ECONOMIC AND MATHEMATICAL MODEL FOR FORECASTING THE VOLUME OF TRAFFIC USING MS EXCEL

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In this article we consider forecasting the economic process using pairwise linear regression and the least squares method using MS Excel. Let's look at an example. Entrust the transportation of industrial products to the company. We have data on traffic volume for the last 9 months. Determine the estimated traffic volume for the 10th month. We build a graph of the traffic volume function depending on the calendar month and a graph of the traffic volume with a polynomial approximation.

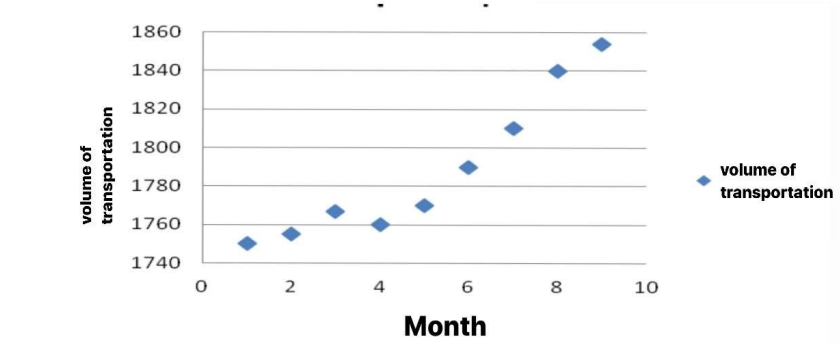

Fig. 1. Graph of the function of the volume of traffic

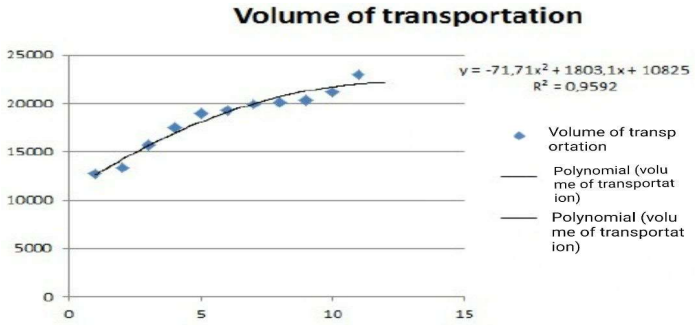

Fig. 2. Diagram of the volume of traffic with polynomial approximation

Set the confidence level γ = 90% (taking into account the ratio α = 1-γ = 10% - the level of significance). Apply the Regression package Data Analysis tool. As a result, we have a mathematical model: volume = 1851 * month ^ 2 -5401 * month + 1756.81. Coefficients a1, a2, b of implicit linear regression (y = 1.851x2 -5.4001x + 1756.81). The probability level of the applied polynomial approximation is close to 1 (equal to 0.98), i.e. there is a close correlation between the variables under consideration.

To get the desired value, go to the trendline editing mode and on the Parameters tab set Forecast forward by 1 unit. We have: forecasted traffic volume for the 10th month ≈22 120 000 tons. There are a number of inconveniences when modeling in Microsoft Excel:

1. Determining the trend line is complicated.
2. Estimation of plausibility of the model and calculation of interval estimates of predicted values are not automated.

To simplify the calculations, we use the least squares method. It consists in selecting a formula that describes the experimental data well. The selection of such a formula is an essential part of the processing of experimental data.

x	y	x^2	x*y	x^3	x^4	x^2*y
1	12658	1	12658	1	1	12658
2	13278	4	26556	8	16	53112
3	15678	9	47034	27	81	141102
4	17430	16	69720	64	256	278880
5	18985	25	94925	125	625	474625
6	19222	36	115332	216	1296	691992
7	19876	49	139132	343	2401	973924
8	20120	64	160960	512	4096	1287680
9	20345	81	183105	729	6561	1647945
10	21202	100	212020	1000	10000	2120200
11	23001	121	253011	1331	14641	2783121
12	22120	144	265440	1728	20736	3185280
78	223915	650	1579893	6084	60710	13650519
60710	6084	650		13650519		
6084	650	78		1579893		
650	78	12		223915		
0,0007493	-0,00974	0,02272727		-71,92932		
-0,00974	0,1336164	-0,3409091		1805,3294		
0,0227273	-0,340909	1,06818182		10821,114		

Thus, the use of a Microsoft Excel spreadsheet allows you to create not only a correlation-regression model, but also to predict the overall efficiency of the economic process and determine the development of the enterprise in the future. However, for more complex economic processes, including multifactor models, it is advisable to use a package of statistics.

List of used literature:

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