Evaluating the Effectiveness of the Regional Industrial Policy Implementation

Ol'ga P. Smirnova[*], Alena O. Ponomareva

Institute of Economics of the Ural branch of Russian Academy of Sciences,

Ekaterinburg, Russia

Email: olygsmirnova95@gmail.com

Abstract: The industrial development is of great importance for balanced economic growth. Emerging new trends such as circular transformation, digitalization, etc. predetermine the need to formulate new methodological approaches to evaluating the effectiveness of industrial policy. Regional imbalances shift the research focus towards assessing the emerging gaps. To do so, we present a multi-criteria methodology for evaluating the effectiveness of the regional industrial policy. Using statistical and structural analysis and 2015–2019 data for 19 regions of Russia, the paper examines the comparative effectiveness of the ongoing industrial policy and identifies the strengths and weaknesses of the industrial regions. Among the key development problems revealed in the study are low pay in the manufacturing industry; high depreciation of fixed assets of industrial enterprises; insufficient investment in technological innovation; falling labor productivity and profitability of the manufacturing industry; and insufficient level of environmental safety of industrial production. The research confirms the hypothesis that industrial policy's effectiveness is influenced by legal regulations at regional level. The findings demonstrate that the top performers in the regional industrial policy implementation have introduced relevant regulations over 15 years ago. Hence, the earlier the institutional norms for supporting industrial regions are adopted, the more efficient the industrial development is going to be in the future. The proposed methodology involves a comprehensive assessment of the industry growth, which allows performing comparative analysis of the regions' development dynamics.

Keywords: industrial policy, industrial region, institutional regulation, structural imbalances, regional differentiation, socio-economic development

1. INTRODUCTION

An integrated industrial policy is becoming a significant tool for the balanced economic development of Russia [16, 29, 37]. To attain this goal, pride of place goes to progressive changes in the structure of industry and its reconstruction on a new technological basis rather than increasing volumes of industrial production. Structural imbalances and uneven regional socio-economic development can be easily traced in transitioning economies such as Russia.

Currently, the development of the manufacturing industry in Russia is influenced by an array of factors, including heightened global competition, low performance (profitability) of enterprises, poor labor productivity, staff shortage, high depreciation of fixed assets, administrative barriers to entering the world market, reduced investment, insufficient innovative activity, etc. [34-35]. Deindustrialization is believed to be the major threat to the Russian economy which resulted in heavy dependence on imports of key industries [15]. The process was initiated in the time of active post-Soviet reforms and is largely associated with the destruction of the existing business ties between enterprises. Another cause is the impairment of the material and technical facilities of the real sector of economy. For a long

---

[*] Corresponding author: olygsmirnova95@gmail.com

time, the main priority was the development of the non-material sphere and the consumer sector, which led to instability in the fundamental sector of the economy, i.e. manufacturing [24].

In Russia, industrial policy is enacted at federal and regional levels. Government authorities use a system of targets and indicators for assessing industrial policy's effectiveness. These indicators are included in government programs for the development of the entire manufacturing sector, as well as in strategies and programs for the development of individual industries. Most of them are focused on the increase in gross indicators and the scope of support. The complexity of the manufacturing industry structure hampers the assessment of the government support measures since even determining their effect for a certain area is an arduous task.

The latest trends such as state-of-the-art technologies, circular economy, digitalization, etc. make it necessary to develop brand-new methodological approaches to evaluating the effectiveness of industrial policy. In today's situation, industrial policy should be assessed according to a wider range of indicators and requires a more individual approach. Thus, the present study aims to design a methodology for evaluating the effectiveness of the regional industrial policy. Using the case of Russia, we attempt to trace the dynamics of the industrial development over the past few years and identify stable patterns. We hypothesize that legal regulations at regional level influence the effectiveness of industrial policy. This allows formulating the following scientific tasks: to systematize the factors affecting the change in the structure of the regional industrial complex and to compare the level of industrial development and the time span during which legislative support for the regional industrial policy has been in effect.

2. LITERATURE REVIEW

The problems of theoretical substantiation of industrial policy are widely debated in academic literature [3, 5, 12, 19, 27]. A plethora of interpretations of the industrial policy concept emphasizes the complexity of this phenomenon and its ambiguous and dynamic nature [14, 17, 28, 37]. A number of researchers highlight that active participation of the state as a bearer of the national interests should be the central factor in the formation and implementation of industrial policy since it is oriented towards resolving strategic challenges [2]. An alternative view is that selective support for the private industrial sector can decrease the competitiveness and efficiency of its functioning.

Establishing the objectives of industrial policy is the principal aspect for assessing its effectiveness and performance. Experts from UNIDO [40] describe new industrialization as a knowledge-intensive, digital and high-tech process focused on the reproduction of population and improving their quality of life rather than earning profit [13]. We believe these statements should become the main principles in assessing the effectiveness of industrial policy. Thus, along with the economic dimension, special attention should be paid to such factors as social justice, human well-being and environmental protection [30].

The formal approach of the Russian federal authorities implies evaluating the industrial policy's effectiveness according to the industrial production index, the index of production by the type of economic activity "Manufacturing", the index of labor productivity, the amount of investment attracted to the region, the number of investment projects being implemented (aimed at developing industry), the number of high-performance jobs created, etc. [23]. The level of centralization is of special interest when analyzing the effectiveness of the government support measures for industrial production. Excessive centralization of power can adversely affect self-sufficiency and initiatives of Russia's constituent territories [9, 33]. A decentralized approach to the implementation of industrial policy makes it possible to more accurately respond to problematic aspects and bottlenecks in a region's economy. Therefore, the purposes and objectives of the federal industrial policy can be

expanded and supplemented by the specifics of regional development while being in strong compliance with the federal concept.

