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Methods of Forecasting the Development of the Nation's Economy Based on the Forecast of Automotive Products Export

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Abstract: ***Various forecasting methods and models have been analyzed, the possibility of their use in forecasting the automotive products export has been substantiated in the study. A mechanism for predicting the automotive products export based on regression analysis, Fisher's ratio, Pearson correlation coefficient has been proposed. The analysis of the automotive products market has been conducted, a mechanism has been designed to substantiate the connection between the export of automotive products and the development of the nation's economy. A methodology has been developed to forecast the development of the nation's economy based on the forecast for automotive products export. The reliability of the statement that the sale of cars characterizes the development of the economy has been proved. The proposed methodology is recommended to be used for forecasting GDP, development of the nation's economy, and at the strategic level of planning the development of the automotive industry.***

Keywords: ***methods, forecasting models, correlation, covariance, regression analysis, Fisher's ratio, Pearson correlation coefficient, Gross Domestic Product.***

I. INTRODUCTION

Research in the application of forecasting methods when determining the volume of exports of products, as well as the development of models for forecasting the development of the nation's economy based on the forecast of automotive products export is a relevant and significant area. Automobile manufacturing is divided into two parts: light and heavy, for example, trucks and heavy vehicles for special purposes. The heavy automobile manufacturing is quite high-tech, it takes a long time to design a product, and the performance life of heavy cars can reach 20-30 years, so this segment of the economy requires large amounts of financial investments.

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Freight motor transport plays a huge role in the development of the nation's economy. It sets the pace of economic growth of various industries and drives growing sectors of the Russian economy.

Manufacturing development, increasing volumes and the ability of organizations to meet all their financial obligations, i.e.

The solvency of enterprises of all segments in the economy show the demand for transportation associated with trucks. It may be said that the pace of development and economic growth in the Russian Federation depends on the development of engineering and motor transport in general. The analysis shows that the increase or decrease in demand for trucks is an indicator of some changes in the development of the nation's economy [13].

The objective of the study is to investigate and apply forecasting methods in determining the volume of export of products and develop a methodology for forecasting the development of the nation's economy, based on the forecast of automotive products export [15].

II. LITERATURE REVIEW

The most important theoretical aspects of the application of forecasting methods and models are reflected in the works of Russian and foreign authors (Braley R., Damodaran A., Egorov V. N. Troshin, A.N., J.K.Horn, Tikhonov, E.Ye., A.G. Granberg, Lapygin Yu. N., Krylov, V. Ye., Chernyavsky, A. P., Jingfei Yang M., Armstrong J.S., Ferrer R.C. Kinnunen, J. Valuing, Mabert, Vincent A Watts, Charles A., Mileris R., Orsag S., McClure K. and others) [1,2,5,8,12]. The analysis of various studies showed an elaboration both in terms of methodology and methods of the issues of the use of forecasting methods and models for solving problems of export and import of products. However, the cited studies do not sufficiently address the most important issues of the dependence of indicators of the development of industries with indicators of changes in GDP and economic development, which justifies the need for research in this direction.

As limitations of this study, the specifics of production, industry, state monitoring and control procedures, political and other foreign economic factors can be singled out. The prospects of the study are the development of a complex of economic and mathematical models for forecasting the development of GDP and the nation's economy based on correlation dependencies and forecasting exports of products from various industries.

The forecasting method is a sequence of actions that must be performed to obtain a forecasting model.

The forecasting model is a functional representation that adequately describes the process under study and is the basis for obtaining its future values. Methods fall into two groups: intuitive and formalized [3,4]. **Intuitive forecasting methods** deal with judgments and expert evaluations. Nowadays, they are often used in marketing, economics, politics, since a system whose behavior needs to be predicted is either very complex and can't be subject to mathematical description, or very simple and does not need such a description [6]. **Formalized methods** are the forecasting methods described in the literature, as a result of which prediction models are built, that is, they determine a mathematical correlation that allows one to estimate the future value of the process, that is, to make a prediction.

