PROCUREMENT OPTIMIZATION WITH POSSIBILITY OF ALTERNATIVE USE OF CAPITAL [1]

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Company buys goods on the stock exchange and sells them. Some values and functions are defined: λ is the intensity of the goods sale, $\alpha + \beta v$ are the costs for the purchase and delivery of goods in the amount of $v > 0$, c is the selling price of one good, c_{xp} are specific storage costs. Periodicity T and purchase size $v = T\lambda$ are to be found to maximize the profit. Problem without storage costs was considered in [1].

We use discounting technology to compare costs in different time. Let r_0 be the rate of alternative risk-free capital allocation. Intensity of the incomming cashflow $c\lambda$ with discounting is $\frac{c\lambda}{(1+r_0)^t}$. Income discounted to the initial time for period T is

$$\int_0^T \frac{c\lambda}{(1+r_0)^t} dt = \frac{c\lambda}{ln(1+r_0)} \cdot \left(1 - \frac{1}{(1+r_0)^T}\right).$$

Storage costs in the delivery moment

$$\int_0^T \frac{(T\lambda - t\lambda)c_{xp}}{(1+r_0)^t} dt = \frac{c_{xp}\lambda}{ln^2(1+r_0)} \cdot \left(T \cdot \ln(1+r_0) + \frac{1}{(1+r_0)^T} - 1\right).$$

The profit to be maximized is

$$\frac{1}{T}\left(\frac{c\lambda}{ln(1+r_0)} \cdot \left(1 - \frac{1}{(1+r_0)^T}\right) - \alpha - \beta v - \frac{c_{xp}\lambda}{ln^2(1+r_0)} \cdot \left(T \cdot \ln(1+r_0) + \frac{1}{(1+r_0)^T} - 1\right)\right).$$

This function is convex and has a unique maximum. Model can be generalized to the case of irregular deterministic demand, but there is no periodicity. It is needed to optimize profits on the fixed interval with the boundary constraints of supply of the product. Discrete model is built, dynamic programming algorithm is proposed. Approaches to profit maximization in multiproduct systems are described.

LITERATURE

1. N.I. Burlakova,V.V. Servakh *Specific profit maximization in the inventory control problem*// Proceedings of the International Conference "Discrete optimization and operation research". — Novosibirsk, 2013, P. 164.

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