

A hybrid egalitarian bargaining game-DEA and sustainable network design approach for evaluating, selecting and scheduling urban road construction projects

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Abstract

Selecting and scheduling urban road construction projects (URCPs) is inherently an Urban Network Design Problem (UNDP) with a complex decision making process. Recently some studies have focused on sustainable UNDP, using different mathematical methods. In this paper, first a new network data envelopment analysis (NDEA) model has been developed. Then, considering sustainability dimensions, by integrating data envelopment analysis (DEA), game theory and sustainable UNDP, a bi-level model has been proposed for selecting and scheduling URCPs. A meta-heuristic algorithm is proposed to solve the presented bi-level model. Different test instances are solved to show the acceptable performance of proposed algorithm in both solution quality and execution time. Afterwards, the proposed model is applied to study the problem of urban road construction projects selection in a real-world case study of urban transportation network of Isfahan city in Iran. The results show that by applying obtained solution the environmental and social performance of the network has been improved and the performance of the network is almost efficient in all evaluation periods.

Keywords: Network data envelopment analysis; Egalitarian bargaining game; Transportation; Sustainable network design problem; Urban road project selection; Scheduling.

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