

A Conceptual Framework and a Mathematical Equation for Managing Construction-Material Waste and Cost Overruns

Authors : Saidu Ibrahim, Winston M. W. Shakantu

Abstract : The problem of construction material waste remains unresolved, as a significant percentage of the materials delivered to some project sites end up as waste which might result in additional project cost. Cost overrun is a problem which affects 90% of the completed projects in the world. The argument on how to eliminate it has been on-going for the past 70 years, but there is neither substantial improvement nor significant solution for mitigating its detrimental effects. Research evidence has proposed various construction cost overruns and material-waste management approaches; nonetheless, these studies failed to give a clear indication on the framework and the equation for managing construction material waste and cost overruns. Hence, this research aims to develop a conceptual framework and a mathematical equation for managing material waste and cost overrun in the construction industry. The paper adopts the desktop methodological approach. This involves comparing the causes of material waste and those of cost overruns from the literature to determine the possible relationship. The review revealed a relationship between material waste and cost overrun that; increase in material waste would result to a corresponding increase in the amount of cost overrun at both the pre-contract and the post contract stages of a project. It was found from the equation that achieving an effective construction material waste management must ensure a "Good Quality-o-Planning, Estimating, and Design Management" and a "Good Quality- of-Construction, Procurement and Site Management"; a decrease in "Design Complexity" which would reduce "Material Waste" and subsequently reduce the amount of cost overrun by 86.74%. The conceptual framework and the mathematical equation developed in this study are recommended to the professionals of the construction industry.

Keywords : conceptual framework, cost overrun, material waste, project stags