


Chapter 6

Innovation Methodologies and Techniques Applied in Green Construction Through Sustainable Waste Materials

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ABSTRACT

This chapter explored new ways to build green by using sustainable waste materi-

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als. It focuses on the circular economy, showing how waste like recycled concrete, glass, and plastic can find new life in construction. This cuts down on environmental harm and uses fewer resources. Key methods include life cycle assessment (LCA) to evaluate environmental perks, green design principles to make the most of materials, and cutting-edge recycling technology to turn waste into top-notch building materials. Real-world examples show successful uses and the resulting economic and environmental gains. The chapter also tackles hurdles like rules that get in the way, market acceptance, and tech limits, offering ways to get past these roadblocks. By bringing sustainable waste materials into building practices, the industry can take big steps toward sustainability. This boosts new ideas and creates a tougher built environment.

INTRODUCTION

Green building, also called sustainable building, tries to lessen how much buildings and infrastructure harm the environment during their whole lives. This matters more and more because construction has a big impact on using up resources, making waste, and putting out greenhouse gases. By using green building methods, the industry can cut down on its effect on nature a lot while making better, longer-lasting buildings. One main idea in green building is to use resources well, which means using sustainable waste materials. These materials, often seen as leftovers or trash in other fields, can be reused and put into building processes. This cuts down on the need for new resources and makes less waste (Vijaya Lakshmi et al., 2024). This idea fits with the circular economy, which focuses on using resources well, making less waste, and keeping materials in use. In green building, using a circular economy model means trying new ways to turn waste into useful building materials.

Life cycle assessment (LCA) plays a key role in green construction. It offers a full look at how the environment feels about the effects of a product's entire life. LCA helps construction projects check how sustainable materials and processes are, from digging them up and making them to using and throwing them away. This big-picture view helps spot ways to cut down on harm to the environment and use resources better. For example, LCA can show why using recycled concrete beats using new materials. It points out how this choice uses less energy, puts out less carbon, and leaves less trash in landfills. Green design principles are another big deal in green construction. These ideas aim to make the best use of materials and energy, boost indoor air quality, and shrink buildings' overall impact on nature. Green design includes tricks like using the sun's heat and light, letting air flow, and picking materials that don't hurt the earth (Mageswari et al. 2024). When architects

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