

SIMULATION MODELLING SOFTWARE FOR INTEGRATED SOLID WASTE MANAGEMENT AT REGIONAL LEVEL

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EXTENDED ABSTRACT

In this paper, a simulation modelling system for the selection of best alternative solution concerning the integrated solid waste management at regional level is presented. The main aim of this software tool (which is based on a Geographical Information System) is to aid decision makers in locating solid waste management facilities and allocating wastes and or residues to them. It enables planning at prefectural and regional level, i.e. the location of solid waste management facilities (transfer stations, material- and energy-recovery facilities and landfills) and the optimal determination of their capacities, by taking into account produced wastes and various cost elements. Through the application of the system, simulation of solid waste management scenarios takes place at the case-study area.

The simulation model constitutes of strategic, tactical and operational decision levels for an integrated solid waste management system. These are expressed as follows: a) Strategic. The system supports long-term planning for integrated waste management, since it takes into account the total lifespan of facilities (years). Furthermore, its GIS-features allow the evaluation of various management scenarios through network planning and optimization. b) Tactical. The vehicle-routing schedule designs dynamically (i.e. on a monthly basis) the routes of waste (and/or residues') flows, after taking into account the requirements of waste producers (cities or municipalities), the number of vehicles and their load constraints (capacity), as well as the local road network. c) Operational. The system lays out the solid waste management schedule on a daily basis, while it also proposes solutions to irregular problems that could affect it (like handling of emergency situations, e.g. strikes, etc). The system was developed and applied for the Region of Western Macedonia, in close collaboration with the Regional Authority for Waste Management.

The main advantages of the above-mentioned simulation modelling system include the flexibility and inter activeness in defining solid waste management facilities' typologies and also their service areas (waste producers). Furthermore, the decision support model optimizes the effectiveness of waste collection and transfer (by taking into account various cost elements like personnel and transportation cost) and the location of transfer, treatment and final-disposal facilities. Thus, the system presents itself as an advisory, user-friendly tool that could be utilized by local authorities and other organizations in a continuous mode of use.

Key words: Integrated solid waste management, simulation, prefectural planning, location, facilities, allocation, residues.