waste minimization and waste management programs are in its infancy in India. It is possible to minimize the volume of C&D waste generated by identifying the potential waste early in the design.
2	Harish.P.Gayakwad, Neha. B. Sasane	Separation of C & D waste should be promoted at source and an institutional mechanism for waste collection should be established involving informal sector who can be trained to separate the waste into categories and also do some amount of use, reuse and reprocessing like making

		tiles from crushed construction debris.
3	Mahlet tesfayehaile, Yudhi dwi hartono	Indicates that current practice of case area's CDWM focused on sorting and recycling.
4	Ajayi, S.	investigate the critical success factors and underlying measures for mitigating waste in construction projects
5	Rohit Bhagwat	To improve environment and meet regularly controls and reduce rising cost of project cost.
6	Milad Najafy	The amount of generated construction and demolition waste materials, feasible to reduce and reuse the generated construction and demolition waste on the construction site, rather than separating them and recycling.
7	Minaxi Rani, Alisha Gupta	There should be fixation of standards that can be used for how much % waste can be utilized. Information regarding C & D generation, Regulatory framework and procedures should be known by all the public.
8	Markandeya Raju Ponnada, Kameswari	the properties of demolition waste, its hazardous effects and suggests safe recycling/reuse/disposal methods
9	Sakshi Gupta, Malik RK	To economize the resources from the earth such as river sand, stone, soil, etc. and energy to protect the environment

		from various pollutants, C & D waste management requires to be focused upon wastage and estimated cost.
10	Jianguo Chen, Yangyue Su	Considering that most of the existing research investigated the recycling of CDW from a single participant's perspective, more research is needed to explore multi-sectoral participation and collaborative governance.
11	Pintu Badatiya, Prof. Dr.H.R.Patel, Asst. Prof. N.B.Yadav	All the stockholders who are directly dealing with the sites and handling the material they should have detailed legislations and information, So in future optimal utilization can be done and saving rate also increase.
12	Priyadarshi H. Sawant, Sameersinh V. Alone	The construction activities generate considerable amount of C&D waste that ultimately goes to land fill spaces and dumping yards and is accounted for 30% of total volume received.

Conclusion: The Construction and Demotion Waste is a major issue to control the estimated cost of a project and is also environment unfriendly. The literature review helped us to find out the various reasons of waste on construction site to some extent and it also helped us to determine the key reasons that directly affects the estimated cost of a the project.

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