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Article

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Long-term Forecast of the Dependence of the Economy of the Khanty-Mansi Autonomous Okrug-Ugra (Russia) on the Sectors of the Fuel and Energy Complex

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ABSTRACT

The purpose of study is to investigate long-term forecasting of the share of fuel and energy complex sectors in the economy of the Khanty-Mansi Autonomous Okrug-Ugra. 10 most significant economic industries (sectors) of the Khanty-Mansi Autonomous Okrug-Ugra were identified, with impact factors determined based on questionnaires and correlation analysis for each industry, as well as regression equations were derived and three forecast scenarios were calculated covering the period until 2028 were elaborated. Regardless of the development scenarios, the oil and gas industry will remain to be the mainstream one in the Khanty-Mansi Autonomous Okrug-Ugra within the next 10 years. All the rest of the industries will develop basically along with the dynamics of this predominant industry. This indicates the effect of the path dependence of the Khanty-Mansi Autonomous Okrug-Ugra economy. To boost the pace of the economic sectors development in the Khanty-Mansi Autonomous Okrug-Ugra, serious institutional changes are needed, which, with few exceptions, cannot be carried out at the regional level.

Keywords: Long-term Forecast, Fuel and Energy Complex, Economic Structure, Energy, Oil

JEL Classifications: Q32, Q43, Q48, R11, F13

1. INTRODUCTION

The Khanty-Mansi Autonomous Okrug-Ugra is located in the center of the West Siberian Lowland. Its territory stretches from west to east for almost 1,400 km, from North to South – for 900 km. KMAO-Ugra is the main oil and gas region of Russia and one of the largest oil producing regions in the world; it belongs to the donor regions of Russia and leads in a number of key economic indicators:

- I place – oil production
- I place – production of electricity
- II place – industrial production
- II place – gas production
- II place – receipt of taxes in the budget system
- III place – investment in fixed assets.

The enterprises of the KMAO-Ugra by their activity form a significant part of the Russian economy: About 7.5% of industrial

production and 15.1% of state budget revenues. However, over the past 20-30 years, the main share in the structure of the region's GRP has been made up of the fuel and energy complex, which in total accounts for 50-70%. Therefore, of particular interest is the change in the share of sectors of the fuel and energy complex in the economy of a northern resource-extracting region, since most often the economy of such a region is a single industry and is represented by one or two dominant sectors. The KMAO-Ugra is a vivid example of such a northern resource-producing region; therefore, long-term forecasting of changes in the share of sectors of the fuel and energy complex and their impact on the economy of the district is of great interest.

Forecasting changes in the share of sectors of the fuel and energy complex in the region's economy is a type of forecasting of the structure of the economy and involves the use of modern methods of economic forecasting.

When predicting regional development, autocorrelation is one of the main methods for studying trends and cyclical components of time series (Peters, 2001). The value of the correlation coefficient $r(\tau)$ determines how strong the statistical relationship between the levels of time series shifted by τ units of time is (Cooley and Ogaki, 1996). Lehmann and Wohlrabe (2014) summed up many case studies from scientific journals and described the most modern methods of regional economic forecasting, most of which are based on correlation and autocorrelation methods.

Tramova et al. (2014), in their paper highlighted the importance of econometric modeling and forecasting of the regional economy using economic and mathematical models as a single set. The authors have analyzed the existing methodological approaches to forecast the development of regional economies. Studies have revealed the need to create the following system: Econometric models, along with correlation and regression models, including economic and mathematical, and interindustry models, as well as using the system analysis methodology and considering the regional economy as a complex system; a model for the forecasting of the Kabardino-Balkaria economic development was elaborated, as an econometric model with a block-recursive structure, medium- and long-term, nonlinear, sectoral, aggregated in macroeconomics and disaggregated by sectors of the economy, simulation and forecasting. As a result of decomposition, key industries of the national economy were singled out as subsystems.

As an example of the forecast of the sectoral structure of the region's economy, we can cite the work by Suzuki (2013). The paper developed a macroeconomic model for the whole state of Japan, and made an empirical analysis of the Japanese economy in terms of structure, forecasts, and modeling, along with policy assessments. In addition, a regional model has been developed for the Chubu region (Central Japan), which is interrelated with the above macroeconomic model for the entire state of Japan.

