Article

Improvement of the methodology for assessment of industrial enterprises for making objective decisions within the framework of industrial policy

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Abstract: The article examines the issues of application and improvement of the methodology for evaluating industrial enterprises as recipients of state support within the framework of the implementation of industrial policy. The authors considered approaches to the content of industrial policy, investigated the factors influencing its efficiency, identified aspects of its imperfections that arise when applying an incomplete list of important parameters of economic development and ambiguity in the interpretation of previously applied estimates. The article presents proposals to improve the methodology for assessing potential recipients of state support based on the development of a comprehensive indicator for assessing enterprises (recipients of support), taking into account not only the classical parameters of the economic efficiency of industrial enterprises applying for state financial assistance, but also such aspects as the development of budgetary funds, belonging to priority sectors of the economy, characteristics of sustainable development and export and innovation potential. Combining the results of a comprehensive assessment of the recipient of state support with a map of the business demography of the territory allows making a decision not only about the fact of support and its efficiency, but also to predict the assessment of the life cycle of the enterprise and its subsequent development.

Keywords: assessment of enterprises; industrial policy; support measures; business demography

1. Introduction

The industrial policy is currently considered as the driving force of economic development at almost all levels: local (level of a specific enterprise or group of enterprises), regional or sectoral within the framework of national macroeconomics and international, when it comes to industrial development at the level of several countries or their associations.

The relevance of the industrial policy topic is confirmed by the interest of international organizations, such as the OECD and UNIDO that made their own analysis and formed relevant documents based on their results (UNIDO, 2023). The facts of the UNCTAD report (2018) show that during the period 2013–2018, industrial policy as a tool of state regulation was developed and implemented in more than 80 countries around the world.

The problem of state support during the implementation of industrial policy is studied in various aspects in the global community: the role of state support in the diversification of economic development (Ieo, 2024); the reaction of enterprises to state intervention in their activities (Shin, 2024); the impact of industrial policy on the entrepreneurial ecosystem (Jafarov, 2024); the effects of industrial policy of

industrial relocation to Asian regions (Damayati, 2024); the effects of quasi-natural experiments of industrial policy implementation (Ge, 2024); the relationship between industrial policy and firm competitiveness in regional markets (Wismansyah, 2024).

The industrial policy of Russia, as noted by several researchers (Bochkarev, 2023; Bodrunov, 2018; Castelli et al., 2023; Shirokova, 2015; Simachev et al., 2022; Smirnov, 2022; Struzhko, 2023; Suzdaleva, 2023; Vasiľková, 2023; Voronin, 2018), focuses on stimulating domestic production, innovation and digitalization, supporting small and medium-sized businesses, infrastructure development and environmental sustainability. These measures are aimed at creating a more competitive and sustainable economy capable of adapting to modern challenges and global changes.

However, the issue of assessment the efficiency of government support measures and reducing the gap between the resources invested in "support" and its results remains relevant. Moreover, the Russian industry is faced with "the challenge of mass production of domestic high-tech products and quickly increase in capacity to balance supply and demand for new technologies in a short time that is unique for the world practice" (Kremlin, 2024).

The novelty of the research results and their practical value consist the authors' vision of improving the methodology for assessing potential recipients of state support among industrial enterprises based on a combination of classical financial and economic assessment of the state of enterprises with indicators of sustainable development, innovation potential and business demography. The authors consider that this improved methodology can be recommended to be applied in the process of industrial policy development, as well as for the evaluation and comparison of industrial enterprises' performance indicators.

2. Materials and methods

The interest in industrial policy by both the state and business entities is demonstrated throughout the evolutionary economic development. For some, it is important to control the economic situation and influence it with the help of a number of direct and indirect instruments of economic regulation, for others it is important to obtain economic benefits and use the preferences that the state can provide within the framework of industrial policy to achieve efficient production and, in general, the development of the economy and its sectors. It should be noted that all parties involved in the development and implementation of industrial policy expect to increase the efficiency of their activities and achieve development goals.

This article is devoted to the methodological side of the implementation of industrial policy, or, more precisely, to the study of the methodology for assessing potential recipients of state support to achieve the goals of sustainable economic growth in the industrial sector of the economy.

The theoretical and methodological basis for the research and subsequent writing of the article were the development materials of Russian and foreign authors in the field of industrial policy, interviews and expert assessments of civil servants, practicing consultants and specialists involved in the study of methods and tools of state support for industrial and other enterprises.

