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System Dynamics Model for A Stackelberg Game in Multi-Echelon Inventory System under Demand and Supply Uncertainty

Noviana Dwi Harsiwi and Elisa Kusrini
Department of Industrial Engineering
Islamic University of Indonesia
Jl. Kaliurang km. 14,5
Sleman, Yogyakarta 55584

Abstact

In addition to cope with a surge in demand, the existence of inventory is also potential to create conflict in manufacturer. While company face problem about how many product should be produced, it also has to deal with the uncertain supply of raw material. In order to avoid any losses, company must apply optimal methods. We consider a model of multi-echelon supply chain consisting of a supplier, a manufacturer and n-retailers. By applying a stackelberg game, we consider manufacturer as a leader and supplier as well as retailers as followers. Also we apply stackelberg in system dynamics simulation to determine the causal relation of the variables behind two types of uncertainty. Although system dynamics simulation is not an optimization tool, but we tried to make some design experiment and make an analysis based on the result of the experimental design to address supply and demand uncertainty. Furthermore, system dynamics simulation is also intended to accommodate variables that are not included in the mathematical model. System dynamics model which we proposed is able to resolve the conflict between supply chain entities and also managed to reduce losses caused by inventory.

Keywords
Inventory, stackelberg game, system dynamics, uncertainty

Biography

Noviana Dwi Harsiwi is a bachelor candidate in industrial engineering department of Islamic University of Indonesia. She was active as modeling and simulation laboratory assistant. She was also active as Faculty of Industrial Technology student council.

Elisa Kusrini is a senior lecturer in industrial engineering department. She has Masters degree in industrial engineering from Bandung Technological Institute and bachelor degree of the same major from Gadjah Mada Universit (UGM). She has experience as a professional trainer, consultant and also as a speaker in many seminars, workshops, training in goverment companies as well as national private companies or multi-national company both regular and in-house training. She is expert in Production Planning and Inventory Control, Supply Chain Management, Warehouse Management and Materials Management. She has certified CPIM (Certified Production and Inventory Management) from APICS American.