An important aspect of long-term forecasting is development scenarios. Uzyakov et al. (2010) study the issues of development of the uniform system of forecast calculations providing long-term prospects of the Russian economy both in the industry and regional contexts. Special emphasis is laid on the formation of regional development scenarios. It is assumed that such scenarios are based on the territorial structure of investments in the national economy. The calculations results are presented for the period up to 2030 under two scenarios. The paper (Vlasyuk and Minakir, 2013) describes a long-term two-scenario forecast of the Russia's Far East economy, compiled as a synthesis of scientific, technical and general economic approaches using a model software package. The paper presents the results of probabilistic systemic changes in the economic and social environment of the region for the period up to 2050. The forecast was based on scientific and technical forecasting and scenario assessment of general economic indicators dynamics.

It should be noted that for long-term forecasts, the uncertainty of the results is a big problem. In the paper (Giarratani and Houston, 1992), for the 1st time, modeling of uncertainty sources in economic policy forecasting was carried out using a large-scale

regional econometric model. The study (Christensen et al., 2018) presents uncertainty estimations in long-term growth forecasts, which are crucial for modeling uncertainty in long-term physical and economic results.

The study (Groshev, 2019) developed a model for determining the influence of macroeconomic factors on tax revenues, based on the application of the theory of algebra functions, elements of fuzzy sets and the analysis of proportional dependencies to predict income in the monoprofitable economy of the regions on the example of the Khanty-Mansiysk Autonomous Okrug-Ugra (KMAO Ugra) of Russia.

Earlier in the work, (Islamutdinov, 2018) we determined the factors influencing the development of the engineering and metalworking industry in the Khanty-Mansi Autonomous Okrug-Ugra based on questionnaire surveys and correlation analysis.

As for forecasting the sectors of the fuel and energy complex, the paper (Roland-Holst et al., 2010) examines the growth factors of Asia's economy over the next 20 years using a dynamic Computable General Equilibrium model to forecast the GDP and consumption trends. The forecast results show that the vulnerability of energy prices is a critical risk for regional growth, i.e., energy efficiency measures are needed to insure against this risk.

Another example is the work (Cui et al., 2019) based on energy consumption, GDP and energy-related CO₂ emissions from 1999 to 2015, a VAR model of the 3E system in Shanxi Province was established. Impulse response analysis and variance decomposition were employed to analyze the dynamic relationship between energy, economy, and the environment, with these three values being predicted from 2016 to 2023. Results indicate that a positive shock in economic growth negatively impacts energy consumption, and a positive change in energy consumption positively affects economic growth and CO₂ emissions as well.

A model was developed in the study (Warsono et al., 2019) that describes the relationship between the 2 time series data vectors: Coal exports and oil exports in Indonesia for the period 2002-2017. Forecasting results show that the model is reliable for forecasting for short periods, but the results are unstable (due to a higher standard error) when forecasting is carried out for long periods.

The article (Sapnken et al., 2018) simulated and predicted gasoline consumption in Cameroon until 2020 using historical data for the period 1994-2010. The results show that price, GDP and income are significant factors in gasoline consumption in Cameroon. Projected results show that gasoline consumption will increase by more than 7% per year by 2020.

Thus, despite the fact that studies have been carried out to forecast individual sectors of the KMAO-Ugra economy, as well as certain aspects of the development of the fuel and energy complex, the problem of forecasting the impact of the fuel and energy complex sectors on the economy of the region has not yet been resolved. The hypothesis of the study is that the economy of the northern resource-extracting region is subject to the effect of path

dependence and in the long run the fuel and energy industry sectors will continue to be crucial for the economy of the KMAO-Ugra. It is necessary to predict how the share of sectors of the fuel and energy complex of the KMAO-Ugra will change in the long term under the influence of internal and external factors.

2. FORECASTING METHODS OF THE REGION'S ECONOMY SIZE AND STRUCTURE

Thus, the predominant method of long-term forecasting of the size and structure of the regional economy is a combination of econometric and expert methods. Based on this, correlation and regression analysis and expert questionnaires were chosen as basic research methods. Correlation analysis was chosen because of the availability of statistical sources for estimating correlation coefficients and constructing regression equations. Expert questionnaires were selected due to the lack of some statistics and served to fill in the blanks.

To predict changes in the share of sectors of the fuel and energy complex in the region's economy, the gross regional product is presented as a set of economic industries and sectors:

$$Y = \sum_{i=1}^N Y_i \quad (1)$$

Where Y_i is the added value of a particular industry (sector) of the region's economy.