The authors applied to the search and processing of information both general scientific methods such as analysis, functional analysis, system analysis, factor analysis, the method of abstraction and generalization, and special methods such as the abstract logical approach, the economic and mathematical method, the graphical method.

The methodology for assessing potential recipients of state support is based on classical approaches to assessing the probability of bankruptcy of an enterprise the Altman-Sabato financial stability indicator was used as one of the components of the comprehensive assessment indicator. Along with it, the components of the indicator proposed by the authors were the following indicators: the industrial potential of the enterprise, its compliance with the priority area of economic development; the efficiency of the enterprise's use of budget funds received earlier.

3. Results and discussion

Effective industrial policy at the national and regional levels should be closely linked to structural, innovation and investment policies to ensure Russia's technological sovereignty, including an effective system of state support measures for the industrial sector of the economy, as mentioned in official documents (Kremlin, 2022).

The details of the content of industrial policy depend on the strategic intentions of the authorities, the state of the economy, the chosen impact model and the challenges of the business environment (Ermolaev, 2018; Galyavov, 2011; Palash, 2022; Starikov, 2023; Yakovlev et al., 2023).

In addition to state institutions, the subjects of industrial policy include regional market entities. Therefore, industrial policy should be a comprehensive system that, on the one hand, forms a common framework of rules and tools, and on the other hand, is a flexible mechanism that makes it possible to adapt to a certain "environment" of activity and "modernization" of this system at all levels of government (vertical), industries (horizontal), the scale of the business (diagonal) taking into account the specifics of the regions (territories). This approach requires new tools and practices for assessing the social and economic consequences that may be associated with the results of the implementation of industrial policy.

According to the analysis of the set of state support measures for industrial enterprises in Russian practice (Garbuzov et al., 2024), the "line" of support tools is diverse in breadth (number of classification criteria) and depth (variety of support measures content regarding each criterion).

Specific measures to support an individual economic entity operating in a particular industry and a specific territory may vary and depend on economic and social factors, the goals of the management entity and the current social and political situation of the region or country. It is important to take into account many factors when grouping support measures in the industrial policy process in order to ensure the greatest efficiency and compliance with the specific needs of the economy and industries.

The efficiency of the industrial policy can be considered as the ratio of the increase in the national wealth of a country obtained as a result of achieving the

industrial policy goals to the costs associated with its implementation (Voynikov, 2022). The researchers propose to consider the following groups of performance indicators in the context of factors influencing industrial policy: resource, personnel, technological, organizational, financial, and infrastructural indicators. Generalized indicators and private (or more specific) indicators can be distinguished in these groups of performance indicators of industrial policy.

In turn, industry, as a set of industrial enterprises, can be characterized by performance indicators of individual industrial enterprises systematically considered within a certain territory (region).

Various approaches to assessing the efficiency of government measures to support industry can be found both in the publications of Russian researchers (Laipanov, 2022; Palash, 2022; Starikov, 2023; Strizhakova, 2018; Yakovlev et al., 2023) and in national and international regulatory documents devoted to various government programs, strategies for industrial, innovative, scientific and technological development, etc.

Most methods offer the application of indicators differentiated by level (macro, meso and micro), functions (finance, personnel, production, innovation, ecology, etc.), effect (scientific and technical, social and economic, organizational and management, etc.), by industry specifics and in terms of forms and instruments of state support (infrastructure, tax preferences, financial assistance, etc.). The choice of the indicators and criteria themselves, as well as their number and composition, depends on many factors, both subjective and objective, including the purpose of the assessment; the key problem(s) for which this assessment is being carried out; the information base of the analysis; requests from stakeholders, etc. (Terebova, 2018).

Existing approaches to assessing the performance of industrial policy do not take into account current trends in industrial development (structural changes in the real sector of the economy, the innovation component, the effects of knowledge increment, intellectual capital of the industry, etc.), or are subjective and based on disparate approaches and evaluation indicators (Adeniran et al., 2023; Grega and Nečas, 2022; Tobisova et al., 2023; Vasiľková, 2023). At the same time, a number of authors in their publications emphasize that the assessment should be comprehensive (Kushbokova et al., 2022; Obolenskaya, 2020).