Numerous researchers use the indicative approach as the basis for industrial policy evaluation [24]. In most cases, they distinguish between the following groups of indicators: resource, staff, technological, organizational, financial and infrastructural. The effectiveness of industrial policy is examined using the indicators such as the number of cutting-edge production technologies created; expenditures on technological innovation [6, 38]; results of intellectual activity; the level of staff competence including those with academic degree [7, 25]. Goryacheva [10] analyzes the effectiveness of state support measures for the industrial complex from the perspective of achieving the tactical objectives, i.e. an increase in production volumes and a break-even activity. Litvinova's [21] integral approach uses the indicators of socio-economic development of a region and innovation activity. Litau [20] proposes a scoring method of evaluation in innovative production. Vorobyova [41] assesses the effectiveness of industrial policy according to the principle of diversification of production activities in a region through indicators of concentration and localization. A number of studies [22] often aim to conduct a simple evaluation of the government support for particular enterprises and territories.

Let us look at the world practice in assessing the industrial policy effectiveness. In Sweden, it is analyzed from the standpoint of the development of scientific, technical and innovation spheres. The country's policy harmonizes the targets set by the state and private business thus forming a responsible attitude [11]. In Germany, an effective policy refers to a structural one that is of corrective or formative nature. In this vein, the effectiveness of industrial policy is determined by its contribution to structural transformations and leveling the consequences of excessively rapid structural shifts [4, 36]. Priorities of the UK industrial policy are closely linked to R&D. There is active cooperation on the projects of research centers and industrial production. To accelerate the introduction of new technologies, special programs are being implemented, such as "Knowledge Transfer Partnerships" and "Knowledge Transfer Networks". In recent decades, the EU economy has witnessed a gradual decline in industrial production, which, however, still serves as the main driver of the economy [39].

The abovementioned approaches to assessing the effectiveness of the regional industrial policy form the basis of the methodology developed in the paper. In the introduction and the literature review we highlight that in the context of the innovation economy it is insufficient to assess the effectiveness of the industrial complex development exclusively by the volume and financial indicators. This is a necessity for both developed and developing nations including Russia [30, 35]. It is noteworthy that the indicator of growth in production volumes taken separately is unable to fully and adequately assess the effectiveness of the industry's development, since its growth may be due to economic and non-economic factors. The case of product passports used in the EU countries is highly relevant here. Products that do not comply with the environmental standards are not allowed for import. Similar quality requirements are applicable to industrial products, and, therefore, they can be taken into account when assessing the development of the regional industrial complex. Hence, we propose an integrated evaluation methodology accounting for new trends and requirements for competitiveness. Under these conditions, the effectiveness of the regional industrial policy implementation needs to be comprehensively analyzed.

3. MATERIALS AND METHODS

In a narrow sense, industrial policy is referred to as a set of measures aimed at ensuring the competitive development of the industry, primarily in the manufacturing sector. In a broad sense, industrial policy is a structural policy that can be implemented in any economic sector. In the current study, *industrial policy* refers to a set of measures aimed at changing

the structure of industry (economy) in order to enhance the competitiveness of enterprises through active innovation and investment.

The proposed methodology for evaluating the effectiveness of the regional industrial policy implements an integrated approach (Fig. 1). Within the methodology, the "effectiveness" category is viewed as the extent to which the selected indicators of the industrial development are met. The average value for the whole country is used as the criterion level. Thus, the criterion of the regional industrial policy's effectiveness is determined by the deviation from the average level in Russia. Juxtaposing the selected indicators will allow establishing whether there is a positive or negative dynamics of industrial development in a region.
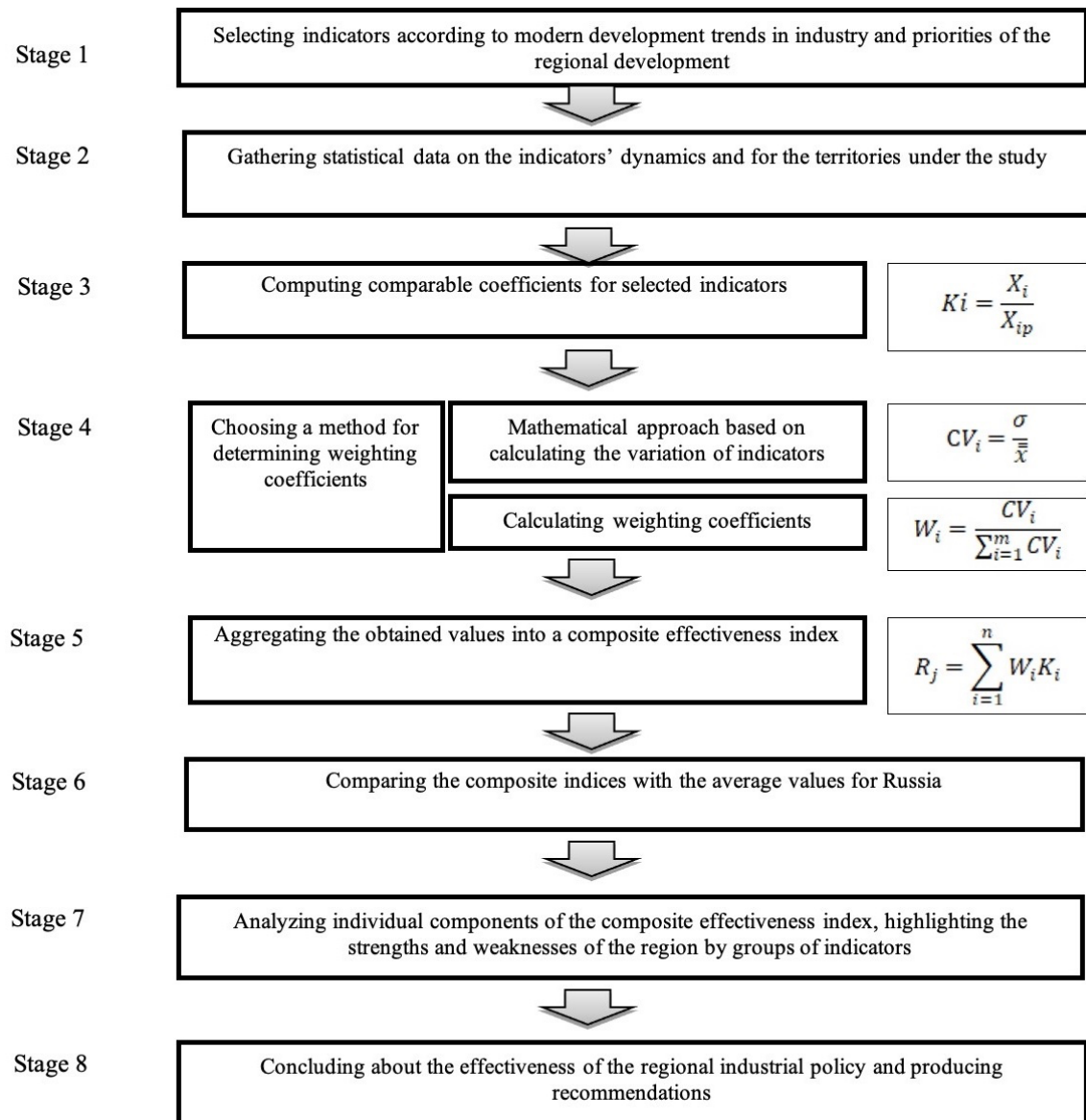
Stage 1	Selecting indicators according to modern development trends in industry and priorities of the regional development	
Stage 2	Gathering statistical data on the indicators' dynamics and for the territories under the study	
Stage 3	Computing comparable coefficients for selected indicators	$Ki = \dfrac{X_i}{X_{ip}}$
Stage 4	Choosing a method for determining weighting coefficients	Mathematical approach based on calculating the variation of indicators	$CV_i = \dfrac{\sigma}{\bar{\bar{x}}}$
		Calculating weighting coefficients	$W_i = \dfrac{CV_i}{\sum_{i=1}^{m} CV_i}$
Stage 5	Aggregating the obtained values into a composite effectiveness index	$R_j = \displaystyle\sum_{i=1}^{n} W_i K_i$
Stage 6	Comparing the composite indices with the average values for Russia	
Stage 7	Analyzing individual components of the composite effectiveness index, highlighting the strengths and weaknesses of the region by groups of indicators	
Stage 8	Concluding about the effectiveness of the regional industrial policy and producing recommendations	