A total of 10 independent industries were selected, providing a total of almost 100% of the GRP, of which two industries are related to the fuel and energy complex:

1. Oil and gas production
2. Electric power engineering.

The remaining 8 industries are not directly related to the fuel and energy complex, but depend on it to a certain degree:

3. Services
4. Transportation
5. Construction
6. Trading and small business
7. Manufacturing
8. IT and communications
9. Agriculture
10. Finance.

For each industry (sector) based on the correlation and regression analysis of the indicators presented in statistical digests and the results of processing the questionnaires, the factors influencing the volume and dynamics of value added were defined, with regression equations derived by type:

$$Y_i = a + \sum_{j=1}^N b_j x_j \quad (2)$$

Where Y_i is the added value of a particular industry (sector) of the region's economy.

a – Y-intersection coefficient

b_j – factors coefficients influencing the value added dynamics of industries (sectors).

The regression equations coefficients for industries are presented in Tables 1-10.

Table 1: Regression equation for the oil and gas industry

Factors	Coefficients
Y-intersection	578154.30
Number of employed within the mineral extraction industry in Ugra, thousand people	-3897.82
Exploration drilling, 1000 m	844.53
Production volume in real terms, thousand tons	-4.74
Wear degree of fixed assets, %	17612.08
Fixed investment, RUB million	0.98
USD exchange rate, RUB	16574.76
Brent crude oil price, USD per barrel	8018.72

Source: Compiled by the author based on the statistical data analysis

Table 2: Regression equation for the service industry

Factors	Coefficients
Y-intersection	-523950.16
Number of enterprises, units	-29.86
Fixed investment, RUB million	-0.16
Population, thousand people	555.14
Average per capita population income, RUB per month	8.59
USD exchange rate, RUB	-244.35

Source: Compiled by the author based on the statistical data analysis

Table 3: Regression equation for the transportation industry

Factors	Coefficients
Y-intersection	-6543.41
Number of enterprises, units	33.42
Fixed assets costs, RUB million	-77.26
Investment, RUB million	0.91
USD exchange rate, RUB	1017.64
Brent crude oil price, USD per barrel	5.07

Source: Compiled by the author based on the statistical data analysis

Table 4: Regression equation for the construction industry

Factors	Coefficients
Y-intersection	39571.11
Number of enterprises, units	-17.38
Fixed investment, RUB million	0.18
Wear degree of fixed assets, %	817.10
USD exchange rate, RUB	-650.53

Source: Compiled by the author based on the statistical data analysis

Table 5: Regression equation for the electric power industry

Factors	Coefficients
Y-intersection	-71794.73
Number of employed, thousand people	2112.22
Profit, loss, RUB million	1.90
Fixed investment, RUB million	-0.21
USD exchange rate, RUB	361.22
Natural gas futures price, USD per m ³	-653.08

Source: Compiled by the author based on the statistical data analysis

Table 6: Regression equation for the trading and small business industry

Factors	Coefficients
Y-intersection	17037.46
Number of enterprises, units	-3.11
Number of employed, thousand people	0.49
Total turnover, RUB million	0.18
Balanced financial result, RUB million	-0.71
USD exchange rate, RUB	-649.24

Source: Compiled by the author based on the statistical data analysis

Table 7: Regression equation for the manufacturing industry

Factors	Coefficients
Y-intersection	46917.43
Number of enterprises, units	-14.86
Import, RUB million	0.31
Return on products, %	3155.53
Fixed investment, RUB million	1.36
Average price of coiled steel futures on the London stock exchange, USD per ton	3.91

Source: Compiled by the author based on the statistical data analysis

Table 8: Regression equation for the IT and communications industry

Factors	Coefficients
Y-intersection	-340995.72
Resident population, persons	0.25
Number of PCs per 100 employees, units	-848.60
Level of consumer interest in e-society, %	-362.70
Dependence on the KMAO-Ugra economy, GRP (RUB million)	0.01
Scientific and technological progress, standardized indicator	3478.87

Source: Compiled by the author based on the statistical data analysis

Table 9: Regression equation for the agricultural industry

Factors	Coefficients
Y-intersection	3723.31
Fixed assets costs, RUB million	0.69
Products price index	-40.44
Fixed investment, RUB million	0.94
Amount of state support, RUB million	0.84
Grain prices on the London stock exchange, USD per ton	2.49

Source: Compiled by the author based on the statistical data analysis

Table 10: Regression equation for the financial industry

Factors	Coefficients
Y-intersection	-14822.839
Fixed investment, RUB million	1.020
Number of operating credit institutions and affiliated offices at the beginning of the year, units	281.921
Key rate (bank rate) of the Central Bank, %	437.209
Credit indebtedness to legal entities and individuals at the beginning of the year, RUB million	-0.004

Source: Compiled by the author based on the statistical data analysis

northern resource-extraction region's economy: Most likely, best-case and worst-case ones.