The systematization of a set of measures to support industrial enterprises showed that the state forms a variety of types, approaches, and instruments of industrial policy and there is a positive dynamics in industrial development. According to the Ministry of Economic Development, industrial production in Russia has begun to grow 5 times faster: in 2022 it increased by 0.7%, then in 2023 it increased by 3.5%. This is evidenced by the report of the Federal State Statistics Service of the Russian Federation, published on 31 January 2024. Industrial production increased by 4.1% compared to the level of 2021 and by 8.4% compared to 2019 (Rosstat, 2024).

With significant amounts of financing and support for industrial enterprises from the state, the issue of substantiating the directed support measures and the expediency of determining its addressees remains unresolved. Therefore, the development of a methodology for evaluating the efficiency of industrial policy is of particular importance at the current stage of the implementation of industrial policy.

According to the analysis of the industrial policy of Moscow and the system of measures of state support for industrial enterprises (in the context of measures of a financial and economic nature), as well as the results of evaluating the performance of the industrial policy of Moscow, published by the authors earlier in the article "Results of anti-crisis financial support for industrial enterprises of Moscow" in the journal "Innovations and Investments" (2023), despite the presence of positive changes in the development of industry, there is an imperfection of methodological support for the development and implementation of industrial policy and, accordingly, underemployment of the potential for possible efficiency growth both of the policy itself and the development of the industrial complex of Moscow.

In our opinion, this is caused by the imperfection in the methodology for evaluating the performance of the Moscow's industrial policy implementation, as well as by the methodological gap between the criteria for selecting enterprises that are recipients of state support, the goals and objectives of industrial policy. When evaluating the recipients, the following key characteristics of industrial enterprises are ignored or not fully analyzed:

• the financial stability of industrial enterprises;
• the production, innovation, export, etc. potential of industrial enterprises;
• the affiliation of an industrial enterprise to the priority areas of activity of the economy of Moscow in accordance with the Resolution of the Government of the Russian Federation of 06 June 2020 No. 1512-r "On Approval of the Consolidated Strategy for the Development of the Manufacturing Industry of the Russian Federation until 2024 and for the Period up to 2035";
• the level of development of budget funds (for other support measures or in periods preceding the period of the application campaign);
• the level of development of budget funds of enterprises with products for export.

In this regard, it is proposed to change the methodology for assessing potential recipients of state support for industrial enterprises in Moscow, forming a comprehensive indicator of the final assessment, including at least 4 indicators (characteristics) (**Figure 1**):

• the financial stability indicator (according to the Altman–Sabato model);
• the indicator of the industrial potential of the enterprise (including production potential, innovation potential, export potential);
• the indicator of the involvement of an industrial enterprise in the priority area of the economy of Moscow;
• the indicator of budget development (receipt of support measures).
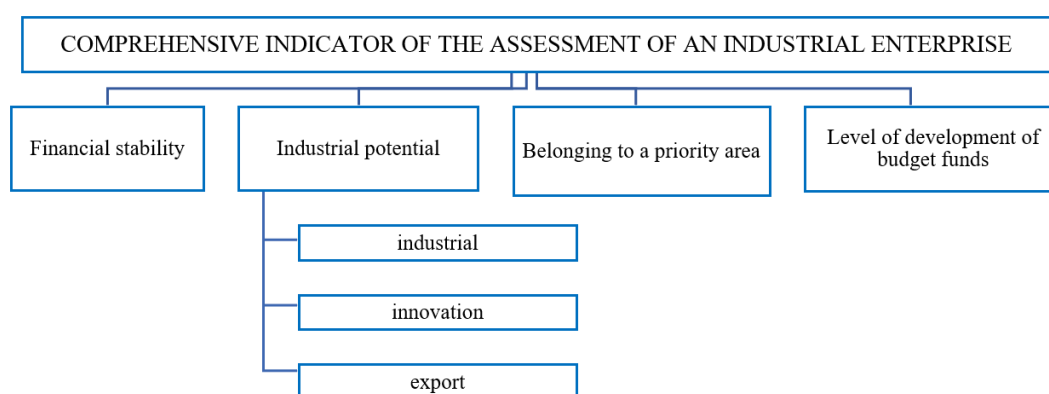
Figure 1. Comprehensive indicator for assessing recipients of state support.
Source: developed by the authors.

The main purpose of the support within the framework of the implementation of industrial policy should be taken into account when evaluating industrial companies that are recipients of state support. In this regard, all enterprises can be grouped according to the following criteria:

1) "Sustainable", for which existing support measures are maintained;
2) "Developing", the main goal of which is the modernization of industrial infrastructure;
3) "Pioneers", whose activities are related to the creation of new industries;
4) Leaders of "competitiveness", producing competitive industrial products;
5) "Leaders of digital transformation", whose goal is to create high-performance and high-paying jobs.