Fig. 1. Methodology for evaluating the effectiveness of the regional industrial policy.
Source: [34].

Note: *Ki* is comparable coefficient of an *i*-indicator; *Xi* is the value of the indicator in the region; *Xip* is average value of the indicator for the country; *CVi* is variation of the *i*-indicator; σ is the standard deviation; $\bar{x}$ is average value; *Wi* is weighting coefficient; *Ri* is composite effectiveness index.

At the initial stage of assessing the effectiveness of industrial policy, it is necessary to determine key indicators. Particular indicators are selected according to modern trends in the socio-economic and industrial development. We have identified indicators that correspond to the definition of industrial policy. In total, 21 indicators were used [35]. They were

organized into 9 groups, each of which characterizes specific areas of industrial policy (Table 1). The presented indicators are calculated based on the unified methodology of Rosstat [31], which allows analyzing them in terms of territorial affiliation and evolution dynamics. The time span of the research is limited to the period of 2015–2019 that provides comprehensive data for the last 5 years.

Table 1. List of indicators characterizing the effectiveness of the regional industrial policy

Indicator of the regional industrial development	Group
[i01] Average monthly nominal accrued wages of employees of organizations	Salary and headcount
[i02] Share of manufacturing industry workers in the total number of employees in the region	
[i03] Share of the manufacturing industry in GRP	Structure of economy
[i04] Share of manufacturing enterprises in the total number of enterprises in the region	
[i05] Percentage of fixed assets of manufacturing enterprises in the overall structure of fixed assets in the region	Fixed assets
[i06] Ratio between fixed assets introduced to industry and the total volume of fixed assets introduced	
[i07] Depreciation of fixed assets of manufacturing enterprises at the end of the year	
[i08] Growth rate of advanced production technologies created in the region	Innovation
[i09] Growth rate of advanced production technologies used in the region	
[i10] Share of organizations engaged in innovation	
[i11] Share of expenses incurred in technological innovations in the total volume of investment in fixed assets	
[i12] Volume of innovative goods, works, services as a percentage of the total volume of goods shipped, works and services performed	
[i13] Industrial production indices in the manufacturing industry compared to the previous year	Production growth
[i14] Index for investment volume in fixed assets	Investment
[i15] Labor productivity index in the manufacturing industry	Production efficiency
[i16] Return on assets of manufacturing enterprises	
[i17] Share of captured and neutralized air pollutants in the total amount of waste pollutants	Environment
[i18] ICT use in organizations (portable computers, %)	Information and communications technology (ICT)
[i19] ICT use in organizations (servers, %)	
[i20] ICT use in organizations (computer networks, %)	
[i21] ICT use in organizations (cloud services, %)	

In the study, we scrutinize the regions with the developed manufacturing industry (over 27% of GRP). The industrial development was characterized using a number of multi-criteria indicators. Therefore, only those indicators were applied describing the state of the industrial development but incapable of affecting it directly. In the methodology, the criterion for evaluating the effectiveness of the industrial policy implementation is the average value of the indicators. Comparison with the average value is a common approach and serves as a standard for determining the differentiation of regional development through ranking.

The industrial policy effectiveness was analyzed for 19 out of 85 constituent entities of the Russian Federation, which are traditionally classified as industrially developed regions (the share of industrial production in GRP is over 27%). Among Russia's industrial regions are the oblasts of Vladimir, Kaluga, Lipetsk, Ryazan, Tula, Yaroslavl, Vologda, Leningrad, Novgorod, Kirov, Nizhny Novgorod, Ulyanovsk, Sverdlovsk, Chelyabinsk and Omsk, the Republic of Bashkortostan, the Mari El Republic, Perm krai and Krasnoyarsk krai.

Due to strong differentiation of regions, it is impossible to compile a single list of indicators suitable for all the constituent entities. Therefore, selection of indicators is one of the methodology's stages. The indicators are selected individually according to the goals and objectives of the socio-economic and industrial development of a particular territory. Some

of the indicators characterize the situation in the entire region, which is due to the existing limitations on the availability of statistical data.

A cross-regional comparison of the effectiveness of industrial policy is carried out through indicators norm setting and their aggregation [32]. As mentioned above, the criterion level is set by the indicators' mean values.

