OPTIMAL ALLOCATION OF RESOURCES BETWEEN THE NETWORK PROJECT (BY THE EXAMPLE OF PIPELINES CONSTRUCTION)

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We consider the construction of the main pipeline in the form of a directed graph G_{ij}, whose works (i, j) are grouped by projects (sites) G_k, having different priorities of execution, where $1 \leq k \leq n$, n - number of projects. Each project has a minimum and maximum allowable probability of completion (P^* and P^{**}, respectively) in the decision-making deadline D_k project.

The basic idea of the problem of optimal allocation of resources between projects is to increase the likelihood of their completion deadlines D_k given initial investment resources company C_Σ. If any of the projects D_k in time $t \geq 0$ can not be completed in the due date with an acceptable probability, then redistributes the remaining investment resources $\sum_{k=1}^{n} C_k(t)$ between projects G_k.

As the objective function is used the sum of products of the coefficients of priority projects and their completion probabilities in the appropriate deadlines. Necessary to determine the values C_{kt}, at which the objective function is maximized:

$$\sum_{k=1}^{n} \{\eta_k \cdot P_k(C_{kt})\} \to \max,$$

following conditions:
1. $P_k^* \leq P_k(C_{kt}) \leq P_k^{**}, \quad 1 \leq k \leq n,$
2. $\sum\limits_{k=1}^{n} C_{kt} = \sum\limits_{k=1}^{n} C_k(t),$
wherein $P_k(C_{kt}) = P(t+T_k(C_{kt}) \leq D_k)$; C_{kt} – investment resources allocated by k– th project at a time $t \geq 0$, $C_{k0} = C_k$; $C_\Sigma \leq \sum\limits_{k=1}^{n} C_k$ – initial volume of investment resources for all n projects; $T_k(C_{kt})$ - random duration of the k-th project, assuming that is $P_k(C_{kt})$ linearly dependent on C_{kt}; $P_k^* = P_k(C_{kt}^*)$ - probability of completing k -th project in the due date D_k dedicated his investments C_{kt}^*; $C_k(t)$ is the remaining unused investment resources for the $t \geq 0$; η_k - priority factor (degree of importance) project.

To solve the problem, we have developed step by step algorithm, which is implemented by means of language C + + programming environment Rad Studio 2010. The algorithm is tested on the example of the allocation of financial resources for construction sites pipeline Eastern Siberia - Pacific Ocean (ESPO). Under certain restrictions, the model allows an exact solution.