Synchronizing inventory and transport within supply chain management

Company: Infora Research Group

Problem statement for 99th European Study Group with Industry

The role of supply chain management includes making strategic, tactical and operational decisions that influence all business processes from raw material procurement to deliveries to end users, and it captures product, information and finances flows. The objective of every supply chain is to maximize the overall value generated, and it can be achieved only via efficient coordination of all supply chain links. Nowadays, we can find and use software solutions, based on mathematical models and algorithms, and optimize supply chain links such as production, warehousing, inventory or distribution. Nevertheless, the developments of tools that are able to simulate, and at the same time perform synchronized optimization of more than one link, are at the beginning.

Practical problem that we want to discuss considers synchronized optimization of inventory and transport, and focuses on producer-distributor relations. A producer has signed a contract with a distributor that guaranties exclusivity for sales in a certain region/country.

The following list describes the distributor's position:
- All sales and delivery activities are outsourced to the distributor;
- The distributor organizes its sales and delivery activities;
- Sales and distribution cannot be done by a same crew; they need to be separated;
- Once the goods leave production facilities, they are owned by the distributor.

We would like to discuss the following questions:

Given a region/country with its road network, historical data about sales, and all relevant costs (facilities, vehicles, workers, and haulage), how should the distributor organize his sales/distribution network?

Since goods are owned by the distributor as soon as they leave production facility, and since stock out results in lost sales, the distributor's cash flow highly depends on inventory control. Given sales forecasts, how should producer manage its inventories?

Can we suggest producer/distributor contracting models that lead to more profitable supply chains?

We will provide real world data.