The integrated indicator of effectiveness was established using weighting coefficients. In the study, a formal method for calculating the weights based on the variation index was used.

The methodology used is conditional, and the assessment of regional industrial policy measures requires a much deeper factor analysis. The immediate provision of statistical data is a significant obstacle. In the course of the analysis, no consequences of the COVID-19 pandemic were considered [1, 8]. The decline in industrial production recorded during the pandemic (according to operational statistics for entire Russia) can change the estimated position of the regions according to the methodology. Despite the research limitations indicated, the proposed methodology allows one to comprehensively assess the development dynamics of industry, as well as conduct cross-regional comparative analysis.

4. RESULTS AND DISCUSSION

The first two stages of the methodology for assessing the regional industrial policy effectiveness were carried out earlier. Based on the comparable coefficients calculated for the selected indicators (see Appendix), one can identify the positive and negative aspects of the regional industrial complex development (Stage 3 of the proposed methodology, Fig. 1). These coefficients are categorized into three groups: the average level in Russia (+/–5%), and those that are above and below it. For example, the weakest spots of Vladimir oblast are labor productivity in the industry, low salary, and a significant amount of pollution emissions. Among the region's strongest points are the structural factors: a substantial share of manufacturing enterprises in the overall structure, and the share of the manufacturing industry in GRP. The industrial complex generates a considerable number of jobs in Vladimir oblast; this indicator is 1.7 times higher than the national average. The activity of the region's industrial enterprises in the field of innovation is also above the average level throughout Russia. At the same time, other regions such as Kaluga oblast experience the opposite trend: the output volume of innovative products and services and the growth rate of advanced production technologies are below the national average. Similarly, one can examine the effectiveness of the regional industrial policy for each of the 19 regions.

To calculate the weighting coefficients for the selected indicators of the industrial policy effectiveness, we have applied a variation (Stage 4 of the developed methodology). Calculations were performed for each individual indicator for all 85 Russian regions for 2019 (Table 2).

Table 2. Weighting coefficients of the significance of the industrial policy effectiveness indicators

Indicator	Variation (CV)	Weight (Wi)
[i15] Labor productivity index in the manufacturing industry	3.697	0.283
[i16] Return on assets of manufacturing enterprises	1.543	0.118
[i11] Share of expenses incurred in technological innovations in the total volume of investment in fixed assets	1.136	0.087
[i12] Volume of innovative goods, works, services as a percentage of the total volume of goods shipped, works and services performed	0.976	0.075
[i06] Ratio between fixed assets introduced to industry and the total volume of fixed assets introduced	0.821	0.063
[i05] Percentage of fixed assets of manufacturing enterprises in the overall structure of fixed assets in the region	0.654	0.050
[i03] Share of the manufacturing industry in GRP	0.630	0.048
[i10] Share of organizations engaged in innovation	0.502	0.038

Indicator	Variation (CV)	Weight (Wi)
[i17] Share of captured and neutralized air pollutants in the total amount of waste pollutants	0.496	0.038
[i01] Average monthly nominal accrued wages of employees of organizations	0.422	0.032
[i02] Share of manufacturing industry workers in the total number of employees in the region	0.403	0.031
[i04] Share of manufacturing enterprises in the total number of enterprises in the region	0.283	0.022
[i08] Growth rate of advanced production technologies created in the region	0.257	0.020
[i07] Depreciation of fixed assets of manufacturing enterprises at the end of the year	0.196	0.015
[i21] ICT use in organizations (cloud services, %)	0.188	0.014
[i09] Growth rate of advanced production technologies used in the region	0.170	0.013
[i14] Index for investment volume in fixed assets	0.166	0.013
[i13] Industrial production indices in the manufacturing industry compared to the previous year	0.160	0.012
[i19] ICT use in organizations (servers, %)	0.158	0.012
[i20] ICT use in organizations (computer networks, %)	0.128	0.010
[i18] ICT use in organizations (portable computers, %)	0.058	0.004

As shown in Table 2, the three most significant industrial policy indicators are labor productivity (28% of the composite index), return on assets of manufacturing enterprises, i.e. financial performance of the industrial production (11%), and the share of expenses incurred in technological innovations in the total volume of investment in fixed assets (8%).

Once weighting coefficients *(W)* are calculated, all the obtained values of comparable coefficients *(K)* are aggregated into a composite indicator of the regional industrial policy effectiveness (Stage 5 of the methodology). It is possible to juxtapose the dynamics of the obtained values and to compare it with the national average taken as the criterion level (Table 3). Assessing the relationships between the regions and their cooperation in various areas should be treated as a separate avenue for analysis.

Table 3. Composite indices of the regional industrial policy effectiveness in 2015–2019

Industrial region	2015	2016	2017	2018	2019
Lipetsk oblast	1.53	1.51	1.79	1.73	1.50
Tula oblast	1.47	1.45	1.44	1.62	1.49
Vologda oblast	1.42	1.35	1.73	1.57	1.49
Perm krai	1.43	1.29	1.30	1.36	1.41
Nizhny Novgorod oblast	1.45	1.42	1.58	1.55	1.39
Kaluga oblast	1.28	1.32	1.54	1.52	1.39
Leningrad oblast	1.34	1.33	1.37	1.22	1.37
Omsk oblast	1.46	1.28	1.48	1.31	1.35
Krasnoyarsk krai	1.12	1.12	1.10	0.99	1.31
Sverdlovsk oblast	1.07	1.21	1.27	1.29	1.27
Vladimir oblast	1.26	1.24	1.16	1.16	1.23
Republic of Bashkortostan	1.22	1.09	1.43	1.33	1.13
Ryazan oblast	1.15	1.08	1.16	1.04	1.05
Yaroslavl oblast	1.07	0.98	1.13	1.01	1.04
Chelyabinsk oblast	1.07	1.14	1.25	1.21	1.01
Novgorod oblast	1.13	1.16	1.10	1.06	0.99
Ulyanovsk oblast	1.02	1.02	1.00	0.89	0.98
Kirov oblast	0.93	0.88	0.94	0.93	0.92
Mari El Republic	1.06	0.96	1.24	0.77	0.63

In recent years, Lipetsk, Vologda and Tula oblasts top the list of the regions with the most effective industrial policy. In Lipetsk oblast, this is due to high profitability of the manufacturing industry, which in 2018–2019 amounted to 17.8–14.3%, respectively. This region is also characterized by intensive use of fixed assets, although their depreciation is

about 10% higher than the national average. Sverdlovsk oblast closes the list of Top 10 regions with the most effective industrial policy. The territory is lagging behind in the indicators such as average wage and the growth rate of advanced production technologies created in the region. Despite a large number of research and educational institutions operating in Sverdlovsk oblast, over the last 5 years it has witnessed a downward trend in advanced production technologies created (from 90 technological inventions in 2015 to 69 in 2019). In comparison, over the same period this indicator in Chelyabinsk oblast has risen from 92 to 135 inventions per year.

