

Waste disposal models for manufacturing firm and disposal firm

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ABSTRACT

This research identifies analyze and propose solutions for waste-related problems in industries. In this research an inventory control of the waste products that are generated during the manufacturing process is concerned. Two types of waste accumulation rates are discussed. One is the constant waste accumulation rate and the other is the linearly increasing waste accumulation rate. Also, waste disposal is examined from two different perspectives, from the point of view of the waste 'producing' company on the one hand, and from the point of view of the waste disposing company on the other hand. The idea of the basic model lies in the 'turning upside down' of the lot-sizing approach to inventory control theory. A corresponding formula for disposal is derived to calculate the optimal number of pick-ups and the amount of waste to be disposed at certain period of time. This shows that the results for these two different types of waste accumulation differ in a wide range because of the difference in the waste accumulated way which disturbs the storage cost. Finally, both the models are verified by a numerical example and both the results are compared.

An integrated model is developed and discussed in which both the manufacturing firm and the disposal firm are benefited by the integrated model. This research also explains the necessity of integration between the manufacturing and the disposal firm for effective implementation of the integrated model. An integrated lot-splitting model of facilitating multiple shipments in small lots is developed and compared with the existing approach in a simple waste disposal model, under deterministic conditions for waste products. It is shown that the optimal policy adopted by the integrated approach can provide a strong and consistent cost-minimizing effect for both the manufacturing firm and the disposal firm over the existing approach.

Keyword: waste disposal model inventory integrated model