UDC 332.1

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ANALYSIS OF THE FACTORS OF "MECHANICAL ENGINEERING AND METALWORKING" INDUSTRY DEVELOPMENT IN THE KHANTY-MANSI AUTONOMOUS OKRUG — UGRA

Interest in studying factors that have an impact on the mechanical engineering and metalworking industry development is associated with studying the impact of institutional factors on the industry structure of a resource-producing region's economy. The survey results and statistical data were used as source data. The research is focused on the impact of internal and external factors on the evolution of the mechanical engineering and metalworking industry in the resource-extraction region. I analyze factors affecting the mechanical engineering and metalworking industry development in the Khanty-Mansi Autonomous Okrug — Ugra. The purpose of the study is to identify the importance, direction and degree of the factors impact on the mechanical engineering and metalworking development amid crisis and sanctions. The hypothesis of the study is that the mechanical engineering and metalworking industry in the Khanty-Mansi Autonomous Okrug — Ugra derived from oil production. The basic methodology of the paper is a questionnaire survey method and an economic-statistical survey, in particular, multiple correlation and autocorrelation methods. As a result, the study revealed the impact of informal institutions, the most important factors and trends in the industry development and the continued dependence on the national currency rate while reducing of that on oil prices. According to the analysis results, it was revealed that informal standards and rules have both positive and negative impact on the industry development. The most important positive factors are the level of competition within the industry, the state strategy for mechanical engineering and metalworking industry development. The most important factors affecting the industry development negatively are the skill level and composition of human resources, as well as the geographical location of the region. An enterprises consolidation trend and an increase in labor productivity are taking place, as well as increase in capital intensity of production, a positive impact of inflation, and enhanced role of export. The dependence on the national currency exchange rate is still in place, while that on oil prices can be deemed settled. The scientific contribution is that I have identified both the impact of informal institutions on the mechanical engineering and metalworking industry development and hard-to-explain interdependencies and trends. I have concluded that the mechanical engineering and metalworking industry derived from the region's leading industry — oil and gas production, and its development is largely determined by internal factors. The results can be applied in public administration domain at the regional level, with changes to be made in legislation, in further studies. The question of what is primary — regional economic institutions or whether the economic development of the industry in the region remains contentious and can be considered as a limitation or direction for future research.

Keywords: analysis, development factors, impact degree, evolution, industry, mechanical engineering and metalworking, resource-extraction region, Khanty-Mansi Autonomous Okrug — Ugra, internal factors, external factors

1. Introduction

The factor is generally understood as a driving force. In this paper, factors are deemed as any parameters, conditions and trends that have an impact on the dynamics and direction of the industry development. The development of economic sectors occurs under the influence of various factors, some of which can be called internal, or endogenous, as they arise from phenomena and processes that can be affected in one way or another, while the other should be considered external, or exogenous, as they cannot be affected and should be accepted as a given. Internal factors include internal industry factors, such as investment, quantity and quality of labor, forms and scale of production, competition level within the industry, and more. External factors include mesoeconomic ones, that is, acting on a regional scale, macroeconomic for all of Russia, and international, or foreign economic. In addition, the whole range of factors can be distinguished by the source of impact as economic, political, socio-cultural, scientific and technical, institutional and other.

The hypothesis of the study is that the mechanical engineering and metalworking industry in the Khanty-Mansi Autonomous Okrug—Ugra is of a derivative nature, that is, its development is determined not by internal, but rather by external factors, and primarily by the development of the region's key industry—oil and gas production.

2. Theoretical and methodological fundamentals to analyze the factors of the mechanical engineering and metalworking industry development

The study of regional development features of the mechanical engineering and metalworking industry in Russia are carried out actively. Examples may include works by V.V. Shevelkov [1] for the Pskov Region, L.V. Potapov [2] based on the materials of the Republic of Buryatia N. Miftakhov [3] on the data of the Republic of Tatarstan, R.A. Tretyakov [4] in the Khabarovsk Krai, T.A. Mezhetskaya and A.N. Mezhetskoi [5] on the materials of Tyumen Region. A.V. Gagarinsky [6] made an attempt to summarize regional challenges of the mechanical engineering and metalworking industry in Russia.

Abroad, interest in studying mechanical engineering and metalworking industry development trends occurs primarily in developing countries. For example, an in-depth comparative study of the mechanical engineering industry transformation with respect to the current trends and state policy was conducted by S. Navrodsky and D. Babitsky, with Belarus, Ukraine and Moldova as an example [7]. Based on the Ukraine's data, there is a separate study of industry development in general, and of mechanical engineering, specifically [8]. Also, the mechanical engineering development in Latvia is being referenced to [9]. The mechanical engineering development in China [10, 11], India [12], Nigeria [13] attracted great interest.

