

Optimal local inventory management in a decentralized Supply Chain

Lidia Argilaguet Montarelo, Mechanical Engineering

Assistant(s):

Professor: Rémy Glardon (EPFL), Nicolas Zufferey (Université de Genève)

The interest of decreasing the cost of the supply chain has always been an important factor for the companies. This work will develop a model to simulate and find the best solution regarding the costs of a supply chain.

This project will consider a case of a linear supply chain consisting of 4 echelons (Figure 1). This chain serves a market with a variable and stochastic demand and a service level required of 95%.

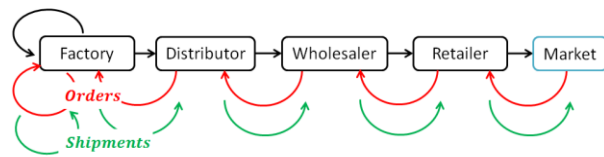


Figure 1 : Representation of the chain

First, the problem will be defined, together with the analytical cost model. Two cases will be studied regarding the inventory policies: (s, Q) and (s, S) .

With this information a discrete-event simulator will be programmed (C++). This program will compute the cost of each echelon using as input variables, the parameters of the inventory policies.

To find the best solution for the two cases, an optimization-simulation program is used. The simulation program will provide the objective function value. A Tabu Search optimization program will be coded to find the solution.

Regarding the parameters used in the tabu search a sensitivity analysis is made. A dynamic tabu search and a static tabu search will be compared.

Then, the results for the two cases will be analysed. The average on-hand inventory and the distribution of the costs will be discussed (Figure 3).

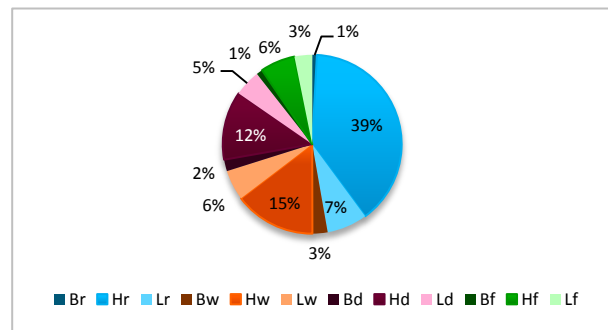


Figure 2: distribution of the costs for the best solution found of (s, Q) . B : backorder cost, H : holding cost, L launching cost.

It will be found that the best result of the (s, Q) policy is better than the best result found of the (s, S) policy (Figure 3).

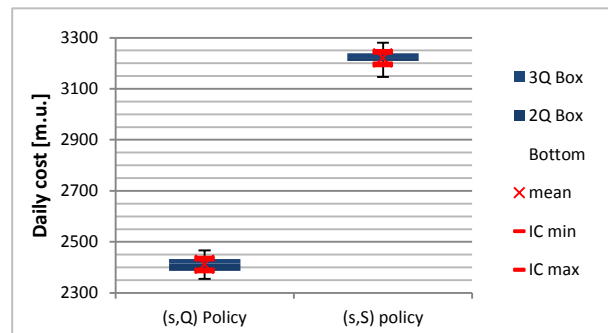


Figure 3 : Boxplot of the daily cost of 10 runs of the best solutions for policies (s, Q) and (s, S)

As an extension included, there will be a comparison between the results for two more service levels, one smaller and one greater than the 95% required. This will show more light in what is the result of increasing or decreasing the service level.