Conditions of the most likely scenario:

- Demographic indicators at the current level
- Oil production volume will fall by an average of 3.3 million tons per year
- Oil price will fluctuate at 75-85 USD per barrel
- National currency will devalue at an average rate of 5% per year
- Consumption rate will grow by 0.01 per year.

Best-case scenario conditions:

- Demographic indicators at the current level
- Oil production volume will fall slowly by an average of 2.9 million tons per year
- Oil price will fluctuate at 115-140 USD per barrel
- National currency will devalue at an average rate of 4% per year
- Consumption rate will grow by 0.02 per year.

Worst-case scenario conditions:

- Demographic indicators are worse than the current level, migration of the population, birth-rate decline
- Oil production volume will fall slowly by an average of 3.8 million tons per year
- Oil price will fall at 45-30 USD per barrel
- National currency will devalue at an average rate of 6% per year
- Consumption rate will remain at the current level of 0.22.

3. RESULTS

3.1. The Dependence of Economic Development of the KMAO-Ugra on the Sectors of the Fuel and Energy Complex

To verify the model's validity, a retro-forecast calculation was performed (Table 11), the results of which were compared with the actual data that showed an acceptable deviation of 2-5%. The three following industries are the exceptions: Manufacturing, agriculture, and financial industry, where the deviation ranged between 13% and 18%, which can be explained by high volatility under the influence of either natural or financial factors.

The most likely scenario forecast of the size and industry structure of the Ugra GRP is presented in Table 12.

As seen in Table 12, the average growth rate of the Ugra economy is predicted at 5.1% per year, which is 1.1% points higher than the projected inflation rate. This is determined by the stagnation of the predominant oil and gas industry with a growth rate of 0.5% per year. The construction industry will be the fastest to grow (+3.6% in comparable prices). Electric power engineering industry (+2.7%) along with IT and communication (+2.8%) also will show good growth rates. The worst-case scenario forecast is for the financial industry, with projected decline by 7.2% per year.

The best-case forecast of the size and industry structure of the Ugra GRP is presented in Table 13.

A total of 3 scenarios were used in forecasting using a regression model of the evolution of the size and industry structure of the

Table 11: Retro-forecast results, RUB million

Industry	2016 in fact	2016 retro-forecast	Deviation	
			RUB million	%
Oil and gas production	2126772	2073446	-53326	-2.5
Services	348188	328563	-19626	-5.6
Transportation	213407	214255	848	0.4
Construction	163115	154438	-3183	-2.0
Electric power engineering	97242	96815	-4059	-4.0
Trading and small business	90968	83046	-4785	-5.4
Manufacturing	62737	54404	-8332	-13.3
IT and communications	34138	34138	0	0.0
Agriculture	9410	7137	-1459	-17.0
Finance	3137	3706	569	18.1
Other (disarrangement)	-6468.38	30500	36968	x
Total	3136832	3080448	-56384	-1.8

Source: Compiled by the author based on the statistical data analysis

Table 12: The most likely scenario forecast of the size and industry structure of the Ugra gross regional product in 2028, RUB million

Industry	2028	12-year	Average annual growth	Growth rates at
	forecast	growth rate	rate, %	comparable prices, %
Oil and gas production	3272498	1145725.6	4.5	0.5
Services	553968	205780	4.9	0.9
Transportation	359369	145962	5.7	1.7
Construction	312571	149456	7.6	3.6
Electric power engineering	174976	77734	6.7	2.7
Trading and small business	146003	55035	5.0	1.0
Manufacturing	88613	25876	3.4	-0.6
IT and communications	62188	28050	6.8	2.8
Agriculture	14085	4675	4.1	0.1
Finance	1931	-1206	-3.2	-7.2
Other (disarrangement)	49862	56330	x	x
Total	5036064	1914190	5.1	1.1

