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Sustainability Assessment of a Deconstructed Residential House

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Abstract : This paper analyses the various benefits and barriers of residential deconstruction in the context of environmental performance and circular economy based on a case study project in Christchurch, New Zealand. The case study project “Whole House Deconstruction” which aimed, firstly, to harvest materials from a residential house, secondly, to produce new products using the recovered materials, and thirdly, to organize an exhibition for the local public to promote awareness on resource conservation and sustainable deconstruction practices. Through a systematic deconstruction process, the project recovered around 12 tonnes of various construction materials, most of which would otherwise be disposed of to landfill in the traditional demolition approach. It is estimated that the deconstruction of a similar residential house could potentially prevent around 27,029 kg of carbon emission to the atmosphere by recovering and reusing the building materials. In addition, the project involved local designers to produce 400 artefacts using the recovered materials and to exhibit them to accelerate public awareness. The findings from this study suggest that the deconstruction project has significant environmental benefits, as well as social benefits by involving the local community and unemployed youth as a part of their professional skills development opportunities. However, the project faced a number of economic and institutional challenges. The study concludes that with proper economic models and appropriate institutional support a significant amount of construction and demolition waste can be reduced through a systematic deconstruction process. Traditionally, the greatest benefits from such projects are often ignored and remain unreported to wider audiences as most of the external and environmental costs have not been considered in the traditional linear economy.

Keywords : circular economy, construction and demolition waste, resource recovery, systematic deconstruction, sustainable waste management
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