Having analyzed the effectiveness of the regional industrial policy, we identified a number of development problems. These are low wage in the manufacturing industry; high depreciation of fixed assets of manufacturing enterprises; insufficient investment in technological innovation; falling labor productivity in the manufacturing industry; and a low level of environmental safety of industrial enterprises. These reference points can be used when adjusting the current measures for stimulating industrial development of the regions and imposing new ones.

It is not allowed using a uniform list of indicators to assess the effectiveness of industrial policy at both the regional and federal levels. When organizing a monitoring system, it should be recognized that regions differ in opportunities for industrial development, and the use of uniform indicators is unacceptable. A cyclic scheme is needed that encompasses observation, analysis and identification of trends in the development of the industrial complex, as well as social, economic and environmental factors. The final step is to adjust the existing tools and mechanisms of industrial policy.

Obviously, a region's institutional environment is of crucial importance for the effective implementation of industrial policy. In order to ensure consistency between the regional and federal industrial policy, each of the constituent territories should adopt a corresponding law. Regional laws and regulations on industrial policy form the institutional basis by establishing purposes, objectives and development priorities. Despite the diversity of these laws and different levels to which they are elaborated, the very fact of their existence affects (sometimes indirectly) the key indicators of the socio-economic and industrial development of the region [18, 37]. Let us match the results of the industrial policy effectiveness analysis and the time span during which legislative support for the regional industrial policy has been in effect.

Table 4. Regional laws and regulations on industrial policy

Region	Law No. and date of adoption	Last amended
Vladimir oblast	No. 93-OZ of July 10, 2015	December 5, 2019
Kaluga oblast	No. 33-OZ of October 28, 1999 (repealed) No. 301-OZ of February 21, 2018	October 31, 2018
Lipetsk oblast	No. 144-OZ of June 4, 2001 (repealed) No. 508-OZ of April 1, 2016	
Ryazan oblast	No. 90-OZ of August 10, 2006 (repealed) No. 61-OZ of October 11, 2016	
Tula oblast	No. 437-ZTO of April 5, 2004 (repealed) No. 2402-ZTO of December 24, 2015	
Yaroslavl oblast	No. 30-z of May 5, 2015	February 25, 2019
Vologda oblast	No. 3945-OZ of April 28, 2016	March 13, 2020
Leningrad oblast	No. 93-oz of December 25, 2017	
Novgorod oblast	No. 712-OZ of March 30, 2010 (repealed) No. 922-OZ of March 3, 2016	January 29, 2019
Republic of Bashkortostan	No. 38-z of December 6, 1999 (repealed) No. 294-z of December 1, 2015	February 4, 2020
Mari El Republic	No. 3-Z of February 29, 2016	August 3, 2020
Perm krai	No. 440-PK of March 3, 2015	November 6, 2019
Kirov oblast	No. 125-ZO of December 31, 2002 (repealed) No. 648-ZO of May 5, 2016	July 27, 2020

Region	Law No. and date of adoption	Last amended
Nizhny Novgorod oblast	No. 190-Z of December 21, 2011 (repealed) No. 206-Z of December 25, 2015	December 24, 2019
Ulyanovsk oblast	No. 073-ZO of November 9, 2004 (repealed) No. 218-ZO of December 25, 2014	December 23, 2019
Sverdlovsk oblast	No. 136-OZ of November 23, 2015	March 3, 2020
Chelyabinsk oblast	No. 197-ZO of November 27, 2003 (repealed) No. 201-ZO of June 18, 2015	August 5, 2020
Krasnoyarsk krai	No. 10-4346 of March 31, 2016	
Omsk oblast	No. 1917-OZ of December 8, 2016	December 3, 2019

Source: compiled using data from [26].

Many Russian regions adopted local laws on industrial policy following the introduction of the federal law of 2014 "On the industrial policy in the Russian Federation". It is worth noting that the fundamental law concentrates not on supporting Russian industry, but stimulating its development.

Many laws on industrial development adopted at the regional level are of a framework nature and do not contain regional specifics. However, this is not always true. The present study showed that regions leading in industrial development were among the first to develop regional laws on industrial policy even before the federal law was introduced in 2014. These constituent entities are actively improving the adopted regional laws on industrial policy and making amendments that allow the use of more modern and relevant tools to support industry, such as investment contract.

Shifts in the global industrial market and new trends in technology require the industrial policy tools to be adjusted. Investment contract is one of the major tools of industrial policy implementation in Russia. Being institutionalized in the regional laws, investment contract encourages industrial development. For instance, in the Republic of Bashkortostan, in accordance with the latest amendments (of February 4, 2020), regional authorities undertake to ensure the stable business environment for investors for the period of the contract and to apply incentive measures in industrial production. A similar amendment was made to Kirov oblast's law on industrial policy. The latest amendments dated July 27, 2020 guarantee the investor the invariability of the terms of the contract. We can conclude that the adjustment of regional laws on industrial policy contributes to the implementation of large-scale projects aimed at introducing or designing competitive innovative technologies.

