

COMPLEMENTARY DETERIORATING PRODUCTS WITHIN A FLEXIBLE PRODUCTION SYSTEM: A SUSTAINABLE APPROACH

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Abstract. The nature of complementary products is the dependency of one product on the other for utility. Further, the complementary products with deteriorated nature create a challenging environment for a suitable strategy. How does an industry deal with complementary deteriorated products at the retailer's house? The present study deals with two complementary deteriorating products in a two-echelon supply chain management. The deterioration of complementary products increases with time, and the deterioration rate is taken as the function of time. Complementary deteriorating products are manufactured by two manufacturers and sold to a common retailer. Manufacturers use a flexible production system to produce products and a single-setup-multiple-delivery policy to deliver those products. Under the flexible production system, emissions from setup, holding products, disposal, and transportation of products are considered. A carbon tax policy is used to reduce emissions. This study aims to optimize the total profit of the supply chain by finding a suitable sales strategy. The total profit is maximized by acquiring the optimal values of the retail price, cycle time of the retailer, production rate, and number of shipments. The numerical result shows that the profit becomes maximum when complementary products are less dependent on each other. The result indicates that adapting the flexible production system increases the total profit by 1.86% and decreases total emissions by 5.36% than a traditional production system.

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1. INTRODUCTION

The section provides a brief introduction about the study.

Keywords. Supply chain management, flexible production, complementary deteriorating items, transportation, emission reduction.

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