Internal factors like a lack of investment and low labor productivity due to a technological gap ere what Russian researchers most often attribute to the key factors affecting the mechanical engineering and metalworking development. In particular, V.V. Shevelkov [1] identified the following factors: low labor productivity, significant depreciation of fixed assets, acquisition of cheap, lower quality and less modern import technologies and equipment, underutilization of production capacities, shortage of technically competent professional personnel, a lack of effective ways of financial support for technological re-equipment in mechanical engineering enterprises. The same opinion is shared by V.I. Vilisova [14], who noted the factors hindering the industry development: significant depreciation of fixed assets, insufficient competitiveness of mechanical engineering products, low production capacities utilization, low innovation activity.

High tariffs for transportation services and energy commodities as well as intense competition among domestic and foreign manufacturers are what Russian authors [15] attribute to the external factors affecting the industry development. The work by I.V. Grebenkin and I.O. Botkin [16] reveals a positive relationship between imports of intermediate products and the growth rate of the manufacturing industry due to a market substitution impact.

As an example of European research, we can cite the work by S. Zekovich [17], who studied the regional competitive ability and spatial industrial development of Serbia. In this paper, the following key factors are identified in decision-making regarding the macro-allocation of foreign investment in the manufacturing industry:

1) political and macroeconomic stability;
2) supply and cost of highly skilled labor;
3) quality of communication;
4) quality of banking and financial services;
5) labor legislation
6) corporate tax;
7) attitude to foreign investors;
8) investment incentives.

Similar factors are mentioned in the fundamental work by a team of authors representing the Mckinsley Institute [18]: access to cheap or highly skilled labor, proximity to sales markets, efficient transport and logistics infrastructure, availability of energy resources, proximity to innovation centres.

As for the research methodology on industrial development factors, one can encounter traditional statistical methods, in particular, correlation-regression analysis [19, 20], and sociological methods, such as survey and expert evaluations [21, 22]. Recently, cluster analysis methods have become quite widespread too [22, 23].

Translation

Besides, the methodological basis of the study was a comparative institutional analysis [24] and a deeper analysis of regional economic institutions, considered in the paper by V.F. Islamutdinov [25].

3. Description of data for analyzing the mechanical engineering and metalworking development factors

To estimate the dependence of development indicators for the engineering and metalworking industry, I performed a questionnaire survey among the industry-related organizations in the Khanty-Mansi Autonomous Okrug—Ugra. A total of 23 organizations participated in the survey, of which 16 operate within the mechanical engineering and metalworking sector, and 7 are indirectly related to the industry (officials and scientists). With a total number of 338 enterprises within the mechanical engineering and metalworking industry, the representativeness of sample, i.e. the confidence interval (with a 90-percent confidence level) is 9.98 %.

With that, the overwhelming majority of respondents—47 % were direct executives, whose activities relate to this industry (Fig. 1).

By geographical distribution, most of the organizations surveyed are located in Khanty-Mansiysk (Fig. 2).

As for size, the majority of the organizations surveyed (74 %) consider themselves to be medium and small, which indicates a small size of organizations in the industry (Fig. 3).

By age, dominant are the experienced companies operating in the market from 10 to 20 years (Fig. 4).

Statistical data are drawn from the statistical collection "Regions of Russia. Socioeconomic indicators" for the period from 2005 to 2015 Thus, the duration of continuous time series was 11 years. Statistical data processing was carried out using correlation analysis methods.

In statistical digests, there are no direct data on the mechanical engineering and metalworking industry in KHMAO—Ugra. This applies to almost every indicator, including the share in the gross

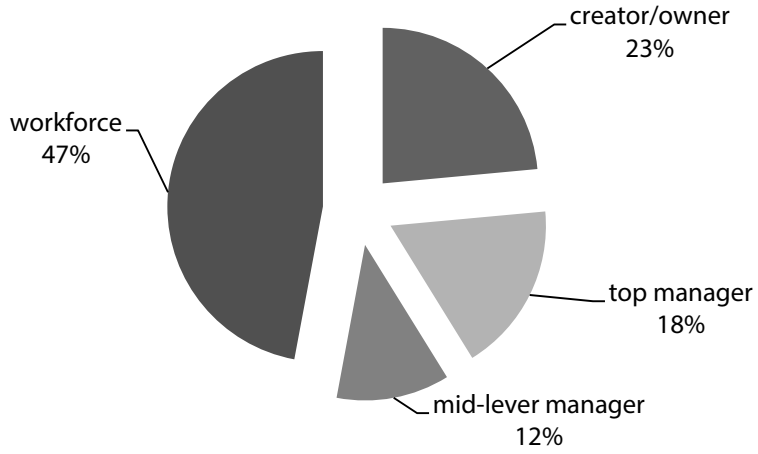

Fig. 1. *Composition of survey respondents by business (organization) position (source: calculated by the author based on the survey results)*

