Estimating Resource Requirements at Conceptual Design Stage Using Neural Networks

Abstract:

Construction conceptual estimating models provide frameworks for evaluating different alternatives at the conceptual design stage. Estimations are prepared in practice primarily based on analogy with previous similar cases. A back-propagation neural-network model was developed in this study to estimate the construction resource requirements at the conceptual design stage. The developed model was applied on the construction of a steel silo walls built by using the slip-form system. A set of 23 input attributes that mostly pertain to the determination of the resource requirements were identified. These input attributes include the bulk density of the stored materials, the wall-to-floor area of the silo complex, the number of lifting jacks of the slipform, and the number of stages through which the silo complex is constructed. The developed model was used to calculate the requirement from nine construction resource types. Outputs of the developed neural-network model were compared with estimations obtained from using multiple regression models. The results indicated that back-propagation neural-network models can be used satisfactorily to estimate the construction resource requirements at the conceptual design stage.