Models should be divided into two groups: domain models (mechanics, thermodynamics, fundamental analysis) and time series models that are looking for dependencies within a process. **Domain models** are mathematical prediction models that use domain laws to build them. For example, the model using which the weather forecast is made contains the equations of fluid dynamics and thermodynamics. The forecast of population development is made on a model built on a differential equation. The prediction of the blood sugar level of a person with diabetes is made on the basis of a system of differential equations. In brief, in such models dependencies are used that are inherent in a particular domain. This kind of models are characterized by an individual approach to the development [6,7].

Time series models are mathematical forecasting models that seek to find the dependence of the future value from the past within the process itself and to make a forecast based on this dependence. These models are universal for different domains, that is, their general appearance does not change depending on the nature of the time series. We can use neural networks to predict air temperature, and then use a similar model on neural networks to predict stock market indices. These are generalized models, like boiling water, in which if you throw a product, it will be cooked, regardless of its nature. Time series models can fall into two groups: statistical and structural [9, 11].

In statistical models, the dependence of the future value from the past is given in the form of some equation. They include:

1. regression models (linear regression, non-linear regression);
2. autoregressive models (ARIMAX, GARCH, ARDLM);
3. exponential smoothing model;
4. maximum sampling model;
5. etc.

In structural models, the dependence of the future value from the past is specified in the form of a certain structure and rules for transition along it. They include:

1. neural network models;
2. Markov chain models;
3. models based on classification and regression trees;
4. etc. [6]

To develop a methodology for forecasting the development of the nation's economy based on the forecast of automotive products export, a regression analysis mechanism will be used. The main goal of the regression analysis is to determine the analytical form of communication, in which the change in the effective attribute is stipulated by the influence of one or several factor attributes, and the set of all other factors that also affect the effective attribute is taken as constant and average values. Tasks of regression analysis:

a) Determining a form of dependence. Regarding the nature and form of the correlation between phenomena, positive linear and nonlinear and negative linear and nonlinear regressions are distinguished.

b) Determining the regression function in the form of a mathematical equation of one type or another and establishing the impact of the explicative variables on the response variable.

c) Evaluation of unknown values of the response variable. Using the regression function, you can reproduce the values of the response variable within the interval of the specified values of the explicative variables (i.e., solve the interpolation problem) or estimate the course of the process outside the specified interval (i.e., solve the extrapolation problem). The result is an estimate of the value of the response variable [10].

Pair regression is the equation of the connection between two variables, y and x:, where y is the response variable (effective attribute); x is an independent explicative variable (factor attribute). There are linear and non-linear regressions. Non-linear regressions are divided into two classes: regressions that are non-linear relative to the explicative variables included in the analysis, but linear according to the estimated parameters, and regressions, that are non-linear according to the estimated parameters. Regressions that are non-linear according to to explicative variables [3,4]:

- polynomials of different degrees
- equilateral hyperbola.

Regressions that are non-linear according to the parameters assessed:

- power
- exponential
- exponential

Building a regression equation is limited to estimating its parameters. To estimate regression parameters that are linear in parameters, the least-squares procedure is used. The least-squares procedure allows obtaining such estimates of the parameters at which the sum of the squared deviations of the actual values of the effective attribute y from the theoretical ones is minimal. Strength of relationship of the studied phenomena is evaluated by the linear coefficient of pair correlation coefficient for linear regression [7]:

$$r = r_{xy} = \frac{Cov(X;Y)}{s_x \cdot s_y} = \frac{\overline{xy} - \bar{x} \cdot \bar{y}}{\sqrt{\overline{x^2} - (\bar{x})^2} \cdot \sqrt{\overline{y^2} - (\bar{y})^2}}$$

The quality assessment of the built model is done by the coefficient (index) of determination, as well as the average approximation error. The average approximation error is the average deviation of the calculated values from the actual values.