Source: Compiled by the author based on forecasted calculations

Table 13: The best-case scenario forecast of the size and industry structure of the Ugra gross regional product in 2028, RUB million

Industry	2028	12-year growth	Average annual growth	Growth rates at comparable
	forecast	rate	rate, %	prices, %
Oil and gas production	3988231	1861459	7.3	3.3
Services	626389	278201	6.7	2.7
Transportation	404743	191336	7.5	3.5
Construction	330996	167881	8.6	4.6
Electric power engineering	218635	121393	10.4	6.4
Trading and small business	163758	72789	6.7	2.7
Manufacturing	113371	50634	6.7	2.7
IT and communications	93524	59386	14.5	10.5
Agriculture	16490	7079	6.3	2.3
Finance	11983	8846	23.5	19.5
Other (disarrangement)	59681	66150	x	x
Total	6027800	2890968	7.7	3.7

Source: Compiled by the author based on forecasted calculations

As seen in Table 13, in the best-case scenario, the average growth rate of the Ugra economy is projected at 7.7% per year, which is higher than the projected inflation rate by 3.7% points. This is determined by the growth of the predominant oil and gas industry, with a growth rate of 3.7% per year. The financial industry will be the fastest to grow (+19.5% in comparable prices). IT and communication (+10.5%) along with electric power engineering industry (+6.4%) also will show good growth rates. The worst-case forecast is for agriculture, which is projected to grow by just 2.3% per year.

The worst-case scenario forecast of the size and industry structure of the Ugra GRP is presented in Table 14.

As seen in Table 14, in the worst-case scenario, the average growth rate of the Ugra economy is projected at 2.6% per year, which is 1.4% points lower than the projected inflation rate. Thus, there is a projected decline in the regional economy. This is determined by the decline in the predominant oil and gas industry by -2.1% per year. The financial industry will be the fastest to fall (-12.3% in comparable prices), and this industry is predicted

Table 14: The worst-case forecast of the size and industry structure of the Ugra gross regional product in 2028, RUB million

Industry	2028 forecast	12-year growth rate	Average annual growth rate, %	Growth rates at comparable prices, %
Oil and gas production	2556764	429992	1.7	-2.3
Services	481548	133360	3.2	-0.8
Transportation	313994	100588	3.9	-0.1
Construction	294147	131032	6.7	2.7
Electric power engineering	156847	59606	5.1	1.1
Trading and small business	146003	55035	5.0	1.0
Manufacturing	63855	1118	0.1	-3.9
IT and communications	45961	11823	2.9	-1.1
Agriculture	11680	2270	2.0	-2.0
Finance	0	-3137	-8.3	-12.3
Other (disarrangement)	40708	47176	x	x
Total	4111508	974676	2.6	-1.4

Source: Compiled by the author based on forecasted calculations

to have completely collapsed in the Ugra economy by 2028. The manufacturing industry also will experience a severe fall (-3.9%). At the same time, a number of industries will enjoy positive dynamics: Construction (+2.7%), electric power engineering (+1.1%) and trading, which is projected to increase by 1.0% per year. That is, the industry is less exposed to the crisis.

3.2. The Projected Structure of the Economy

Possible change in the regional economy structure is of the greatest interest. The current structure is shown in Figure 1. As seen in the figure, the oil and gas production is the predominant industry of the Ugra economy, which share in GRP accounts for 68%. In the second place is the service industry with its 11% share, in the third place is the transportation industry with 6.8%. Then follow construction (5.2%), electric power engineering (3.1%), trading (2.9%), manufacturing (2%), IT and communications (1.1%), agriculture and financial industry with less than 1%. That is, the industry-specific nature of the region's economy is evident.

Based on the modeling results of the most likely development scenario, the industry structure of the region's GRP will have minor changes (Figure 2).

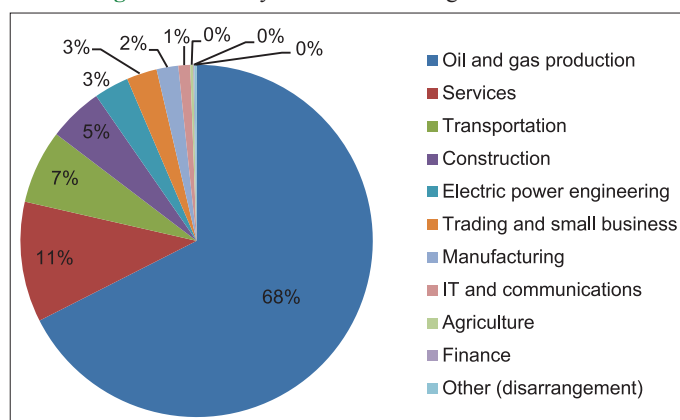
As seen in Figure 2, the share of the oil and gas production will remain almost at the same level of 65%. The common disposition of industries will not change, with only minor changes in the ratio, for example, the share of construction will increase to 6%, and the share of electric power engineering to 4%.

