

Prediction of Construction and Demolition Waste Generation of Residential Projects in Sri Lanka

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A considerable amount of construction and demolition (C&D) waste is generated every year in Sri Lanka causing huge harm to the natural environment. Managing C&D waste has become a very important and timely requirement in the country as it cannot be illegally disposed of to the environment. Therefore, strong C&D waste quantification methods are required to manage C&D waste disposal. Main reasons to demolish a residential project in Sri Lanka are to increase property value, buildings with weak foundations, before putting the property on sale and buildings in need of endless repairs. Moreover, analysing additional techniques of waste generation is important apart from those already identified because of the absence of attention paid to the sizes of the used products in construction, lack of influence of contractors, and lack of knowledge regarding construction throughout design activities. This study is conducted based on different residential construction project plans and bills of quantities to quantify the construction wastage. This study mainly used a combination of the Generation Rate Calculation method and the Lifetime Analysis method for quantifying waste factors from plans and Bill of Quantities. Addressing the unavailability of proper methods to predict quantities of C&D waste generation in Sri Lanka this paper suggests a method to improve the accuracy of C&D waste generation prediction using machine learning using random forest (RF) and K-nearest Neighbour (KNN) algorithms. Gross floor area, roof material and no of stories are taken as input variables of the model and quantities of mortar, concrete, bricks, roofing tile, asbestos, metal and timber taken as output variables. Predicted quantities of wastage can be managed in a reusable manner making it profitably and harmlessly. Further, it can reduce resource wastage in construction sites and minimize environmental pollution that happens due to construction as well as demolition activities.

Keywords: *Construction & Demolition Wastage, K-Nearest Neighbour, Machine Learning, Quantifying C&D, Random Forest*