The F-test — regression equation quality assessment — consists in testing the hypothesis. To assess the statistical significance of the regression and correlation coefficients, the Student's t-test and confidence intervals of each indicator are calculated. A H_o hypothesis is put forward about the random nature of the indicators, i.e. about their insignificant difference from zero.

The assessment of the significance of the regression and correlation coefficients using the Student's t-test is carried out by comparing their values with the value of the random error.

AR(p) autoregression models

Forecasting using the autoregression model is based on previous values.

An autoregression model of p order is generally described by the equation:

$$\widehat{Y}_t = \sum_{i=1}^{p} \alpha_{t-i} Y_{t-i} + \beta + \varepsilon \qquad (2)$$

Where:

$\widehat{Y}_t -$ predicted value at time t

$\alpha_i -$ autoregression model parameters

$Y_{t-i} -$ time series values

$\beta \in R -$model's intercept term

$\varepsilon \sim N(0, \sigma^2) -$ accidental exposure – white noise errors [9,11].

The conditions of development of different states and the combination of factors of production do not provide a full assessment of the level of a nation's economic development. To reveal this, there are many indicators that characterize the state of the economy of states, for example, is the state in a state of stagnation or stagflation. Studying the engineering industry and the heavy truck market, it has been established that by analyzing and evaluating the sales of heavy trucks in the nation's industry, one can determine the direction of the economy [4].

The production and sale of heavy trucks characterizes the state of the economy as follows:

1. Upgrading and creating modern technologies;
2. Development of road facilities;
3. Growth of investments in the engineering sector;
4. Development of the transport system and infrastructure;
5. Development of metallurgy;
6. Development of the agricultural industry;
7. Expansion of truck production which is a job creation;
8. Development of engine building;
9. Increase in freight turnover in the state;
10. Development of financial products, for example, the creation of leasing products.

Thus, the total volume of sales of trucks messages possible prospects and problems in the nation's economy. The greater the volume of truck sales in the state, the greater the volume of freight traffic becomes, the more infrastructure grows, the more the economy develops in general, the dynamics of truck sales in the industry explains changes in the nation's economy [2].

The method of forecasting the development of the nation's economy based on the forecast for the automobile products export developed in the study includes the following steps:

Stage 1. Market research, analytical presentation of the trucks export volume and GDP in the Russian Federation over the period.

Stage 2. Conducting a regression analysis of the export of cars and vehicles and GDP in the Russian Federation over the period. (On the basis of the initial data - the absolute values of GDP and the export of cars and vehicles, we will analyze the obtained correlation coefficients of factors).

Stage 3. Analysis of the dispersion statistics of vehicle export and GDP of the Russian Federation over the period (based on the determination of the Fisher's F ratio).

The determination of Student's t-test is of great importance at this stage, showing the significance of X factor (in this case, the export of vehicles) by comparing the table and calculated values. If the table value of the Student's t-test is lower than the calculated one, then this inequality confirms the existence of a direct interdependence between the variables.

Stage 4. Determining the dependence of the volume of GDP from the volume of vehicle export.

Stage 5. Formation of a correlation field for the distribution of GDP and truck export values, as well as a correlation field for export of trucks with a time series of 10 years.

Stage 6. Forecast of the volume of export over the period, million rubles

Stage 7. Forecast of GDP for the period in accordance with the equation of the linear regression line. (The level of increase in GDP volume which will cause an increase in vehicle export by one unit is determined).

III. RESULTS

The industrial complex of KAMAZ PTC comprises the entire technological cycle of the production of trucks - from the design and development, manufacture, assembly of automotive equipment and automotive components to the marketing of finished products and after-sales service. The following enterprises are part of the KAMAZ association of the technological chain:

1. Foundry and forge enterprises;
2. Engine manufacturing plant;
3. Press-frame enterprise;
4. Automotive enterprise;
5. Repair and tool companies;
6. Master Industrial Park [13,14,15].

