

ABSTRACT

In recent years, infrastructure growth has substantially increased due to people's increased disposable income worldwide, notably in nations like India, China, Brazil, South Africa, and Vietnam. The resource requirement will keep growing due to spurt needs for housing, commercial and industrial establishment, and road, railway, and airport infrastructures. Over time due to rapid development, the management of construction projects has continuously become more challenging. Additionally, there is increased pressure to construct intelligent and sustainable buildings. More construction will lead to more wastage of materials and other resources. Therefore, due to the environmental damage it causes, waste produced during building and demolition has become a significant obstacle to sustainable development. Construction and demolition waste management (C&DWM) is a complicated process involving much analytical thinking and is the prime reason for the success of any construction project.

India is awakening to the problem and potential of C&DW. Even though several studies have examined various aspects of C&DWM, there is still a sizable gap in integrating strategic tools. Advanced technological solutions are the answers to the problems related to C&DW and building information modeling (BIM) is one of them. BIM has developed as a cutting-edge technology with several applications in different construction areas. It demands utilizing some strategies and tools for minimizing waste, which has been reported in the literature. However, several challenges and complexities have been encountered, some of which have been addressed in this work. The study aims to address the pressing issue of C&DWM in India by leveraging BIM technology. To achieve the aim of the work, the following four objectives have been set out:

- i. To assess the factors causing construction and demolition wastes in the Indian construction industry.
- ii. To investigate the BIM strategies for C&DWM and propose a BIM-based C&DWM theoretical framework.
- iii. To quantify the amount of construction waste using BIM technology.
- iv. To identify the factors affecting BIM for deconstruction (BIM-D) and develop a conceptual model for BIM-D in the Indian construction industry.

Despite the rapid growth of the construction industry, C&DW remains a significant challenge, prompting the need for efficient waste management strategies. Through comprehensive literature review, this research identifies existing gaps and explores the root causes of C&DW, setting the stage for the development of innovative frameworks that integrate BIM into the waste minimization and deconstruction processes.

The results of this study demonstrated that effective waste prediction and minimization at the design stage depend on the integration of C&DWM into BIM. Further, it can be stated that the findings from this research will aid the construction authorities, experts, and stakeholders in managing C&DW more efficiently. It is, therefore, acknowledged that BIM technology will enhance a project's capabilities from its initiation to the EOL of the structure.

Thus, this research influences the field of construction management by catering the needs of a comprehensive framework for C&DWM using BIM, with the potential to significantly reduce waste and promote sustainable practices within the Indian construction industry.

Keywords: Building Information Modeling; Construction Waste; Construction and Demolition Waste; Construction Industry; Deconstruction; Framework; India; Strategies; Sustainability; Waste Management.