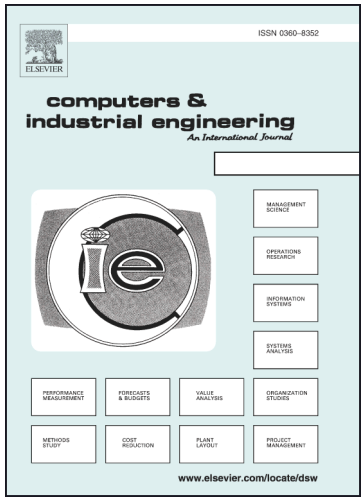

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Optimizing Fuzzy Reverse Supply Chain for End-of-life Vehicles

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Abstract

The rapid development of new technologies, such as the anti-lock braking system, navigation or Global Positioning System, and electronic fuel injection, has shortened the life cycles of vehicles. Currently, the average life cycle of vehicles in Japan is around 10 years. Hence, the disposal of end-of-life vehicles (ELVs) has placed heavy pressure on both the environment and human life given its negative effects. To achieve sustainable development, ELVs must be properly handled through depollution, reuse, recovery, or recycling, among others. Considering its efficiency, effectiveness, and practical advantages, reverse supply chain management has been adopted in several industries and viewed as a highly prominent option among suggested tactic solutions for solving this issue. In this study, a model of multi end-of-life vehicle reverse supply chain system with fuzzy parameters is studied. The proposed model is subsequently transformed into the equivalent auxiliary crisp model through an appropriate approach, that is, linear programming with fuzzy parameters, and the final preferred compromise solutions are determined. Finally, a numerical example is presented to illustrate the capability of and provide insights into the proposed model.

Keywords: End-of-life vehicles, fuzzy linear programming, reverse supply chain

Abstract

The disposal of end-of-life vehicles (ELVs)is a huge challenge for many countries to achieve sustainable development. To reduce their negative impacts on environment, ELVs must be handled through proper processes such as depollution, reuse, recovery, or recycling. To help the industry and country achieve their goal, this study develops a fuzzy multi-echelon, multi-product, reverse supply chain model, which includes both network design decisions and tactical decisions in ELV treatment. The proposed model is then transformed into the equivalent auxiliary crisp model through an appropriate approach, that is, linear programming with fuzzy parameters, and the final preferred compromise solutions are