The share of KAMAZ is almost equal to half of the truck market in the Russian Federation:

1. Trucks (more than 60 models, more than 1500 options of complete sets);
2. Different types of trailers;
3. Engines, power units, and various options of tools;

Products of the new generation: dump trucks 65802, 6580, 65801. Together with Daimler, the KAMAZ-6520 dump truck and the luxury KAMAZ-65201 truck were launched. The quality management system of KAMAZ PTC meets the requirements of international and national standards:

1. ISO 9001:2008, GOST ISO 9001-2011 in relation to the design, development, production and sale of trucks and truck and buses chassis, automotive components, spare parts and assembly kits for automotive parts, castings and stamped forgings, tools and accessories; truck maintenance;
2. GOST PB 0015-002-2012 applicable to the design, development, production, research, and sale of automotive equipment.

The quality management system of KAMAZ includes all stages of the product life cycle from marketing and design to the servicing of finished cars at the client. KAMAZ PTC exports automobiles, assembly kits of parts and spare parts to more than 40 countries of the CIS, Southeast Asia, Africa, the Middle East, Latin America, and Eastern Europe. By the end of 2017, the main foreign client of KAMAZ PTC was Kazakhstan with about 50% of the total export of cars and sets of parts for assembly.

Also, large volumes were supplied to Cuba in connection with the completion of a large contract, the implementation of which began in 2016. In addition, in 2017, the first export of KAMAZ vehicles to the company's new market, the Philippines (January 2018), was carried out [14].

The list of advantages of KAMAZ products:

1. Simplicity in operation, service, quality, trucks with low operating costs at reasonable prices;
2. Satisfying absolutely any customer desires;
3. The equipment of KAMAZ PTC can be used in any road and climatic conditions and is adjusted for them (reliability);
4. The development of the system of service centers in the Russian Federation and the CIS countries makes it possible to guarantee service up to 77 thousand kilometers of a car's mileage [13].

Table 1Structure of shareholders of KAMAZ PTC (shares of major shareholders owning more than 5% of the authorized capital of KAMAZ PTC)

Name	Amount of shares as of 31.12.18	% of authorized capital
Rostec State Corporation	333 110 899	47.1 %
Avtoinvest LLC	166 491 378	23.54 %
Daimler AG	106 084 434	15.00 %
Other legal entities and individuals	101 542 848	14.36%

The analysis of the dynamics of KAMAZ PTC for the last ten years shows the growth in sales of trucks from 2009 to 2012, decrease in sales from 2012 to 2015, from 2015 the sales of trucks have been increasing every year. It can be noted that the industry has been in decline since 2014. In 2013–2014 the tractive unit entered the market, in 2015 13% of the market was secured, in 2018 - 30%. Mechanical engineering industry of the Russian Federation on the example of KAMAZ PTC started to stabilize in 2016 [13,14,15].

According to the report of KAMAZ PTC 2016-2017 and subsequent years show that macroeconomics is in a state of stabilization. GDP growth for 2017 amounted to 1.5%.

The heavy truck market has had the following positive effect:

1. Mining has increased by 2%;
2. Growth in agricultural output has risen by 2.4%;
3. Retail turnover has had a positive trend by 1.3%;
4. Investment in fixed assets has increased by 4.4%;
5. Freight turnover of road transport has increased by 1.2%.

Thus, the sale of trucks characterizes the nation's economy and can show in which direction it is moving. In order to quantify this, it is necessary to conduct research on theoretical, analytical, mathematical aspects, which will prove this statement.

To assess the impact of the export of the machine-building complex on the gross domestic product, a correlation and regression analysis of the dependence of the studied indicators will be conducted. In accordance with the information of the Federal State Statistics Service, a table will be designed (see Table 2).

Table 2 Analytical representation of the volume of export of trucks and GDP in the Russian Federation in 2009-2018 [15].