The general formula for the comprehensive assessment of recipients (enterprises) of state support is the following Equation (1):

$$CAE_i = \alpha \times (EP_i) + \beta \times (IPE_i) + \gamma \times (Ccorrespond_i) + \delta \times (Edevelop_i) \quad (1)$$

where EP_i is an indicator of the economic potential of the enterprises "i"; IPE_i is an indicator of the industrial potential of the enterprises (including production potential, innovative potential of the enterprise) "i"; $Ccorrespond_i$ is an indicator of the involvement of an industrial enterprise in a priority area of the Moscow economy, if the priority industry corresponds, this indicator is taken as "1", if it does not correspond, it is "0"; $Edevelop_i$ is an indicator of budget development (receipt of support measures), it is defined as an indicator of efficiency and can be calculated in two ways:

$$Edevelop_i = \frac{BF_{act}}{BF_{plan}} \quad (2)$$

where BF_{act} is an actual development of budget financing, BF_{plan} is a planned indicator of budget financing. In the absence of budgetary financing of the enterprise "i" in the analyzed period, this indicator is considered to be equal to "0".

α, β, γ, δ are the coefficients of significance of the special indicator of the assessment of the recipient of state support, determined by the expert method in accordance with the following conditions $\alpha + \beta + \gamma + \delta = 1$.

At the first stage of enterprise assessment, special indicators are calculated on the basis of summarized indicators, and then four types of potentials (economic, export, production, innovation).

The following calculation formula is used to determine the economic potential:

$$EPi = \frac{1}{3} \times (FS_i + FEPi + Exporti) \tag{3}$$

where FS_i is an indicator of the financial stability of the *i*-th enterprise; FEPi is a financial and economic potential of the *i*-th enterprise; Exporti is an export potential of the *i*-th enterprise.

The Altman-Sabato model is used to determine the indicator of financial stability of the FS_i, in which the logistic regression (logit model) is applied to assess the risk of bankruptcy. The calculation formula is the following:

$$FS = 1/(1 + e{-}y) \tag{4}$$

$$Y = 4.28 + 0.18 \times X1 - 0.01 \times X2 + 0.08 \times X3 + 0.02 \times X4 + 0.19 \times X5 \tag{5}$$

where X1 is a profit before taxes and interest/Assets; X2 is short-term liabilities/Equity, X3 is a net profit/Assets; X4 is a finance/Assets; X5 is a profit before taxes and interest/interest payable.

The calculation will result in a value from 0 to 1 (bankruptcy probability). For example, a value of 0.4 will indicate a 40% probability of bankruptcy, and a value of 0.9 will indicate a 90% probability. In fact, if the FS is > 0.5, the enterprise can be classified as a bankrupt, and if the FS is < 0.5, it will be considered financially stable. There is no "grey area" of uncertainty in this model.

The following calculation formula is used to calculate the indicator of financial and economic potential:

$$FEPi = \frac{1}{6}(Spi + Epri + Eri + Enpi + Esi + Eifai) \tag{6}$$

where Spi is a share of profit of the enterprise i in the total profit of the industry, Epri is an elasticity of profit of the enterprise i to support measures, Eri is an elasticity of the company's revenue i to support measures, Enpi is an elasticity of the net profit of the enterprise i to support measures, Esi is an elasticity of salary of employees of the enterprise i to support measures, Eifai is an elasticity of investments in fixed assets of the enterprise i to support measures.

The formula for the calculation of the export potential indicator is the following:

$$Expi = \frac{1}{2}(Sei + Eei) \tag{7}$$

where Sei is the share of exports of enterprise i in the exports of the industry, Eei is the elasticity of exports of enterprise i to support measures.

IPEi is an indicator of the industrial potential of an enterprise, defined as a set of indicators characterizing such potentials as production (PP), innovation (IP) and calculated using the following formula:

$$IPEi = \frac{1}{3}(Elpi + Epvi + Erfai) + \frac{1}{3}(Sipi + Eexpi + Eipi) \tag{8}$$

where Elpi is the elasticity of labor productivity with respect to support measures; Epvi is the elasticity of production volumes with respect to support measures; Erfai is the elasticity of renewal of fixed assets with respect to support measures; Sipi is the share of innovative products of enterprise "i" in the total volume of the industry; Eexpi is the elasticity of R&D expenditures with respect to support measures; Eipi is the elasticity of innovative products with respect to support measures.

