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A Review on Waste Management Techniques in Construction Industry

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ABSTRACT:

The construction industry has been a significant contributor to waste generation. In earlier days, the wastages were disposed of in open dumps or by burning. Now a days, the construction industry is shifting towards sustainable practices, including waste reduction, reuse, and recycling. The aim of the study is to review the waste management techniques and the methodologies that are adopted in various construction works. This study helps in identifying the gaps and reducing the wastes in construction. The various methodologies are adopted by different authors for minimizing the construction industry waste based on Mixed Method Approach, Prefabrication, Accumulation Method, Global Index Method, Waste index method, BIM (Building Information Modelling), DOI (Drop of Waste) Method, Simple Random Sampling Approach. This study helps in developing standardized protocols and guidelines that contributes to the understanding of the environmental impact of building construction practices in terms of waste generations. Based on the various methodologies mentioned, Building Information Modelling (BIM) is considered one of the most advantageous methods for minimizing construction waste because it improves accuracy, optimizes the material usage and the BIM's clash detection minimizes rework, which is a significant contributor to construction waste. The result of this study is to demonstrate the necessity of developing a conceptual framework by using BIM, as a next research initiative, consisting of these different factors for CDWR.

Keywords: Construction and demolition waste (CDW); waste reduction factors; sustainability; BIM-technologies; Information technologies.

INTRODUCTION

- The construction industry has been a significant contributor to waste generation. In earlier days, the wastages were disposed of in open dumps or by burning. Now a days, the construction industry is shifting towards sustainable practices, including waste reduction, reuse, and recycling.
- Despite these efforts, the construction industry continues to generate massive amounts of waste. According to the United States Environmental Protection Agency (EPA), construction and demolition waste accounts for approximately 25% of the country's total waste generation. [1]
- In recent years, the construction industry has shifted towards sustainable practices, including waste reduction, reuse, and recycling. Building Information Modeling (BIM), circular economy principles, and sustainable materials are just a few approaches being adopted to reduce waste and promote resource efficiency. [4]
- Non-renewable raw natural resources are subject to increasing pressure from the global construction boom and it has become vital to maximize the use of these natural resources to ensure sustainable construction methodologies is essential to minimize construction waste so housefathers were adopted some strategies to minimize the construction waste. They have collected the data by survey questions asking for the respondents' demographical data, front-end site waste reduction strategies and potential sources of physical waste on construction sites. [2]
- This research aims to explore the current state of waste management in the construction industry, examining the challenges, opportunities, and best practices in reducing waste and promoting sustainability. By examining the history and background of waste management in construction, this research seeks to contribute to the development of more effective and sustainable waste management strategies in the industry.

Literature Review

- Waste in construction materials represents a various problem for the Egyptian construction industry. In Egypt, up to 40% of total construction materials cost is wasted because of this waste generation, this is equivalent to 16 of total building cost (i.e. labor and materials cost), So it is essential to know the factors which are affecting on construction and demolition waste. These authors found some main factors which will help in CDWR as waste efficient materials procurement measures, awareness measures, culture & behavior measures etc. The

detailed study aims of this paper are to determine the perceptions and attitudes towards the CDW problem in Egypt and to rank the different IDVs based on their effectiveness and applicability in the Egyptian construction sector and to examine the relationships between the different IDVs and the DV. They found that, most of the dumping sites are unsafe and marked by the non-existence of sufficient precautions to prevent the self-ignition of waste, leading to environmental pollution. The biodegradation of CDW in landfills results in severe health and environmental problems.

- Non-renewable raw natural resources are subject to increasing pressure from the global construction boom and it has become vital to maximize the use of these natural resources to ensure sustainable construction methodologies is essential to minimize construction waste so housefathers were adopted some strategies to minimize the construction waste. They have collected the data by survey questions asking for the respondents' demographical data, front-end site waste reduction strategies and potential sources of physical waste on construction sites. This paper evaluates front-end strategies to minimize physical site waste on Australian projects. Front-end strategies are those practices at the initial phase of the material logistics chain that will reduce or totally remove site waste, rather than simply treat the residual waste product. The research findings showed that 52% of responses were within the 'management' theme, 26% were within the 'design' theme and 10% were within the 'procurement' theme.
- Construction industry is one of the primary sources of entropic elements such as CDW which is a part of economic and social development in a country. Despite these efforts, the construction industry continues to generate massive amounts of waste. And they mentioned that according to the United States Environmental Protection Agency (EPA), construction and demolition waste accounts for approximately 25% of the country's total waste generation. They have collected the information from the primary and secondary sources, which includes 265 surveys, interviews, and visits to construction and disposal sites. It aims to recognize the status of the different stages of CDW and to identify the extent to which CDW management is followed, and to determine problems arising at each stage. This study is essential to produce reliable data for stakeholders to enable them to make informed decisions for a positive change. This research segregates the information for each stage of the CDW cycle and then processes and cross-verifies it to finally facilitate the broad and systemic vision of CDW management, by adopting few methods such as accumulation method, global index method, waste index method, BIM modelling. And finally, they have concluded that 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.
- The CDW is one of the key challenges in this circular economy. In recent years, the construction industry has shifted towards more sustainable practices, including waste reduction, reuse, and recycling. Building Information Modelling (BIM), Circular economy principles, are sustainable materials are just a few examples the few examples being adopted in order to reduce waste and promote resource efficiency. This research paper approaches the mixed method approach by conducting few case studies, site investigations, and interviews in Shenzhen. Developing thriving CDW waste recycling market, introducing advanced recycling technologies. This study aims to report some lessons on developing an efficient circular economy for C&D waste management in fast-emerging economies. They have done this by conducting a case study in Shenzhen, but some methods consume nonrenewable natural resources, generates solid waste, dust and gas emissions, and noise pollution, and causes land depletion and deterioration. Particularly, the problem of disposal of construction and demolition (C&D) waste, while researching this paper they faced some problems and challenges. Finally, they passed a statement that " Although Shenzhen's C&D waste recycling industry has developed efficiently, further improvements are needed to sustain its prosperity in the long term". And future research is recommended to explore the "epidemiologic link" of knowledge between the contexts of different economies.

Conclusion

- The construction industry has been a significant contributor to waste generation. In earlier days, the wastages were disposed of in open dumps or by burning. Now a days, the construction industry is shifting towards sustainable practices, including waste reduction, reuse, and recycling. The effective waste management techniques play an important role in reducing CDW generation and promoting sustainable construction practices.
- The different methodologies and techniques discussed, such as Mixed Method Approach, Prefabrication Accumulation Method, Global Index Method Waste Index Method, BIM, and DOI (Drop of Waste) Method shows the complexity and multifaced nature of CDW management.
- Building Information Modelling (BIM) is one of the approaches to reduce the generation of CDW through increased precision, collaboration, data driven making, and efficiency.
- The main objective of all the authors is to tackle the following
    - Sustainable design and planning
    - Recycling and reusing the materials
    - Prevention and segregation of waste
    - Education and training among stockholders

- Efficient procurement and handling of materials

➢ These strategies will help to minimize CDW generation by implementing the innovative technologies of BIM while reducing environmental impacts and promoting sustainable development within the construction industry.

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