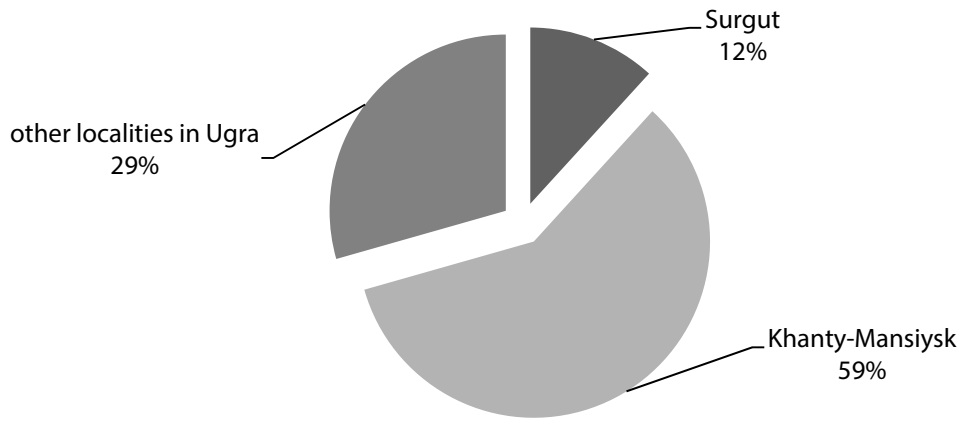

Fig. 2. *Composition of the surveyed companies by geographic location (source: calculated by the author based on the survey results)*

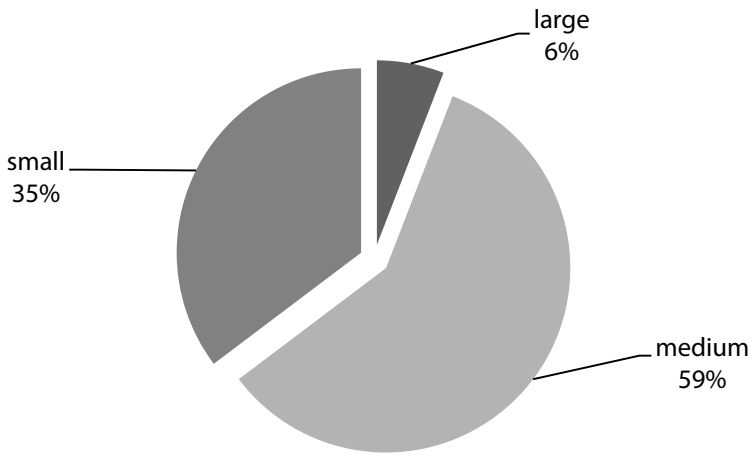

Fig. 3. *Composition of the surveyed companies by size (source: calculated by the author based on the survey results)*

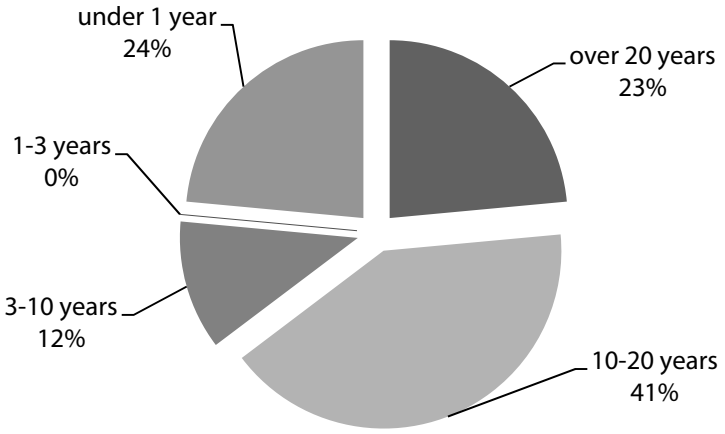

Fig. 4. *Composition of the surveyed companies by age (source: calculated by the author based on the survey results)*

regional product value of KHMAO — Ugra. There is information only about the enlarged manufacturing industry, part of which is the mechanical engineering and metalworking industry. Therefore, in the future, the correlation analysis used primary data on the manufacturing industry.