The industry structure of the region's GRP in the best-case scenario will have minor changes (Figure 3).

As seen in Figure 3, the share of the oil and gas production will remain almost at the same level of 66% and the share of the electric power engineering will increase to 4%. The common disposition of industries will not change, with only minor changes in the ratio, for example, the share of service industry will decrease to 10%.

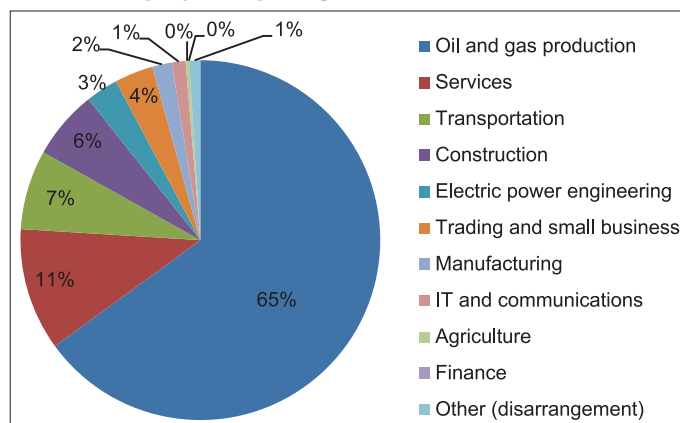
The industry structure of the region's GRP in the worst-case scenario will have more considerable changes (Figure 4). The share of oil and gas production will decrease to 62%. Though the common disposition of industries will not change, with only

Figure 1: Industry structure of the Ugra GRP in 2016



Source: Compiled by the author based on the statistical data analysis

Figure 2: The most likely scenario forecast of the industry structure of the Ugra gross regional product in 2028, RUB million



Source: Compiled by the author based on forecasted calculations

minor changes in the ratio, for example, the share of the service industry will increase to 12%, transportation to 8%, construction to 7%, electric power engineering to 4%. That is, regardless of the projected crisis in the oil and gas industry, the industry-specific nature of the Ugra economy will remain intact in the long term.

A comparison of different forecast scenarios of the size and industry structure of GRP shows that the industry-specific nature

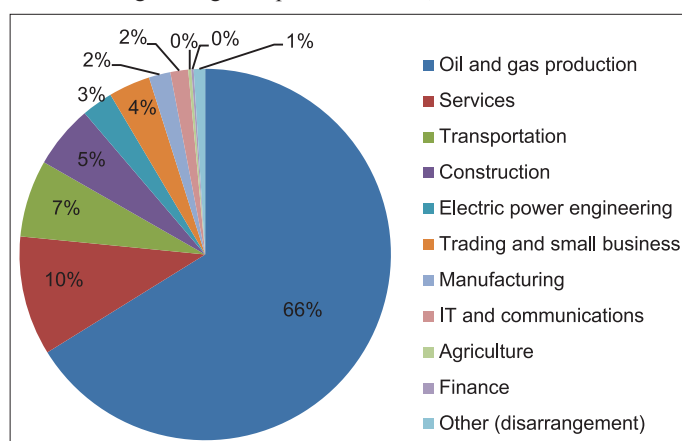
of the Ugra economy will remain intact within the next 10 years, regardless of the scenarios. Hopes for the large-scale development of the manufacturing industry in the region can be traced in none of the development scenarios. It seems, this requires a fundamental change in economic institutions or prices in international markets.

4. DISCUSSION

Thus, using the forecast model based on correlation and regression analysis and expert estimates, the hypothesis was confirmed that the dominant role of the fuel and energy complex sectors in the economy of the KMAO-Ugra will remain in the long term.

