Control Policies of Production and Waste Disposal in a Production/Inventory System with Production Waste

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ABSTRACT

With increasing competition in the market and the trend of globalization, more and more new products are launched in a shorter time span. In the mean time, the amount of wastes produced during manufacturing is increasing rapidly. Environmental issues related to the increasing production wastes have drawn growing attention. Many production wastes require proper storage and professional treatment. Manufacturing firms need to manage the storage and disposal of production wastes in order to meet environmental regulations.

This study considers a production/inventory system with a single product. Production waste is generated during manufacturing and requires to be treated by professional waste disposal companies. Joint control policies of production and waste disposal are investigated. Three models are constructed: common production and waste disposal cycle, multiple waste disposal cycle and multiple production cycle. In addition, two decision procedures, traditional decision procedure and integrated decision procedure, are considered. Cost functions are derived and optimal production and waste disposal cycles are obtained such that total related costs are minimized. Furthermore, models with waste storage time and capacity constraints are also studied.

The result of the conducted numerical experiment shows that the integrated decision procedure provides the best total costs in each model. Moreover, it is found that constraints on waste storage time and capacity can have great influence on optimal production and waste disposal cycles. It is important for enterprises to decide the production and waste disposal decision procedure in practice.

Keyword: Production/Inventory System, Waste Storage System, Waste Disposal, Storage Capacity Constraint, Storage Time Limit