4. Obtained results

4.1. Analysis of the questionnaire survey results about the impact of the factors on the mechanical engineering and metalworking development in the Khanty-Mansi Autonomous Okrug — Ugra

In the intraindustry structure, the largest share falls on the machinery and equipment maintenance subindustry, or rather, the oil and gas equipment repair, which again confirms a hypothesis for the mechanical engineering and metalworking derivative nature from the oil industry in KHMAO — Ugra (Fig. 5).

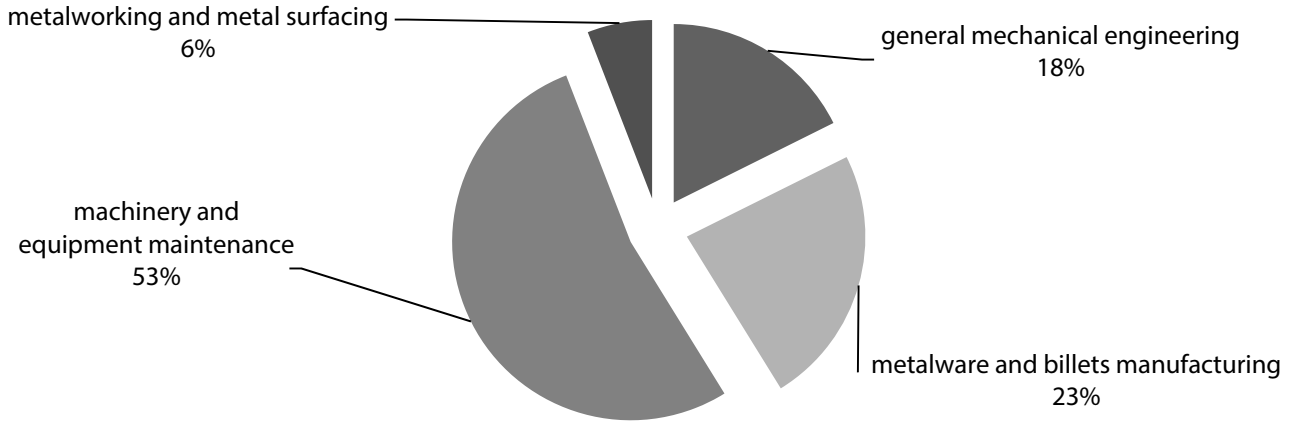

Fig. 5. *Intraindustry composition of the companies surveyed (source: calculated by the author based on the survey results)*

Translation

Table 1

The impact of informal standards and rules on the industry development

Title of informal standards and rules	Nature of the industry development impact	
	positive	negative
Deviations from standards in the Russian State Standard GOST's unified system for design documentation and the unified system for process control documentation	reduces design and technological documentation development costs	reduces documentation quality
A punishment system, traditions, social conventions	develops discipline	not always beneficial
An informal division of responsibilities		poor decision-making
Informal methods of collecting information on competitors		causes damage to the reputation
Non-standardized requirements of the customers	expands the range of goods and services	not always reasoned from the scientific and technical aspect and leads to a deterioration in relationships
The established procedure of payment for works performed by oil companies within 90 days		diminishes financial indicators

Source: calculated by the author based on the survey results.

Interesting results were obtained after answering questions concerning the informal standards and rules in force in the industry. Opinions nearly split up, with 52.9 % of those believing that informal standards and rules do present in the mechanical engineering and metalworking industry, while 47.1 % replied they do not.

Also, interesting are the results on the impact that informal standards and rules have on the industry development (table. 1).

In general, informal standards and rules have both positive and negative impact on the industry development, but one can note that negative reviews prevail.

Specific informal institutions, typical exactly for the mechanical engineering and metalworking industry are "deviations from the standards in the GOST unified system for design documentation and the GOST unified system for process control documentation", and "non-standardized requirements of customers." Moreover, the respondents believe these informal standards have both positive and negative impact on the industry development. These standards are classified as informal ones due to failing to be enshrined in the documents, though they are a common deviation from the established standards and rules.

An informal institution, specific for KHMAO — Ugra, is the "established procedure of payment for works performed by oil companies within 90 days", caused exactly by the derivative nature of the mechanical engineering and metalworking in the region. This procedure allows oil companies to actually receive an interest-free three-month loan from mechanical engineering and metalworking industry enterprises, which, of course, negatively affects their development, reducing financial opportunities by freezing working capital in receivables.

