
Colored Petri Nets for Modeling and Simulation of Green Supply Chain Systems

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Résumé

Green supply chain is an emerging approach in supply chain management to reduce environmental impact of the process concerning the flow of goods and materials. As a discrete-event system, a supply chain network can be modeled using Petri Nets. Colored Petri Nets (CPNs) extend the classical Petri net formalism with data, time and hierarchy. These extensions makes it possible to deal with the green aspects of the supply chain.

This paper deals with a Colored Petri Net approach to model and simulate a green supply chain system. The forward supply chain network starts from the raw material suppliers, to the manufacturers, wholesalers, retailers and to the final customers. The reverse supply chain network is made of collecting points, recycling plants, disassembly plants, and secondary material market. A government environment agency plays the role of regulation of the recycling process.

A colored Petri net model of the green supply chain is developed and simulated with CPN Tools, a dedicated software for CPN models. The simulation results as well as the state-space analysis results validate the correctness of the model.

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