Implementation of Sustainable Development Goals in an Integrated Solid Waste Management

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Quick growth of urbanization and population as well as transformation of industrial and materials have pushed the management of municipal solid waste into a crisis especially for developing markets based on the grand challenge of sustainable development. The compounding complexity of the multiple objectives and dynamic problem constraints required to represent an integrated solid waste management (ISWM) problem in practice is a hugely significant issue for vehicle routing problem studies. The purpose is to introduce a new coordinated framework for a practical and efficient vehicle routing problem considering the tripe bottom line of sustainability. The ISWM multiple objective functions applied in this study incorporate financial, environmental and social considerations to develop a sustainable vehicle routing problem considering heterogeneous vehicle fleets operating across a multi-echelon logistics network with the optimization goals. An entirely novel development and application of the adaptive memory social engineering optimizer (AMSEO) is introduced and is shown to perform significantly better than the simulated annealing (SA) as well as the social engineering optimizer (SEO) itself. Finally, the potential overall waste disposal cost savings achievable through increased recycling (revealed by framing the logistics problem across several echelons) is of particular significance. The main findings are the practical solutions with the use of sustainable development goals for the ISWM and further application and development of the AMSEO in the routing optimization.

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