Figure 2 displays that the Top 3 regions with the most effective industrial policy (Tula, Lipetsk and Kaluga oblasts) have had their local laws regarding industrial policy for more than 15 years. We can conclude that legal regulation concerning regional industrial policy accelerates the development of the industrial complex.
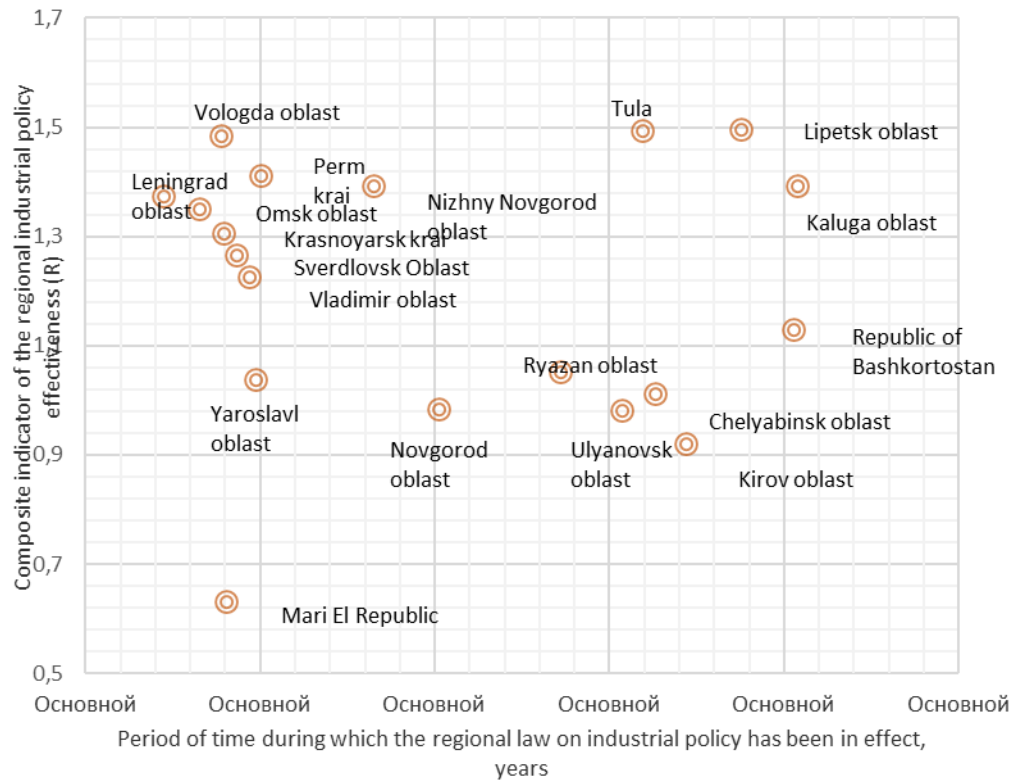
Fig. 2. Correlation between the time span that the regional law on industrial policy has been in effect and the composite indicator of its effectiveness

The obtained results demonstrate that a formal framework law on industrial policy introduced in a region cannot positively influence the effectiveness of industrial policy. However, in order to implement it, legislative support is needed that is part of the institutional framework.

5. CONCLUSION

When assessing industrial policy at regional level, it is crucial to allow for the peculiarities of the socio-economic development of a particular territory. The special features of the regional development can cause the expansion of the federal concept (key indicators), but cannot contradict it. We have worked out a multi-criteria methodology for evaluating the effectiveness of the regional industrial policy and identified the strengths and weaknesses in the regions' industrial development. The performed analysis indicates that the current measures are effective and a growing number of industrial regions are improving their positions in comparison with the average level in Russia. Such factors as the level of labor productivity and the profitability of industrial enterprises exert the greatest influence on the effectiveness of the regional industrial policy. However, investment support for technological innovation is also of a significant importance. The given research shows that Lipetsk, Vologda and Tula oblasts top the list of the regions with the most effective industrial policy in 2019. Sverdlovsk oblast is lagging behind in such indicators as average wage and the growth rate of cutting-edge production technologies created in the region. Despite a large number of research and educational institutions operating in the oblast, over the last 5 years it has witnessed a downward trend in advanced production technologies created. This fact proves the need for stimulating scientific research for industrial production at regional level and more active development of production modernization tools. In the course of the study, we have confirmed the hypothesis that the effectiveness of the local industrial policy is influenced by the region's legal regulations. The earlier the institutional

norms for supporting industrial regions are adopted, the more efficient the industrial development is expected to be.

ACKNOWLEDGEMENTS

REFERENCES

1. ACRF. (2020). Accounts Chamber of the Russian Federation. *Digest. Impact of the COVID-19 pandemic on industry and the environment*. Retrieved from https://ach.gov.ru/upload/pdf/Covid-19-prom.pdf

2. Andrianov, K. N. (2015). *Industrial policy in the context of new industrialization*. Moscow: MAKS Press.

3. Atanov, N. I. (2012). Scientific and applied approaches to the new industrial policy of the Republic of Belarus. *Bulletin of the BSC SB RAS, 1*, 190-198.

4. Belov, V. B. (2009). *Germany. Challenges of the 21st century*. Moscow: Ves Mir.

5. Chang, H. J., & Lin, J. (2009). Should industrial policy in developing countries conform comparative advantage or defy it? A debate between Justin Lin and Ha-Joon Chang. *Development Policy Review, 27*(5). https://doi.org/10.1111/j.1467-7679.2009.00456.x

6. Chernova, V. Y., Starostin, V. S., Degtereva, E. A., & Andronova, V. I. (2019). Study of sector-specific innovation efforts: The case from Russian economy. *Entrepreneurship and Sustainability Issues, 7*(1), 540-552. https://doi.org/10.9770/jesi.2019.7.1(38)

7. Demidenko, D. S., Babkin, A. V., & Kudryavtseva, T. Yu. (2009). Theoretical aspects of assessing the effectiveness of budget expenditures. *St. Petersburg State Polytechnical University Journal. Economics*, *3*(79), 255-262.

8. Dvořák, M., Rovný, P., Grebennikova, V., & Faminskaya, M. (2020). Economic impacts of COVID-19 on the labor market and human capital. *Terra Economicus*, *18*(4), 78-96. https://doi.org/10.18522/2073-6606-2020-18-4-78-96

9. Fujita, M., Krugman, P., & Venables, F. J. (2000). *The spatial economy: Cities, regions and international trade*. Cambridge, MA: The MIT Press. https://doi.org/10.7551/mitpress/6389.001.0001

10. Goryacheva, T. V. (2012). Criteria and a system of indicators for assessing the effectiveness of the industrial policy implementation. *Heteromagnetic Microelectronics*, *12*, 123-129.