Assessment of intraindustry factors impact on the industry development is shown in table 2.

The most of those surveyed suppose the industry development is subject to an impact by factors such as "skill level and composition of human resources" and "level of competition in the industry." The first factor basically has a negative impact and a greater degree of the impact, which provides for making a conclusion of the poor current skill level and composition of human resources, according to respondents. The second factor has a positive impact, but at an average level, that is, the existing competition in the industry rather contributes to the development than stifles it.

The level of specialization and cooperation also has a clearly positive, but at the same time average degree of impact. However, this factor needs more detailed study. There are no factors that have a pronounced negative impact.

The "transportability of finished products and raw materials" factor has the least impact, which is logical, since the products of mechanical engineering and metalworking are usually quite transportable.

Translation

Table 2

Assessment of the presence, direction and degree of impact of intraindustry factors, %

Factor	Impact	Impact direction		Impact degree			
		positive	negative	direct	major	medium	minor
Skill level and composition of human resources	76.5	29.4	47.1	29.4	41.2	5.9	0.0
Form and scale of production	64.7	52.9	23.5	17.6	41.2	11.8	0.0
Level of specialization and cooperation	52.9	70.6	5.9	5.9	23.5	41.2	5.9
Level of competition in the industry	76.5	69.2	30.8	7.7	15.4	61.5	15.4
Capital investments and sources of financing	58.8	46.2	23.1	23.1	15.4	30.8	0.0
Transportability of finished products and raw materials	11.8	23.5	29.4	0.0	23.5	23.5	5.9
Scientific and technological progress	58.8	52.9	29.4	11.8	35.3	23.5	11.8

Source: calculated by the author based on the survey results.

Table 3

Assessment of the presence and degree of intraregional factors impact, %

Factor	Impact degree	Impact direction		Impact degree			
		positive	negative	direct	major	medium	minor
Geographical location of the region	82.4	11.8	64.7	11.8	29.4	11.8	23.5
Region's natural climatic conditions	47.1	5.9	58.8	0.0	0.0	41.2	23.5
The development level of other industries and their location in the region	58.8	47.1	29.4	0.0	35.3	35.3	5.9
Area's level of urbanization	11.8	35.3	11.8	0.0	0.0	35.3	11.8
The development level of the transport network and the area connectivity	52.9	23.5	41.2	0.0	41.2	17.6	5.9
Science and education development level	58.8	41.2	29.4	11.8	23.5	17.6	17.6
Population size and density	17.6	29.4	23.5	0.0	17.6	17.6	17.6
Real income of the population	11.8	29.4	23.5	5.9	5.9	29.4	11.8
Business activity of the population and business	0.0	41.2	5.9	0.0	11.8	29.4	5.9
Labor migration	11.8	41.2	5.9	0.0	11.8	11.8	23.5

Source: calculated by the author based on the survey results.

The assessment of intraindustry factors impact on the industry development is shown in Table 3.

The respondents considered "geographical position of the region" to be the most important intraregional factor, with an explicit negative impact and an inexplicit degree of impact. That is, the fact that the region belongs to the areas equated to the Far North has a negative impact on the industry development.

At the same time, factors derived from geographic location: "region's natural climatic conditions" and "development level of the transport network and the area connectivity", were only mentioned by half of those surveyed, in a negative sense as well. With that, the degree of impact of the development level of the transport network and are connectivity is estimated higher than the degree of impact of region's natural climatic conditions, which give me reasons to conclude that the transport component prevails in the negative impact of the region's geographical position.

Obviously positive factors in this group are not noted, though the predominance of positive assessments can be seen in such factors as the development level of other industries and their location within the region and the development level of science and education. That is, according to the respondents, the development of the mechanical engineering and metalworking industry is

Table 4

Assessment of the presence, direction and degree of impact of domestic factors, %