Years	GDP, millions USD		Exports of trucks, millions USD	
	Absolute value	Relative change	Absolute value	Relative change
2009	1354663.2	-	17754.2	-
2010	1475214.6	8.9	22401	26.17
2011	1290656.5	-12.51	25932.6	15.77
2012	1505830.4	16.67	26579.1	2.49
2013	1773173.3	17.75	28910	8.77
2014	2175784.1	22.71	26495.1	-8.35
2015	2160808.5	-0.69	254404	-3.98
2016	1454895.3	-32.67	24431,.7	-3.96
2017	1185237.6	-18.53	28283.1	15.76
2018	1395977.7	17.78	29059.8	2.75

Based on the initial data - the absolute values of GDP and the export of trucks, the obtained correlation coefficients of the factors presented in Table 3 will be analyzed.

Table 3 The data of regression analysis of the export of trucks and GDP in the Russian Federation in 2009-2018

Multiple R	0.801819262
R-square	0.642914129
Standardized R-square	0.598278395
Standard error	220155.4853
Observation data	10
F	14.4

The resulting correlation coefficient (multiple R), equal to 0.802, indicates a rather high interdependence of the selected elements. In other words, the reliability of the model is more than 80%, which indicates a significant impact of truck export volumes on GDP. This means that with the growth in vehicle export volumes, GDP increases. At the same time, the R-square coefficient, equal to 0.643, says that the calculated parameters of the model explain the dependence between the variables for 64%. These results can be explained by the fact that the amount of export of trucks is included in the calculation of GDP.

In the generally accepted concept of regression analysis, this dependence is considered significant and its results can be called solid. Nevertheless, it is necessary to take into account the fact that a number of factors affecting all spheres of the nation's economy affect the gross production indicator.

According to calculations, Fisher's F-test (14.4) is three times the table value of this model (5.32), which once again confirms its reliability.

Table 4Dispersion statistics data of trucks export and GDP of the Russian Federation in 2009-2018

Dispersion statistics	Ratios	Standard error	t-statistics	R-indicator	Lower 95.0%	Upper 95.0 %

Y-intersection	506356.8	290625.1324	1.742302	0.119625	-163825.9432	1176540
X variable	55.75758	14.6915897	3.795204	0.005273	21.8787159 4	89.63645

Equally important is the Student's t-test (see Table 3.3), which shows the significance of X factor (in this case, the export of trucks) by comparing table and calculated values. Thus, the table value of the Student's t-test (2.2622) is lower than the calculated one (3.7952). This inequality confirms the existence of direct interdependence between variables.

The dependence of the GDP volume from the export volume of trucks is presented in Fig. 3

Подпись: Distribution of GDP and truck export values

Fig. 3 Correlation field of the distribution of GDP and truck export values

From the figure, it can be seen that the distribution of values has a rather ordered character. According to the presented calculations, as has been noted earlier, the dependence of the change in GDP from the increase or decrease in export of the machine-building complex is revealed.

To forecast the volume of trucks export, it is necessary, first of all, to determine the value of X factor. In our case, this factor will be a time series (years from 2019 to 2023). Forecasted values will also be determined by correlation and regression analysis.

According to this estimation, the export level of trucks will tend to increase every year. Thus, by 2023, the volume of exports should increase in comparison with 2018 by USD 8130.1 million, namely by 58.5%. The forecast on the basis of this analytics is rather optimistic, but, unfortunately, is not accurate (see Table 5). Based on the information received, the correlation field for the export of machines and vehicles to identify the future forecast of GDP will be designed (see Fig. 4).

