Model optimasi sistem pengolahan sampah kota (Wilayah Studi Jakarta Barat)

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Abstrak

Meningkatnya pembangunan kota; pertambahan jumlah penduduk, tingkat aktivitas dan tingkat sosial-ekonomi masyarakat menyebabkan meningkatnya jumlah timbulan sampah di perkotaan. Sampah yang tidak dikelola dengan baik tentunya akan berdampak terhadap nilai dan fungsi lingkungan, oleh katena itu diperlukan upaya pengelolaan di antaranya melalui pengolahan dan pemanfaatan sampah. Namun demikian, pada tingkat kota umumnya pengelola dihadapkan pada permasalahan keterbatasan lahan dan metode dalam menentukan sistem pengolahan sampah yang optimal. Tujuan umum dari penelitian ini adalah mengembangkan model pendukung pengambilan keputusan dalam menentukan sistem pengolahan sampah kota yang optimal dengan mempertimbangkan aspek keberlanjutan, yang meliputi aspek teknis, lingkungan, ekonomi dan sosial. Dalam model yang dikembangkan ini dirumuskan model matematis perhitungan dampak lingkungan potensial terkait clengan konsumsi energi, potensi pemanasan global dan _potensi toksik, dengan skenario yang dikembangkan atas altematif pilihan teknologi. Pada Studi kasus wilayah Jakarta Barat, melalui implementasi model perhitungan dampak lingkungan potensial yang telah dirumuskan, menunjukkan bahwa skenario sistem pengolahan sampah dengan kombinasi teknologi pengomposan dan teknologi reusable landfill (Skenario 3) merupakan sistem pengolahan sampah yang optimal untuk wilayah studi. Kombinasi altematif teknologi pengolahan sampah terpilih_ tersebut didasarkan atas analisis manfaat-biaya yang telah memperhitungkan aspek lceterbatasan lahan dan dampak lingkungan potensial.

<hr>The population growth and rapid urbanization flow have caused the amount of solid waste generation in the urban area to increase. Solid waste that is not managed properly will definitely affect the value and function ofthe environment. In addition, large amounts of urban solid waste disposal require large area. Densely populated areas like large cities will have difiiculty in iinding land for landiills. To reduce the burden on landfill and prolong the life of landfills, it is necessary to reduce the amount of solid waste dumped into landfills, inter alia, through processing and utilization of solid waste. In an urban area, generally, organizers are faced to problems in developing sustainability -of the solid waste treatment system, including the method and strategy for determining the best combination of solid waste treatment technologies. The purpose of this research is to develop a model that can support the decision making process in determining the optimal urban solid waste treatment system. The formulation of the model for selecting the optimal urban solid waste treatment system was done through the step of organizing the altematives of urban solid waste treatment technology combination. Generally the optimization strategy was done in two steps that included the formulation of the mathematical model for calculating the potential environmental impact -which covered energy consumption, global warming potential and toxicity potential. The step followed atierwards was the implementation of the mathematical model, implying on the emergence of the environmental cost burden. In the case study of West Jakarta area, the implementation of mathematical model for calculating the environmental impact potential indicated that the scenario of solid

waste treatment system with the combination of composting technology and reusable landfill technology (Scenario 3) is the optimal solid waste treatment system for the study area. The combination of alternative solid waste treatment technology selected was based on a cost-benefit analysis which has considered the aspect of land scarcity and potential environmental impacts.