SUPPLY CHAIN OPTIMIZATION FOR A MAJOR RETAILER: CHOOSING THE RIGHT LOCATION FOR WAREHOUSES

PROBLEM:
Eldorado Company, a huge electronics retailer in Russia, with stores in 350 cities, needed to determine the optimal number of warehouses, and where they should be situated, in order to better fulfill customer demand and minimize delivery and storage expenses. The analysis showed that the problem could be solved with introduction of the anyLogistix supply chain optimization system. Input data provided by the customer described potential warehousing points: rent cost, investments for building new or modernizing old warehouses, average level and cost of storage, overall costs for staffing and security, etc. In addition, the anyLogistix simulation model considered the warehouse and retail store GIS coordinates, and distances between cities.

SOLUTION:
The introduced system allowed the client to simulate, in detail, several kinds of activities:

- **Daily basis (model time):** goods are sold in stores, and losses from the shortage of demanded goods are counted.
- **Weekly basis:** inventory is supplemented to target level, transportation costs are counted, and deferred payments to suppliers are planned.
- **Monthly basis:** warehouse levels are renewed according to monthly sales levels of stores, transportation routes from warehouses to stores are generated, and franchisee shipments are planned.

Monthly sales numbers conform to average sales numbers, while daily sales are generated stochastically.

Users can carry out several experiments with the model:
• In a simple **simulation experiment**, a user manually chooses warehouses from the list to test the desired scenario, and launches the model in order to receive statistics for this specific network configuration.

• **Parameter variation experiment** checks all possible scenarios of warehouse positioning, taking into account “fixed” warehouses and their maximum number. The result of this experiment is the best combination of warehouses that cost the least amount of money.

• Based on this configuration of the supply chain, **optimization experiment** can calculate in-store warehouses’ floor space.

### Eldorado case study: model input and output

- **Input**
  - Warehouses: possible locations, rent rates, salaries
  - Stores: cities, rent rates, space, fleet
  - Initial and targeted inventory levels
  - Sales plan
  - Routes parameters
  - Products prices and terms for deferred payments
  - Formula for calculation losses from the shortage

- **Output**
  - Transportation costs
  - Storage costs
  - Service level estimation
  - Losses from the shortage
  - Suppliers’ transportation costs
  - Investments for building new or modernizing old warehouses
  - Dependence of total costs on storage space at stores

### OUTCOME:

The supply chain optimization project allowed the retailer to choose positioning variant of a warehouse network out of 63,000 combinations. The software implementation costs are paid off during the first two months of work when using the distribution network system recommended by the model. The decision support system is expected to operate for a long time, as it allows the users to find new optimal distribution system setups in case the market situation changes (change of transportation tariffs, warehouse parameters, amount of stores and sales, etc.).