11. Govorova, N. V. (2010). *Industrial policy of the European countries*. Moscow: Institute of Europe of the RAS. https://www.instituteofeurope.ru/publications/doklady-ie-ran/4

12. Graham, O. L. Jr. (1994). *Losing time: The industrial policy debate*. Harvard University Press.

13. Gubanov, S. (2021). Industrial mainstream: UNIDO and Russia. *Economist*, *1*, 3-14.

14. Hausmann, R., & Rodrick, D. (2003). Economic development as self-discovery. *Journal of Development Economics*, *72*(2), 603-633. https://doi.org/10.1016/S0304-3878(03)00124-X

15. Khairulina, Ya. R., Dushin, A. V., & Lyaptsev, G. A. (2016). Deindustrialization of Russian economy: problems and opportunities. *News of the Ural State Mining University*, *4*(44), 80-83. https://doi.org/10.21440/2307-2091-2016-4-80-83

16. Kheyfets, B., & Chernova, V. (2021). Comparative assessment of the influence of a technological factor on economic growth. *Eastern-European Journal of Enterprise Technologies*, *1*(13-109), 6-15. https://doi.org/10.15587/1729-4061.2021.225526

17. Kleiner, G. B. (2013). The concept of the Federal Law "On industrial policy in the Russian Federation". *Economics of Contemporary Russia, 3*, 70-75.

18. Korovin, G. B. (2016). Institutionalization of the multi-agent industrial policy in Russian regions. *Economics. Taxes. Law, 5*, 113-121.

19. Krugman, P. R., & Obstfeld, M. (2006). *International economics: Trade and policy* (7th ed.). Boston: Pearson Addison-Wesley. https://doi.org/10.1007/978-1-349-91968-0_18

20. Litau, E. Y. (2020). Scoring method as applied to innovation project evaluation for startup support. *Entrepreneurship and Sustainability Issues*, *7*(4), 2978-2990. https://doi.org/10.9770/jesi.2020.7.4(27)

21. Litvinova, O. V. (2014). Evaluation of the effectiveness of state industrial policy and development of measures of targeted impact on the region's economy. *Izvestiâ Sankt-Peterburgskogo gosudarstvennogo èkonomičeskogo universiteta*, *5*(89), 97-100.

22. Makarova, I. V. (2018). Analyzing the efficiency of regional measures to support industry. *Economic Analysis: Theory and Practice*, *17*(10), 1800-1818. https://doi.org/10.24891/ea.17.10.1800

23. Minpromtorg. (n.d.). Ministry of Industry and Trade. *On the main directions of the regional industrial policy implementation.* https://minpromtorg.gov.ru/docs/#!ob_osnovnyh_napravleniyah_realizacii_regionalnoy_promyshlennoy_politiki

24. Moshkov, A. A., Zherebov, E. D., & Zdolnikova, S. V. (2016). Methods and approaches of forming the state industrial policy. *St. Petersburg State Polytechnical University Journal. Economics*, *1*(235), 147-157. https://doi.org/10.5862/JE.235.14

25. Nizamutdinov, I. K. (2012). Impact of the global crisis on regional industrial policy. *Scientific Works of the Center for Advanced Economic Research*, *5*, 141-147.

26. Pravo (n.d.). *The official website of legal information of Russia*. Retrieved from http://pravo.gov.ru

27. Price, V. C. (1981). Industrial policies in the European Community. *Macmillan for the Trade Policy Research Centre*, *4*. https://doi.org/10.1007/978-1-349-16640-4

28. Rodrik, D. (2004). Industrial Policy for the twenty-first century. *CEPR Discussion Paper №4767*. Retrieved from http://ssrn.com/abstract=666808

29. Romanova, O. A., & Kuzmin, E. A. (2020). Industrial policy strategy: A case of changing national priorities in Russia. *WSEAS Transactions on Business and Economics*, *17*, Art. #86, 879-888. https://doi.org/10.37394/23207.2020.17.86

30. Romanova, O. A., & Ponomareva, A. O. (2020). Industrial policy: New realities, formation and implementation issues. *Economic and Social Changes: Facts, Trends, Forecast*, *13*(2), 25-40. https://doi.org/10.15838/esc.2020.2.68.2

31. Rosstat. (2020). *Russian regions. The main features of the constituent territories of the Russian Federation*. Statistical bulletin, Moscow. Retrieved from https://rosstat.gov.ru/folder/210/document/13205

32. Safina, A. I. (2012). Methodology for assessing the socio-economic efficiency of regional industrial policy. *Electronic Economic Newsletter of the Republic of Tatarstan*, *1*, 145-152.

33. Shvetsov, A. N. (2010). *Improving regional policy: Concepts and practice*. Moscow: KRASAND. https://doi.org/10.1007/978-0-387-89684-7_10

34. Smirnova, O. P., and Ponomareva, A. O. (2020a). A methodological approach to evaluating the effectiveness of regional industrial policy. *Economic Analysis: Theory and Practice, 19*(8(503)), 1431-1457. https://doi.org/10.24891/ea.19.8.1431

35. Smirnova, O. P., & Ponomareva, A. O. (2020b). The technological transformation of Russia's industrial sectors: Difficulties and prospects. *National Interests: Priorities and Security, 16*(9), 1674-1697. https://doi.org/10.24891/ni.16.9.1674

36. Smirnova, O.P., Averina, L.M., & Ponomareva, A.O. (2020). Transformation of industries in the conditions of new technological challenges. *Advances in Systems Science and Applications, 20(3)*, 36-49. https://doi.org/10.25728/assa.2020.20.3.851

37. Tatarkin, A. I., & Romanova, O. A. (2014). Industrial policy: Genesis, regional features and legislative provision. *Economy of Region*, *2*, 9-21. https://doi.org/10.17059/2014-2-1

38. Toomsalu, L., Tolmacheva, S., Vlasov, A., & Chernova, V. (2019). Determinants of innovations in small and medium enterprises: A European and international experience. *Terra Economicus*, *17*(2), 112-123. https://doi.org/10.23683/2073-6606-2019-17-2-112-123

39. UNECE. (2019). *UNECE statistical database*. https://w3.unece.org/PXWeb/ru/DataMap?IndicatorCode=11

40. UNIDO. (2020). *Industrial Development Report 2020*. https://www.unido.org/resources-publications-flagship-publications-industrial-development-report-series/idr2020

41. Vorobyova, N. A. (2012). Assessment of Far Eastern Federal District industry within the framework of state industrial policy, *Proceedings of Irkutsk State Technical University, 10*, 270-275.

