THE STUDY OF DYNAMIC MODEL OF THE COMPETITION BETWEEN TWO ENTERPRISES

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A lot of literary works are dedicated to the mathematical modeling of the competition processes. For our project we have chosen the model of population's interaction by V.Volterra which was used to develop the dynamic model of competition in the work [1].

As for example consider two companies, which produce the interchangeable commodities of the same quality, and which are at the same market sphere. In this case, the single price is set for the whole market, which is determined by the balance of gross demand and supply. Therefore, within a model, competitive battle is conducted with the help of marketing methods: the opponents can influence each other only by changing the parameters of their manufacturing.

The changing of the vending capacity of the competitive companies, within the time, is presented by the nonlinear system of differential equations:

$$\frac{dq_1(t)}{dt} = a_1 q_1(t)[N - (q_1(t) + q_2(t))] - b_1 q_1(t) q_2(t);$$

$$\frac{dq_2(t)}{dt} = a_2 q_2(t)[N - (q_1(t) + q_2(t))] - b_2 q_2(t) q_1(t),$$

within initial conditions: $q_1(0) = q_{01}, \quad q_2(0) = q_{02}$. The vending capacity of the first and the second company is denoted as: $q_1(t), q_2(t)$, N - the capacity of the marketing pending segment, a_1, a_2, b_1, b_2 -positive coefficients, which determine the degree of influence of various factors on changing the market capacity of the first and the second companies.

The numerical solution of this problem was obtained with the help of Scilab system. The final dependencies of the changes at the market demonstrate the mortification of one company, depending on the initial parameters of the system. The productive analysis of the differential equation system shows, that the stationary condition, when b1,b2>0 and the two companies' vending is more than zero, and is unstable.

Conclusion. The given model reflects the real tendencies of the development of this situation, except for long-lasting co-existence of the companies.

References: 1. A.V.Kopylov , A.E.Prosvirov . A dynamic model of competition between two firms in a homogeneous market. - Successes contemporary science No. 8, 2003 , p.29- 32.