Therefore, the detailed formula for a comprehensive assessment of an enterprise as a potential recipient of state support measures is the following:

$$
\begin{aligned}
CAEi = &\alpha \times \left(FS_i + \frac{1}{6}(Spi + Epri + Eri + Enpi + Esi + Eifai) + \frac{1}{2}(Sei + Eei)\right) + \beta \times \left(\frac{1}{3}(Elpi + Epvi + Erfai)\right. \\
&\left. + \frac{1}{3}(Sipi + Eexpi + Eipi)\right) + \gamma \times Ccorrespondi + \delta \times Edevelopi
\end{aligned} \tag{9}
$$

A single interval with a scale from 0 to 1 is used for all calculated indicators (private and integrated). A basis for further management decisions for the support measures and their efficiency is formed in **Table 1** by distributing the obtained results of the CAEi in the context of three dimensions: enterprises with a low level of effectiveness of support measures (levels V and VI), medium level (IV) and high level of effectiveness of support measures (I, II and III).

Table 1. Levels of the indicator of the comprehensive assessment of the enterprise (a potential recipient of support).

Parameters	Status of the CAE indicator					
Assessment status	Very low level	Low level	Medium level	Above average	High level	Very high level
Interval	0.00–0.2	0.21–0.36	0.37–0.50	0.51–0.62	0.63–0.79	0.80–1.00
CAE indicator	VI	V	IV	III	II	I

Source: Developed by the authors.

Based on the assessments obtained for the entire set of enterprises (potential recipients) of state support, it is worth to form a rating of the well-being industrial enterprises (or demography of industrial enterprises) in Moscow, which will serve as the basis for building a map of the "business demography" of industrial enterprises and will allow regular monitoring of the results of industrial development in Moscow both in terms of individual enterprises and in the context of Moscow administrative districts.

In 2014, the methodology for the formation of business demography for legal entities (Rosstat, 2014) was approved, for which a special register of all commercial entities of the economy was created. According to this methodology, the "Birth" of an enterprise is the fact of registration of an enterprise in the Uniform State Register of Legal Entities in the reporting year as a newly created legal entity, involving the creation of a new set of production factors, with an understandable location, organizational structure, form of ownership, etc. A born enterprise should have at least one employee, this fact is considered as the "economic birth" of the enterprise.

Depending on the value of the average number and economic indicators such as turnover, revenue, an enterprise can be recognized as "active" (the values of the number and turnover/revenue should be more than "0"). If the values of the average number and turnover/revenue for several periods (years) are positive, it will mean that the enterprise "survive".

The "survival" of an enterprise means the economic activity of an enterprise for a certain number of years.

The "death" of an enterprise means an enterprise that was officially liquidated in the reporting year (with the exception of liquidation as a result of a merger, separation, joining an existing enterprise or restructuring a group of enterprises), or was not economically active during the last two years, provided it was active in an earlier period. If the company did not function and does not have (or has lost) its employees, then it is considered as "dead".

Depending on the rate of change in the number and/or turnover, enterprises are classified by different types of "fast-growing" enterprises. For example, enterprises with an increase in number or turnover above 10% per year or more than 20% in 3 years are classified as enterprises with high growth potential.

The methodology for assessing business demography classifies enterprises that are no older than 5 years, but with an average annual increase exceeding 20% per year over a three-year period, as "Gazelles". Enterprises of the same fast-growing group, but with 5–10 employees at the beginning of the growth period, are classified as "Mice".

In order to recognize an enterprise in accordance with the methodology of business demography as "fading", it should demonstrate a reduction in the number of employees by an average of more than 15% per year for two consecutive years, with the age of the enterprise being more than 3 years and more than 10 employees at the beginning of the recession period.

However, the results of business demography provide a generalized assessment of the birth, death or life cycle of enterprises. It does not allow us to identify the degree of influence of external factors (for example, measures of state industrial policy) on the emergence, development or activity of the industrial sector.

The main grouping feature of business demography is the age of the enterprise, but this is not enough to make a decision on measures to support one or another economic entity.

By combining the business demography base with other characteristics that are key for government support measures, it is possible to create a more accurate rating of the well-being enterprises in Moscow in order to make objective decisions within the framework of industrial policy.

