

Study on Coordinated Industrial Waste Disposal and Recycling Strategies with Multiple Plants and Multiple Types of Waste

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ABSTRACT

High-tech companies in Taiwan face with the planning of disposal and recycling operations of industrial wastes to reduce related costs. There are various types of industrial waste that require services of recycling centers. The recycling center has to process batches of waste separately, even for those who are from the same industry. as a result, the sequence and time duration of batches of waste to be processed need to be carefully planned. Furthermore, in the process of recovering valuable materials from industrial waste, the recovering rate may drop as the processing time increases. Examples can be found in semiconductor and printed circuit board manufacturing industries. This research studies the planning of waste disposal and recycling operation in a green supply chain with multiple plants and multiple types of industrial waste. The goal is to identify optimal disposal cycles that minimize costs or maximize profits.

This research considers systems with multiple manufacturing plants and a recycling center. Various types of waste can be from a single plant or many plants. Mathematical models are constructed under integrated recycling strategy and sequential recycling strategy. A search algorithm is developed to find the optimal disposal cycles. Numerical experiments and sensitivity analysis are conducted. We conclude that the sequential recycling strategy has better performance than the integrated recycling strategy, regardless the amounts of wastes and the size difference of plants. However, it requires more effort in management. The findings from this research can serve as valuable reference in management and operation for enterprises.

Keyword: nonlinear recycling rate multiple plants various waste disposal waste recycling