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Multi-agent based simulation and policy regulation for urban household solid waste recycling behavior

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The urban household solid waste (HSW) classification and recycling system is a complex adaptive system (CAS), containing multiple agents and the behaviors between them are interactive. In order to figure out which is the most effective waste management policy for the HSW classification and recycling, this study tried to establish a simulation model combining multi-agent based simulation (MABS) techniques with a social survey questionnaire. The model can simulate the behavior change of the agents in the system under different policy scenarios. Then the proposed model is utilized in Suzhou City in Eastern China. The system contains three main agents: resident agents that generate the HSW, the recycling site agents that collect the recyclable materials, the agents in the sanitation department that is responsible for the municipal solid waste collection and terminal garbage disposal. In addition, three waste charge policy scenarios are set and relevant simulation experiments are carried out. The results show that the specific charge policy can improve the performance of residents' separation behavior, which is a more effective way to reduce the HSW and increase the collection rate of domestic recyclable resources. There exists certain benefit conflicts between the environmental sanitation agent and the DRR recycling agent at the present stage. At the same time, it is suggested to strengthen the planning and construction of supporting facilities for urban classification and recycling, to push forward the integration of the classification and recycling of the HSW, and to promote the new recycling mode according to local conditions.

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