Effect of Wall Materials on Building Sustainability: A Comparison of Different Wall Materials

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Amidst increasing concerns about environmental impacts such as global warming, greenhouse gas emission, and air pollution, the world is trying to find measures to mitigate these impacts. The construction industry plays a major role in this regard. Sustainable building construction seeks to minimize the negative environmental impacts from buildings by enhancing efficiency and moderation in the use of materials, energy, and development space. There are only a few studies that relate to the impacts of building materials on the three pillars of sustainability in the Sri Lankan context. This study investigates the most suitable wall material for an urban residential building in Sri Lanka to satisfy the environmental, social, and economic sustainability requirements. Wall materials considered in the study are solid concrete blocks, hollow concrete blocks, burnt clay bricks, and compressed soil bricks. The environmental burdens associated with embodied energy and CO_2 emission were identified using the cradle-to-gate life cycle assessment of the wall materials, while the life cycle cost of materials was used for economic analysis. Also, social aspects related to wall materials such as thermal comfort and aesthetics were considered in identifying the sustainability of wall materials. Data related to raw material extraction, material production, and transportation were collected from visiting material manufacturing facilities and conducting interviews with relevant personnel. The three sustainability aspects of each wall material were compared using a sustainability index and compressed soil bricks were identified as the best wall material to be used for urban residential buildings in Sri Lanka.

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