Abstract

Plastic waste has become an unavoidable problem in Thailand. However, the recovery percentage of plastic in Thailand is still low due to the high cost in constructing and operating the plastic recycling plants. Therefore, most of the plastic wastes are either burnt to destroy or sent to the landfills. In order to be financial viable, an effective reverse logistics infrastructure is required to support the product recovery activities. In this research, an approach for designing reverse logistics infrastructure is presented in the form of Mixed-Integer Linear Programming (MILP). This formulation includes the feature to raise the recovery percentage and manage the landfill economically in the long run. In this research, we propose a mathematical model for the design of reverse logistic system and offer a guideline to the large-scale problem for the planning of countrywide plastic recycling program for Thailand. In the case study, we set the recovery percentages to be 5, 15 and 30 percent of all plastic wastes that could be converted into crude oil. The results from case study show that the key decisions in the model are resource allocations, facility locations, and material flows in the system. Even though recovery percentage 30 percent may need a huge amount of investment, the payback period is shorter than the one of lower recovery percentage. Thus, the increase of recycling plastic amounts significantly affects the future outcome financially. This research also provides a practical case study of plastic recycling of Thailand which is a pilot study that could be practically applied.