Factor	Impact	Impact direction		Impact degree			
		positive	negative	direct	major	medium	minor
Level of basic development of science and technology in the country	70.6	69.2	30.8	15.4	53.8	23.1	7.7
State strategy on mechanical engineering and metalworking development	82.4	53.8	30.8	30.8	15.4	38.5	0.0
State budgetary policy	35.3	7.7	46.2	7.7	15.4	23.1	7.7
Credit availability	17.6	30.8	23.1	0.0	7.7	38.5	7.7
Tax concessions for mechanical engineering and metalworking enterprises	64.7	46.2	30.8	15.4	23.1	30.8	7.7
Inflation rate and inflation expectations	5.9	15.4	30.8	0.0	0.0	15.4	30.8
National currency rate	5.9	7.7	38.5	0.0	0.0	30.8	15.4
Structure and scale of consumption of finished products in the domestic market	47.1	38.5	38.5	0.0	38.5	38.5	0.0
Environmental standards and regulations	0.0	38.5	7.7	0.0	0.0	15.4	30.8
State standards for mechanical engineering and metalworking enterprises	17.6	30.8	15.4	0.0	7.7	7.7	30.8
Level and scope of corruption	29.4	0.0	46.2	0.0	7.7	30.8	7.7

Source: calculated by the author based on the survey results.

determined by the development of other industries, first of all, oil production, and secondarily by the fact that there are research institutes and universities, though not of such quantity and quality, as in the "mainland".

A significant part of the intraregional factors is practically assessed as not affecting the development of the mechanical engineering and metalworking industry: urbanization level of the territory, real income of the population, business activity of the population and business, labor migration. Apparently, this is also associated with the derivative nature of the industry.

Russia's domestic factors impact is shown in Table 4.

The most important domestic factor happens to be that of "state strategy on the mechanical engineering and metalworking industry development", with 82.4 % votes of the respondents. At the same time, one cannot say this factor is definitely positive, since opinions divided in a proportion of 53.2 % to 30.8 %. Also, it is rather difficult to unequivocally assert whether its impact is direct or medium; opinions on this matter are divided too.

The level of basic development of science and technology in the country as well as tax concessions for mechanical engineering and metalworking enterprises are also important and rather positive impactful factors. Although the impact of the first factor is greater in the opinion of those polled.

Obviously negative factors are the state budgetary policy and the level and scale of corruption. Though their importance for the industry development was noted only by 30–35 % of respondents, and the degree of impact turned out to be medium, according to the survey results.

Nearly half (47.1 %) of the respondents considered such a factor as the structure and scale of finished products consumption on the domestic market to be rather important, but they failed exactly define both the direction and the degree of impact, which is most likely due to the complication of the factor itself.

Similar to the previous table, a significant part of Russia's domestic factors are assessed practically as not affecting the mechanical engineering and metalworking industry development: credit availability, inflation rate and inflation expectations, national currency rate, environmental standards and regulations, mechanical engineering and metalworking state standards. Apparently, this is associated with the derivative nature of the industry as well.

International factors impact is shown in table 5.

Table 5

Assessment of the presence, direction and degree of impact of international factors, %

Factor	Impact	Impact direction		Impact degree			
		positive	negative	direct	major	medium	minor
Globalization of world trade and production	41.2	30.8	23.1	0.0	15.4	23.1	15.4
Development of interstate trade and economic relations (customs union, etc.)	52.9	61.5	0.0	0.0	30.8	23.1	7.7
Enhanced role of international trade and economic organizations (WTO, etc.)	23.5	15.4	23.1	0.0	7.7	7.7	23.1
Political standoff (sanctions and counter-sanctions)	76.5	53.8	23.1	7.7	15.4	53.8	7.7
Migratory flows	11.8	23.1	15.4	0.0	7.7	30.8	7.7

Source: calculated by the author based on the survey results.

The most important international factor was expectedly that of "political confrontation (sanctions and counter-sanctions)," with the majority assessed its impact as being positive, albeit weak. The second most important factor was the development of international trade and economic relations (customs union, etc.), while its impact is definitely positive, and with that quite large.

The globalization of world trade and production has some impact on the mechanical engineering and metalworking industry development in the Khanty-Mansi Autonomous Okrug—Ugra, though the respondents failed to clearly identify its impact either by direction or degree of that.

Two international factors — enhanced role of international trade and economic organizations (WTO, etc.) and migration flows — turned out to be insignificant for the industry development.

4.2. Analysis of the mutual correlation of factors of the mechanical engineering and metalworking industry in the Khanty-Mansi Autonomous Okrug—Ugra

The internal factors impact analysis was also carried out based on the identification of the correlation coefficients between the time series of industry indicators within an available range of 11 years (table 6).

Expected interdependences revealed:

— a positive interdependence between value added, turnover of organizations, profitability and labor productivity;

— a positive relationship between the number of enterprises and the number of employees;

— a positive relationship between investments and fixed assets costs, as expected, as investments always raise funds;

— a negative relationship between investments and the share of unprofitable enterprises, as expected, as investments in unprofitable enterprises are difficult;

— a strong positive relationship between labor productivity and value added and profitability, is less strong with the turnover of organizations.

