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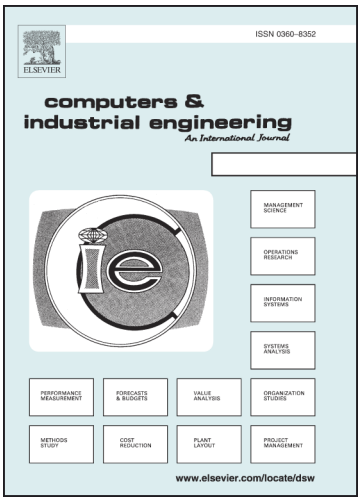

Green logistics under imperfect production system: A Rough age based Multi-Objective Genetic Algorithm approach

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Green logistics under imperfect production system: A Rough age based Multi-Objective Genetic Algorithm approach

Abstract: Imperfect economic production lot size (EPL) models are considered with time dependent defective rate. Here, defective production starts after the passage of some time from production commencement. Produced defective units are partially reworked and sold as fresh units. Under the environmental regulation, a cost (carbon tax) is charged by the government to mitigate global warming by reducing carbon emission (CE). Management also uses carbon trading when upper limit of carbon emission is given by the government. These costs bring a contradiction to a production manager. For more profit, if more production is decided, then CE and tax due to that are more. The models are formulated as single- and multi-objective profit maximization problems and solved using Rough age based single- and multi-objective Genetic Algorithms (RMOGAs). Numerical experiments are performed and graphical presentation of the results are depicted to illustrate the models. An algorithm with example for a firm management to achieve the maximum profit is also presented.

Keywords: Logistics, Defective Production, Carbon Emission, Management Decision, Genetic Algorithm.

1 Introduction

In recent years, besides economic criteria (cost minimization or profit maximization), the social impact of production system for a long period has become a major topic in research and industrial application. The environmental concerns are becoming increasingly relevant for firms due to more stringent various rules and regulations on carbon policies imposed by government and growing customer's awareness to the social welfare. Worldwide firms take several measures to improve their environmental and economic performances. One of those actions is to incorporate CE management into the production and business decisions. Many countries have enacted legislations to mitigate global warming by reducing carbon emission. A number of countries have implemented carbon taxes for every unit of carbon emission whatever be the amount- low or high. Some countries have introduced carbon cap and trade scheme for their industries. Emission trading i.e. cap and trade is a market based approach used to control pollution by providing economic incentives for achieving reductions in the emission of pollutants. "Cap" means a legal limit on the quantity of green house gases which an industry

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