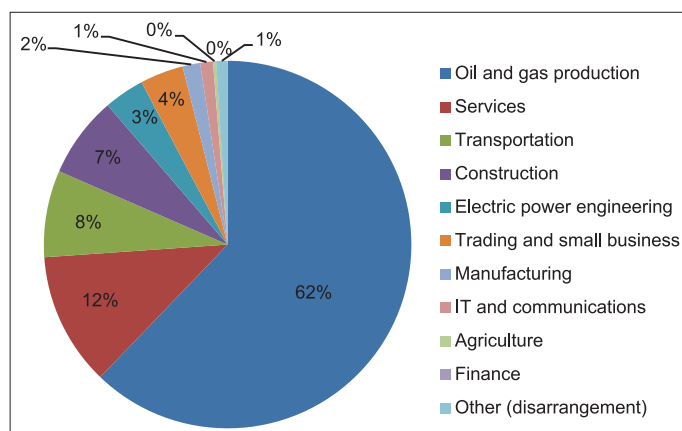
The forecast for most sectors that are not related to the fuel and energy complex, with rare exceptions, practically copies the forecast for the sectors of the fuel and energy complex. At the same time, an increase in the share of the service sector with a pessimistic version of development does not contradict the general trend since this does not lead to the replacement of the products of the fuel and energy complex with the products of manufacturing industries. This suggests the presence of the effect of path dependence (Martin and Sunley, 2006; North et al., 2007).

Figure 3: The best-case scenario of the industry structure of the Ugra gross regional product in 2028, RUB million



Source: Compiled by the author based on forecasted calculations

Figure 4: The worst-case scenario of the industry structure of the Ugra gross regional product in 2028, RUB million



Source: Compiled by the author based on forecasted calculations

The current state of the region's institutional system depends on its development in previous periods, restrictions on the freedom of arbitrary choice, imports or the structure of institutions and can lead to stabilization of inefficient institutional systems, or an "institutional trap" (Libman, 2008; Brekke, 2015). On the other hand, the development of technological solutions will help the development of the fuel and energy complex, for example, by integrating development strategies with the construction sector. This area is cost-effective: It is estimated that 25-40% of only direct energy savings, depending on the country, can be achieved at the national level in the housing sector through the use of cost-effective fuel and energy technologies (Nezhnikova, 2019).

To further test the path dependence, it is of great interest to develop marginal forecast scenarios that require a critical change in the basic conditions and institutions.

In addition, a very promising area of research is the involvement in the scientific circulation of information from the already emerging databases of big data and information freely distributed on the internet. The use of big data will improve the accuracy and quality of forecasts of the impact of the fuel and energy complex on the development of the regional economy.

To improve the quality of forecasts, one can use the apparatus of deep learning neural networks, with the help of which it is possible to identify hidden relationships between factors. Of great interest is simulation modeling, which allows one to take into account the mutual influence of industries and economic sectors, as well as build a dynamic model for the development of the scale and structure of the regional economy.

5. CONCLUSION

Summing up, it should be noted that the oil and gas industry will continue to be the key industry in the KMAO-Ugra in the next 10 years. Thus, the hypothesis that the KMAO-Ugra economy is subject to the effect of path dependence has been confirmed. In order to overcome the dependence of the KMAO-Ugra economy on the fuel and energy sector, serious institutional transformations are needed in the long term, which, with rare exceptions, cannot be carried out at the regional level.

Long-term forecasting of the development of the KMAO-Ugra economy shows that the average growth rate of the KMAO-Ugra economy is projected at 5.1% per year, which is 1.1% points higher than the projected inflation rate. This is determined by the stagnation of the prevailing oil and gas industry with a growth rate of 0.8% per year. As a result, the sectoral structure of the region's GRP will change insignificantly; the share of the sectors of the fuel and energy complex will remain almost at the same level of 66-70%.

As for other industries, the construction industry will grow the fastest (+3.6% in comparable prices). The electric power industry (+2.7%) and IT and communications (+2.8%) will also grow well. The worst forecast is for the financial sector, which is projected to decline by 7.2% per year. The general order of industries will

not change; only specific weight will change a little. For example, the share of construction will increase to 6% and the share of the electric power industry – to 4%.

The use of expert estimates and regression models to predict the evolution of the scale and sectoral structure of the economy of the northern resource-mining region has shown high efficiency, allowing for experiments to be carried out with various scenarios of basic conditions. However, additional experiments are required to test the effect of cyclicity in the development of the KMAO-Ugra economic sectors. Additional experiments are also needed to test the impact of demographic indicators on the development of the region's economy.

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