Interdependencies that need to be explained:

— a negative relationship between the number of enterprises (and the number of employees), their value added, turnover and volume of shipped products, that is, we can talk of the enterprises consolidation trend and increased productivity;

— a positive relationship between the volume of products shipped and the value of fixed assets, which may indicate an increase in the capital intensity of products;

— a positive relationship between the price index and the industrial production index, which can mean a positive impact inflation has on the production growth rate;

a negative relationship between investment and the number of enterprises (as well as the number of employees), which also indicates the consolidation processes of and production automation;

— a very close relationship between investments and shipping volume, which is explained by the mutual influence of these factors: the growth of investments leads to that of production and sales, and vice versa, the growth of revenue provides additional funds for investment;

— a positive relationship between investments and imports, which indicates the prevalence of imported equipment;

Translation

Table 6

Correlation coefficients between time series of development indicators of the manufacturing industry

Indicator	Value added	Number of enterprises	Number of employees	Fixed assets costs	Wear degree of fixed assets	Industry enterprises turnover	Shipping volume	Industrial production index	Price index	Import	Export	Profit, loss	Proportion of unprofitable enterprises	Return on products	Investments	Labour productivity in comparable 2015 prices
Value-added	1.000															
Number of enterprises	−0.547	1.000														
Number of employees	−0.413	0.878	1.000													
Fixed assets costs	0.246	−0.410	−0.661	1.000												
Wear degree of fixed assets	0.130	−0.638	−0.821	0.691	1.000											
Industry enterprises turnover	0.807	−0.785	−0.605	0.146	0.274	1.000										
Shipping volume	0.444	−0.594	−0.786	0.797	0.597	0.397	1.000									
Industrial production index	−0.268	0.173	0.264	−0.016	−0.027	−0.197	−0.131	1.000								
Price index	−0.434	0.128	0.187	−0.140	0.170	−0.333	−0.439	0.647	1.000							
Import	0.654	−0.677	−0.550	0.220	0.246	0.656	0.380	−0.518	−0.258	1.000						
Export	0.445	−0.399	−0.624	0.768	0.513	0.348	0.645	−0.261	−0.417	0.191	1.000					
Profit, loss	0.353	−0.467	−0.191	−0.247	0.179	0.603	−0.174	0.018	0.251	0.570	−0.183	1.000				
Proportion of unprofitable enterprises	−0.125	0.195	0.212	−0.140	0.173	−0.071	−0.432	−0.134	0.134	−0.125	−0.002	0.389	1.000			
Return on products	0.688	0.011	0.139	−0.133	−0.289	0.576	−0.101	−0.135	−0.364	0.235	0.223	0.373	0.285	1.000		
Investments	0.412	−0.643	−0.760	0.720	0.511	0.391	0.880	−0.135	−0.255	0.519	0.414	−0.146	−0.616	−0.213	1.000	
Labor productivity in comparable 2015 prices	0.790	−0.070	0.163	−0.223	−0.426	0.597	−0.071	−0.196	−0.446	0.366	0.114	0.340	0.062	0.922	−0.112	1.000

Source: calculated by the author based on the statistical data.

Table 7

Correlation coefficients between the time series of development indicators of the manufacturing industry and external factors

