

INTISARI

Kesadaran masyarakat Indonesia dalam memilah dan mendaur ulang sampah masih rendah. Survei di beberapa kota besar menunjukkan 51,1% tidak mendaur ulang, 29,6% kadang-kadang, 15,2% sering, dan hanya 4,1% selalu mendaur ulang sampah anorganik. Mayoritas rumah tangga masih menggunakan metode tidak ramah lingkungan, seperti membakar sampah, sementara metode berkelanjutan seperti pengomposan, bank sampah, dan daur ulang belum diminati.

Kota Yogyakarta saat ini menghadapi darurat sampah akibat penutupan TPST Piyungan, yang menyebabkan penumpukan sampah di TPS perkotaan. Dengan penutupan total TPST, Pemda Yogyakarta harus menerapkan kebijakan pengelolaan sampah dari sumbernya untuk mengatasi krisis ini.

Penelitian ini menggunakan simulasi berbasis agen untuk memahami keputusan rumah tangga dalam memilah dan mengelola sampah organik dan anorganik. Simulasi ini mensimulasikan perilaku pemilahan dan pengelolaan sampah dalam berbagai skenario berbasis realita. Keputusan rumah tangga dimodelkan menggunakan Theory of Planned Behavior (TPB), yang dikombinasikan dengan pengaruh tetangga dan biaya retribusi. Selain itu, fungsi utilitas digunakan untuk menentukan opsi pengelolaan sampah yang dipilih rumah tangga.

Hasil penelitian menunjukkan bahwa keputusan rumah tangga dalam memilah dan mengelola sampah dipengaruhi oleh faktor internal (niat, pengetahuan, informasi, pandangan terhadap uang, waktu, jarak, dan tetangga) serta faktor eksternal (jarak ke fasilitas, pengaruh tetangga, retribusi, dan harga jual). Skenario 4 (Antar-Jemput) paling efektif dalam mengurangi sampah ke TPS sebesar 77,03 ton dan meningkatkan serapan bank sampah (19,72%) serta peternak maggot (41,85%), meskipun menimbulkan defisit finansial. Skenario 3 (Optimalisasi Kompos) meningkatkan serapan kompos hingga 34,47% tanpa dampak finansial negatif. Skenario 2 (Pembangunan Peternak Maggot) mengurangi sampah organik ke TPS sebesar 2,8 ton, tetapi menyebabkan defisit Rp150.000/minggu bagi peternak maggot. Skenario 1 (Kenaikan Retribusi) memiliki dampak paling kecil, hanya mengurangi sampah campur 2,39 ton, karena rumah tangga tetap membuang sampah pilahan ke TPS.

Kata Kunci : Simulasi berbasis agen, perilaku rumah tangga, bank sampah, peternak maggot, pengelolaan sampah rumah tangga.

ABSTRACT

Public awareness of waste segregation and recycling in Indonesia remains low. A survey conducted in several major cities revealed that 51.1% of households do not recycle, 29.6% do so occasionally, 15.2% frequently, and only 4.1% always recycle inorganic waste. Most households still adopt environmentally unfriendly waste management methods, such as burning waste, while sustainable methods like composting, selling to waste banks, and recycling remain underutilized.

The city of Yogyakarta is currently facing a waste emergency due to the closure of TPST Piyungan, leading to waste accumulation at urban TPS (temporary waste disposal sites). With the total shutdown of TPST Piyungan, the Yogyakarta municipal government must implement waste management policies at the source to address this crisis effectively.

This study employs an agent-based simulation to analyze household decision-making in waste segregation and management of organic and inorganic waste. The simulation models waste sorting and management behavior under various real-world-based scenarios. Household decision-making is formulated using the Theory of Planned Behavior (TPB), incorporating neighborhood influence and waste collection fees. Additionally, a utility function is utilized to determine household waste management choices.

The findings indicate that household decisions on waste segregation and management are influenced by both internal and external factors. Internal factors include intention, knowledge, information, financial perception, time, distance, and neighbor influence, while external factors encompass distance to facilities, neighborhood influence, collection fees, and selling prices. Among the scenarios tested, Scenario 4 (Waste Collection Service) proved the most effective, reducing waste sent to TPS by 77.03 tons and increasing waste bank absorption to 19.72% and maggot-based waste processing to 41.85%, despite causing financial deficits. Scenario 3 (Composting Optimization) successfully increased compost absorption to 34.47% without significant financial drawbacks. Scenario 2 (Establishment of Maggot Farming Facilities) reduced organic waste to TPS by 2.8 tons but resulted in a weekly deficit of Rp150,000 for maggot farmers. Scenario 1 (Increased Waste Collection Fees) had the least impact, reducing mixed waste by only 2.39 tons, as many households continued disposing of sorted waste at TPS.

Keywords : Agent Based Simulation, Household Behavior, Bank Sampah, Maggot Farmer, Household Waste Management