APPENDIX

Table. Comparable coefficients *(K)* of industrial policy effectiveness indicators for the regions under study in 2019

Indicator	Vladimir oblast	Kaluga oblast	Lipetsk oblast	Ryazan oblast	Tula oblast	Yaroslavl oblast	Vologda oblast	Leningrad oblast	Novgorod oblast	Republic of Bashkortostan	Mari El Republic	Perm krai	Kirov oblast	Nizhny Novgorod oblast	Ulyanovsk oblast	Sverdlovsk oblast	Chelyabinsk oblast	Krasnoyarsk krai	Omsk oblast
[i01]	0.69	0.87	0.72	0.72	0.80	0.75	0.82	0.97	0.67	0.76	0.63	0.82	0.63	0.74	0.64	0.86	0.78	1.04	0.74
[i02]	1.71	1.69	1.27	1.39	1.59	1.46	1.41	1.23	1.51	1.10	1.51	1.44	1.45	1.44	1.52	1.43	1.59	0.99	1.03
[i03]	1.91	2.36	2.48	1.62	2.51	1.61	1.52	1.74	1.84	1.95	1.77	1.69	1.64	1.77	1.49	1.81	2.00	1.77	2.02
[i04]	1.54	1.51	1.14	1.30	1.28	1.22	0.99	1.24	1.29	1.03	1.65	1.01	1.35	1.20	1.30	1.15	1.34	0.93	0.99
[i05]	1.71	2.91	3.03	1.42	2.80	1.85	2.14	2.58	1.68	1.52	0.95	1.68	1.63	2.14	2.08	2.15	2.49	1.71	2.14
[i06]	3.04	2.15	2.22	0.70	5.21	1.95	3.78	4.02	1.61	1.34	0.87	1.80	1.80	1.31	2.42	2.33	2.07	1.43	2.85
[i07]	-1.01	-0.91	-1.05	-1.16	-0.72	-1.19	-0.99	-0.88	-0.95	-1.08	-1.02	-1.11	-0.80	-1.14	-0.94	-0.93	-1.09	-0.89	-1.07
[i08]	0.97	0.34	1.35	1.14	1.93	0.83	1.59	1.00	1.69	1.14	1.35	1.09	0.97	1.69	0.12	0.78	0.90	0.80	1.61
[i09]	1.09	1.01	1.07	1.08	1.46	1.07	1.09	1.15	1.07	0.84	0.93	1.07	1.01	0.98	0.77	1.12	1.00	1.06	0.99
[i10]	1.15	1.26	1.22	1.30	1.29	1.16	1.27	0.89	1.08	1.13	1.24	0.96	1.60	1.51	1.60	1.27	1.15	0.76	0.82
[i11]	1.61	1.45	0.97	1.26	1.26	1.79	0.08	0.65	0.30	0.92	0.21	2.34	0.72	2.74	0.53	1.31	0.79	1.75	4.22
[i12]	1.23	0.34	1.32	1.83	1.55	1.13	0.53	0.38	0.21	1.23	2.00	2.26	1.85	2.58	2.08	1.19	1.02	0.89	0.25
[i13]	1.08	1.02	0.94	1.04	1.04	1.02	1.00	1.02	1.03	1.01	1.06	0.94	0.99	1.02	1.01	1.00	1.00	1.00	0.97
[i14]	1.11	1.08	1.10	1.01	1.07	1.00	1.16	0.75	0.67	1.12	0.91	1.09	1.10	1.02	0.81	1.08	1.08	0.94	1.28
[i15]	0.68	1.57	1.43	0.71	1.00	0.67	1.44	1.74	0.73	1.09	0.57	1.08	0.44	0.96	0.57	1.06	0.35	0.39	0.90
[i16]	1.59	1.19	2.07	1.22	0.83	0.74	3.03	0.71	1.64	1.48	-1.07	1.68	0.45	1.35	0.49	1.26	1.23	4.13	0.75

Indicator	Vladimir oblast	Kaluga oblast	Lipetsk oblast	Ryazan oblast	Tula oblast	Yaroslavl oblast	Vologda oblast	Leningrad oblast	Novgorod oblast	Republic of Bashkortostan	Mari El Republic	Perm krai	Kirov oblast	Nizhny Novgorod oblast	Ulyanovsk oblast	Sverdlovsk oblast	Chelyabinsk oblast	Krasnoyarsk krai	Omsk oblast
[i17]	0.21	0.83	1.05	1.12	1.16	0.19	0.84	1.13	0.99	0.54	0.29	1.07	0.81	0.51	0.58	1.18	1.08	0.91	1.22
[i18]	1.03	1.02	1.00	1.01	0.98	1.03	1.04	1.02	1.01	1.01	1.03	1.00	1.03	1.02	0.98	1.04	1.02	1.00	0.97
[i19]	1.04	1.05	0.94	0.91	1.04	1.15	1.01	1.11	1.06	0.98	0.93	1.07	0.91	1.02	0.83	1.14	1.09	0.97	0.90
[i20]	1.08	0.99	0.96	0.97	1.06	1.16	1.01	1.07	1.05	1.00	1.03	1.05	1.08	1.01	0.93	1.09	1.08	1.03	0.91
[i21]	1.00	1.14	1.03	1.02	1.01	1.06	0.92	0.97	1.52	0.95	0.86	1.38	0.84	1.05	0.74	1.08	0.99	0.94	0.79

Note:

🟩	Above the average value
🟨	Average value (+/–5%)
🟥	Below the average value