

Optimization of reverse logistics network for end-of-life vehicles: A Shanghai case study

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ABSTRACT

With the surge in car ownership, the end-of-life vehicles recycling market has shown enormous development potential. As the reverse logistics network for recycling end-of-life vehicles suffers from high operating costs and low recycling rates, there is an urgent need to upgrade the actual recycling measures for end-of-life vehicles to an operable level. This article first uses the OGM (1, N) model to predict the number of end-of-life vehicles in the coming years. At the same time, a reverse logistics network model with the second-hand car market as the recycling centre was constructed with the goal of minimizing the total cost of the end-of-life vehicles reverse logistics network. The network model was simulated using mixed integer programming (MILP), and the optimal solution was solved through LINGO 12 programming. Through an example analysis of Shanghai, it is found that the market of end-of-life vehicles will embrace growth, and it is verified that the optimized reverse logistics network can effectively reduce the operation cost and logistics cost of recycling centres, and can effectively improve the actual recycling rate of end-of-life vehicles. Finally, the optimized site selection results are obtained, and a specific traffic distribution scheme is proposed, which is crucial for promoting cars that meet scrap standards to be recycled through formal channels and reducing logistics costs for recycling enterprises.

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Optimizacija omrežja povratne logistike za odslužena vozila: Študija primera iz Šanghaja

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POVZETEK

Z naraščajočim številom lastniških avtomobilov dobiva recikliranje odsluženih vozil izkazal izjemno razvojno priložnost. Ker ima omrežje povratne logistike za recikliranje odsluženih vozil visoke obratovalne stroške in nizko stopnjo recikliranja, je nujno treba dejanske ukrepe za recikliranje odsluženih vozil nadgraditi na operativno raven. Ta članek najprej uporablja model OGM (1, N) za napoved števila odsluženih vozil v prihodnjih letih. Hkrati je izdelan model povratnega logističnega omrežja s trgov rabljenih avtomobilov in centrom za recikliranje, da bi se čim bolj zmanjšali skupni stroški povratnega logističnega omrežja za odslužena vozila. Model omrežja je bil simuliran z mešanim celoštevilskim programiranjem (MILP), optimalna rešitev pa je bila poiskana s programiranjem LINGO 12. Z analizo primera Šanghaja je bilo ugotovljeno, da bo trg odsluženih vozil rasel, preverjeno pa je bilo tudi, da lahko optimizirano omrežje povratne logistike učinkovito zmanjša stroške delovanja in logistične stroške reciklažnih centrov ter učinkovito izboljša dejansko stopnjo reciklaže odsluženih vozil. Na koncu so bili pridobljeni rezultati optimizirane izbire lokacije in predlagana je bila posebna shema ureditve prometa, ki je ključna za spodbujanje uradne reciklaže avtomobilov, ki izpolnjujejo standarde za odpadke in zmanjšanje logističnih stroškov za podjetja za reciklažo.

PODATKI O ČLANKU

Ključne besede:

Odslužena vozila;
Povratna logistika;
Recikliranje;
Model OGM (1, N);
Mešano celoštevilsko programiranje (MILP);
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