Table 5 Forecast of the volume of export in 2019-2023, million, rubles

	2019	2020	2021	2022	2023
Export volume of machines and vehicles	29836.28	30132.76	31429.24	31725.72	3202 2.2

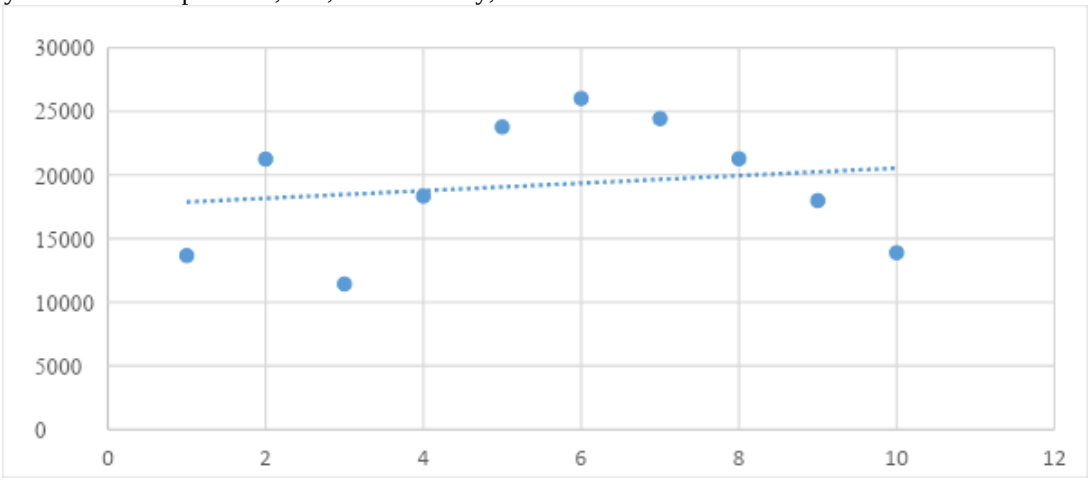

Fig. 4 Correlation field of export of trucks with a time series of 10 years (from 2009 to 2018)

According to the linear regression line equation, it has been revealed that an increase in the volume of export of trucks by one unit would entail an increase in the volume of GDP to 17,871.48 units.

Thus, the volume of GDP from 2019 to 2023 will increase from USD 6195115.29 million to USD 6546716.86 million, namely, by 5.68%. With such a growth rate, the Russian economy would show a significant breakthrough in the system of world economic relations and international trade relations. Predicted data are presented in the table.

Table 6 Forecast of GDP volume in 2019-2023, million, USD

	2019	2020	2021	2022	2023
GDP	6195115.29	6283015.68	6370916.08	6458816.47	6546716.86

Thus, the conducted study showed a high level of support for the industry from the state's side; an increase in the share of Russian brands in total truck production; based on heavy truck sales a conclusion can be made that the Russian economy is moving into a state of stabilization.

IV. DISCUSSION

The heavy machine-building industry is of great importance for the development of the economy. The authors have substantiated the feasibility of applying forecasting methods for forecasting automotive products export. The proposed mechanism for predicting the automotive products export based on regression analysis, Fisher's ratio, Pearson correlation coefficient corresponds to the theoretical foundations. The study has substantiated the connection of the automotive products export with the development of the nation's economy. The practical implementation of the developed methodology for forecasting the development of the nation's economy based on the forecast of the automotive products export confirms this fact. The proposed methodology is recommended to be used to predict the nation's GDP when creating state programs.

V. CONCLUSION

The study has examined the methods and models of forecasting and justified the feasibility of applying methods in determining the volume of export. A mechanism for forecasting the export of products has been proposed. A study of the machines and vehicles export market and GDP in the Russian Federation has been carried out. A regression analysis of machines and vehicles export and GDP in the Russian Federation for the period has been conducted. As well as the analysis of the dispersion statistics of vehicle export and GDP of the Russian Federation. A methodology has been developed for forecasting the development of the nation's economy based on the forecast for automotive products export. The mechanism of substantiation of the correlation of automotive products export with the development of the nation's economy has been proposed. The reliability of the statement that the sale of cars characterizes the development of the economy has been proved. The dependence of the volume of GDP from the volume of vehicles export on the basis of which the forecast of the volume of export of products was formed has been determined.

