

Chapter 2

Building a Sustainable Future Through Innovations in Green Construction and Recycling Waste Materials


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ABSTRACT

In this chapter, the evolving landscape of sustainable construction practices and the significant role of green construction and waste material recycling have been explored in shaping the future of building practices. The green construction principles focusing on passive design, energy-efficient materials, and sustainable sourcing

DOI: 10.4018/979-8-3693-3398-3.ch002

have also been illustrated to reduce environmental impact and improve building performance and occupant comfort. The advancements in technology to use recycled materials in construction have been described to improve the economic feasibility and environmental benefits. The adaptation of digital technologies (BIM and IoT) for enhancing sustainability in construction projects, promoting efficient resource management, predictive maintenance, and lifecycle analysis are also discussed.

INTRODUCTION

Growing environmental concerns and regulatory demands are transforming the worldwide building sector. In order to lessen their influence on the environment and help create a sustainable future, stakeholders are implementing cutting-edge green building techniques and recycling waste materials. Green construction is a sustainable approach to building design that reduces the structure's lifetime environmental effect. It is also referred to as sustainable or eco-construction. It emphasizes passive design, making the most of natural ventilation, lighting, and temperature control to cut down on energy use, save operating expenses, and enhance the quality of the interior environment to support occupant comfort and health (Ahmad et al., 2021).

Energy-efficient materials, such as high-performance insulation, which lower energy usage during manufacture and during the building's life, are key components of successful green construction projects. Sustainable sourcing techniques, such as using locally produced goods and eco-friendly manufacturing methods, are also essential. The Forest Stewardship Council (FSC) and other certification programs guarantee that wood products originate from sustainably managed forests, therefore fostering biodiversity and aiding local people. In general, green building is a sustainable method of construction (Tang et al., 2020).

Energy-efficient components, such as high-performance insulation, which lower energy usage during production and during the building's life, are used in green construction projects, making them successful. Additionally essential are sustainable procurement techniques including using locally produced goods and eco-friendly manufacturing procedures. Programs for certification such as the Forest Stewardship Council (FSC) guarantee that wood products originate from forests that are ethically managed, so fostering biodiversity and aiding local people. Green building is, all things considered, a sustainable method of construction (Li et al., 2022).

The regulatory environment for green building is changing globally as a result of the implementation of stringent standards and certifications by industry associations and governments. The U.S. Green Building Council created the Leadership in Energy and Environmental Design (LEED) certification program, which is a globally accepted framework for assessing a building's environmental performance

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