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MEASURING DEMAND AMPLIFICATION IN A CLOSED LOOP SUPPLY CHAIN

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The issue of sustainability has attracted attention towards closing the traditional supply chain through different reprocessing options. This paper develops an analytical expression for measuring the bullwhip effect in a six echelon closed loop supply chain for recycling of products like paper, plastic. A first order auto regressive end customer demand is assumed with each supply chain participant employing an order-up-to (OUT) policy and Minimum Mean Square Error (MMSE) forecasting scheme. The model assists the closed loop supply chain entities in anticipating the downstream demand and suggests them to carefully select the value of auto regressive parameter so as to avoid any order-process instability in the closed loop supply chain. Sensitivity analysis of replenishment lead-time combination could be utilized by management for designing an optimal recycling-distribution system, under the condition of constant accumulated lead-time. Further, the segregation analysis reveals that increase in the degree of segregation at the source reduces the bullwhip effect in the closed loop supply chain.

Key Words/Phrases: Environmental Issues, Demand Amplification, Closed loop supply chain, Recycling

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