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REFERENCES

1. Burdina A.A., Moskvicheva N.V., Problems of Formation, Building and Implementation of Innovative, Investment and Intellectual Potential of Aviation Industry Enterprises in Modern and Projected Socio-Economic Conditions - Vestnik MGTU STANKIN [Bulletin of MSTU Stankin] - M.: Moskovskiy gosudarstvennyy tekhnologicheskiy universitet "STANKIN" Publ., 2018. 121-128p
2. Kibzun A.I., Kan S.Yu. Zadachi stokhasticheskogo programmirovaniya s veroyatnostnymi kriteriyami [Problems of Stochastic Programming with Probabilistic Criteria] - M.: FIZMATLIT Publ., 2009 – 361p.
3. Lapygin Yu. N., Krylov V. E., Chernyavskiy A. P. Ekonomicheskoe prognozirovanie: ucheb. posobie [Economic Forecasting: study guide] /— M.: Eksmo Publ. — 256 p.
4. Moskvicheva, N.V., Melik-Aslanova, N.O. Analysis of the Features of the Modernization of Production Capacity of Aviation Industry Enterprises /Melik-Aslanova N.O., Moskvicheva N.V.//Vestnik Moskovskogo aviatsionnogo instituta [Bulletin of the Moscow Aviation Institute].-2015.-Vol.22.-No.4.-p.208-213.
5. Statisticheskoe modelirovanie i prognozirovanie [Statistical Modeling and Forecasting] / pod. Red. A.G. Granberga. – M.: Finansy i statistika Publ., 1990. – 382 p.
6. Tikhonov E.E. Prognozirovanie v usloviyakh rynka [Forecasting in Market Conditions]. Nevinnomyssk, 2006. 221 p.
7. Troshin A.N., Burdina A.A Formalizatsiya zadachi optimizatsii stoimosti korporativnykh struktur s uchetom faktora regional'noy nadezhnosti [Formalization of the Task of Optimizing the Cost of Corporate Structures, Taking into Account the Factor of Regional Reliability]//Trudy MAI – M.: MAI Publ., eISSN: 1727-6942, 2011 – 74p.
8. Armstrong J.S. Forecasting for Marketing // Quantitative Methods in Marketing. London: International Thompson Business Press, 1999. P. 92 – 119.
9. Bodiako A.V., Ponomareva S.V., Rogulenko T.M., Karp M., Kirova E., Gorlov V.V., Burdina A.A. The goal setting of internal control in the system of project financing// International Journal of Applied Business and Economic Research. 2016. T. 14. № 15. C. 11045-11063.
10. Jingfei Yang M. Sc. Power System Short-term Load Forecasting: Thesis for Ph.d degree. Germany, Darmstadt, Elektrotechnik und Informationstechnik der Technischen Universitat, 2006. 139 p.
11. Troshin A.N., Burdina A.A., Moskvicheva N.V., Nikulina E.N., Tarasova E.V., Rogulenko T.M. Mechanism to analyze economic reliability of the innovational potential of aircraft enterprises//International Journal of Applied Business and Economic Research. 2016. T. 14. № 14. C. 747-765.
12. Analiticheskoe agentstvo AVTOSTAT [AUTOSTAT Analytical agency] [Electronic resource]: Gruzovye avtomobili [Trucks]. – Ofitsial'nyy sayt. – Rezhim dostupa: https://www.autostat.ru/.
13. Kharakteristika PAO «KAMAZ [KAMAZ PTC Characteristics] [electronic resource]. - https://kamaz.ru/
14. Analiticheskoe predstavlenie ob"ema eksporta mashin i transportnykh sredstv i VVP v Rossiyskoy Federatsii v 2009-2018 gg. [Analytical Representation of the Volume of Exports of Machines and Vehicles and GDP in the Russian Federation in 2009-2018] [Electronic resource]. - http://www.gks.ru/
15. Tarasova, E.V., Moskvicheva, N.V., Nikulina, E.N. Simulation-Based Improvement in the Models for Tool-Inventory Management at Manufacturing Plants/ Journal Russian Engineering Research/-2019