Indicator	2007–2015			2006–2014			2005–2013		
	USD exchange rate, RUB	Oil prices, USD per barrel	Average price of coiled steel futures on the London Stock Exchange, USD per ton	USD exchange rate, RUB	Oil prices, USD per barrel	Average price of coiled steel futures on the London Stock Exchange, USD per ton	USD exchange rate, RUB	Oil prices, USD per barrel	Average price of coiled steel futures on the London Stock Exchange, USD per ton
Value added	0.296	0.378	0.551	0.187	0.618	0.709	0.244	0.628	0.709
Number of enterprises	–0.411	–0.491	–0.277	–0.611	–0.721	–0.386	–0.618	–0.699	–0.381
Number of employees	–0.700	–0.209	0.030	–0.788	–0.619	–0.176	–0.772	–0.585	–0.158
Fixed assets costs	0.872	–0.193	–0.182	0.811	0.307	0.117	0.615	0.609	0.412
Wear degree of fixed assets	0.715	0.085	–0.039	0.543	0.587	0.239	0.369	0.547	0.228
Industry enterprises turnover	0.200	0.470	0.413	0.379	0.595	0.469	0.517	0.597	0.467
Shipping volume	0.733	0.122	–0.004	0.728	0.577	0.250	0.452	0.566	0.266
Industrial production index	–0.178	0.076	0.169	–0.471	0.087	0.180	–0.766	0.086	0.179
Price index	–0.260	0.127	0.143	–0.366	0.066	0.101	–0.515	0.083	0.106
Import	0.145	0.489	0.378	0.638	0.519	0.370	0.643	0.477	0.365
Export	0.941	–0.473	–0.384	0.706	–0.020	–0.144	0.692	–0.134	–0.191
Profit, loss	–0.221	0.468	0.436	0.064	0.402	0.379	0.316	0.466	0.399
Proportion of unprofitable enterprises	0.011	–0.268	–0.071	–0.235	–0.252	–0.035	0.015	–0.189	–0.011
Return on products	–0.031	0.005	0.304	–0.176	0.029	0.341	0.030	0.098	0.373
Investments	0.503	0.381	0.186	0.768	0.620	0.305	0.417	0.694	0.387
Labor productivity in comparable 2015 prices	–0.152	0.202	0.479	–0.166	0.178	0.479	0.049	0.257	0.516
Coefficients total with a value greater than 0,5	6	0	1	8	8	1	8	8	2

Source: calculated by the author based on the statistical data.

— a positive relationship between the degree of depreciation of fixed assets and the value of funds, the volume of shipped products, exports and investments. Most likely, this connection can be explained only by crisis phenomena, when investments growth is forced, but it does not cover the need for updating fixed assets, and exports are growing due to a decrease in domestic demand.

4.3. The analysis of how external factors affect the mechanical engineering and metalworking industry development in the Khanty-Mansi Autonomous Okrug — Ugra

The analysis of how internal factors impact was carried out based on the identification of the correlation coefficients between the time series of industry indicators and external factors (Table 7).

For comparison, three time periods are taken, one which (2005–2013) is characterized by high oil prices, the second (2007–2015) includes a period of low prices and sanctions, and the third (2006–2014) is an interim one.

The choice of external factors is determined by the fact that the mechanical engineering and metalworking industry is derived from the oil production industry, which means its development is determined by the oil price movement. The other two factors, the dollar rate and the average price of coil steel futures on the London Stock Exchange, were chosen based on the assumption that the industry's development depends on the raw materials and machinery import.

The largest number of manufacturing industry indicators depends on the exchange rate, which indicates a significant degree of the industry's integration into the world economy. Also, there is a value-added dependence on the average price of roll steel futures on the London stock exchange, USD per ton. At the same time, one can claim that oil prices dependence, at least in the manufacturing industry, has been overcome, which is most likely due to the economic crisis. As evidence for this serves that within the period 2005–2015 no indicator had a strong connection with oil prices, while if we take time series from earlier periods, this dependence is manifested in at least half of the indicators (8 indicators out of 16).

5. Conclusions

Thus, according to the results of the questionnaire survey in the mechanical engineering and metalworking industry, there is a significant impact of informal institutions, the effect of which is ambiguously estimated by the respondents.

The most important positive factors affecting the mechanical engineering and metalworking industry were the level of competition in the industry, the state strategy on the mechanical engineering and metalworking industry development, the level of basic development of science and technology in the country, tax concessions for the engineering and metalworking enterprises, political stand-off (sanctions and counter-sanctions). The most important factors having a negative impact on the industry development are the skill level and composition of human resources, as well as the region's geographic location. Negative factors, though not of that significant impact, are the state budgetary policy and the level and scale of corruption.

In addition, the statistical analysis revealed such factors as the enterprises consolidation trend and increased labor productivity, the growth of production capital intensity, the positive impact of inflation, the enhanced role of export.

The analysis of the impact of external factors showed that the dependence of the mechanical engineering and metalworking development on the national currency rate is still in place, which is associated with a large share of imported machinery, but at the same time, the dependence on oil prices can be considered overcome.

Potential users of the analysis results are the mechanical engineering and metalworking industry enterprises, which can employ this data to build their own development strategy, as well as the authorities of the Khanty-Mansi Autonomous Okrug—Ugra, who can use the results for economic policy-making in the region.

Acknowledgements

The article has been supported by the Russian Foundation for Basic Research and Department for Education and Sciences of KhMAO-Yugra, Grant №17-12-86010 Long-term forecasting of the economic evolution of the resource-extraction region, considering path-dependence and institutional environment features (case study of the Khanty-Mansi Autonomous Okrug — Ugra)".

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