This rating, in fact, is an analogue of the rating of regions, but the subjects of the rating will not be regions, but industrial enterprises of a specific territory (within the region). The purpose of forming this rating is to assess the potential of industrial enterprises, determine the best practices for the development of enterprises within the framework of the implementation of the anti-crisis policy of state support management, and form a base of new support measures.

By combining in one matrix the results of the assessment of an enterprise (a potential recipient) of state support (according to private and general final

assessment indicators) with the criteria of business demography, it becomes possible to create a map of the business demography of enterprises in the territory and their attractiveness to authorities in order to develop industry and increase the efficiency of state support measures (**Table 2**).

According to the business demography map the analyzed enterprise has multi-level values of particular assessment indicators. Thus, the values of such potentials as production, export and innovation are in the "risk" zone, and are characterized by critical assessment levels of 0.32; 0.230; 0.223, respectively. At the same time, the overall level of financial and economic stability (FES) of the enterprise "1" shows the potential for growth. The comprehensive assessment of the enterprise (CAE1) as a potential recipient of support is in the middle zone that corresponds to the level of the indicator 0.597 or a combination of (III) = (IV; V; V; V) in accordance with the levels of the indicator of the comprehensive assessment of the enterprise as a potential recipient of support in **Table 1**. The parameters of the enterprise within the characteristics of business demography indicate that the enterprise is classified as a "born" and "active" enterprise. Within the framework of characteristics for the implementing industrial policy, the enterprise is in the position of a "pioneer" enterprise. A comprehensive assessment of an enterprise (a potential recipient of state support) allows the state to make a decision not only about the fact of support itself, but also about its format, technologies and duration, based on an assessment of the life cycle of the enterprise and its subsequent development.

Table 2. Business demography map for the purposes of implementing industrial policy on the example of one of the enterprises "1".

Parameters	Classification of enterprises according to the methodology of Business demography						
	Born	Active Fast-growing "Mice"	With an average growth potential	With high growth potential	"Gazelles"	Survivors	Dying
	Classification for the purposes of implementing an effective industrial policy						
	Pioneers	Sustainable	Leaders of digital transformation	Competitiveness leaders		Laggards	
	Potentially effective (fast-growing)	Medium-effective	Highly efficient			Low-efficiency (stagnant)	
Performance indicators	**Threshold values of enterprise evaluation indicators "1" (recipient of state support)**						
FES	0.38–0.50 threshold value	0.51–0.62 threshold value	0.63–0.79 threshold value	0.80–1.00 threshold value		0.20–0.36 threshold value	0.00–0.19 threshold value
	0.334 actual value						
PP	0.38–0.50 threshold value	0.51–0.62 threshold value	0.63–0.80 threshold value	0.80–1.00 threshold value		0.20–0.37 threshold value	0.00–0.19 threshold value
						0.32 actual value	
EP	0.38–0.50 threshold value	0.51–0.62 threshold value	0.63–0.81 threshold value	0.80–1.00 threshold value		0.20–0.38 threshold value	0.00–0.19 threshold value
						0.230 actual value	
IP	0.63–0.82 threshold value	0.51–0.62 threshold value	0.63–0.82 threshold value	0.80–1.00 threshold value		0.20–0.39 threshold value	0.00–0.19 threshold value
						0.223 actual value	
CAE	0.20–0.50 threshold value	0.51–0.62 threshold value	0.63–0.83 threshold value	0.80–1.00 threshold value		0.20–0.30 threshold value	0.00–0.19 threshold value
		0.597 actual value					

Source: developed by the authors.

4. Conclusion

The developed authors' methodology for a comprehensive assessment of recipients (enterprises) allows for the most accurate identification of recipients of support, taking into account the level of their key potentials (production, export, innovation), financial and economic stability, demographic business characteristics of the life cycle and development prospects. The system of indicators developed by the authors for assessing the efficiency of the implementation of support measures and the expediency of their application in the future based on an assessment of changes in the indicators of enterprises (recipients of the state support) that were formed on the basis of their financial reports and the characteristics of elasticity of the selected indicators to support measures, will eliminate subjectivity and ambiguity of conclusions. The combination of indicators of the financial and economic assessment of an enterprise with its position on the business demographic map can provide information not only on the possible prospective growth of the industrial potential of the enterprise, but also on its entrepreneurial and innovative activity, business maturity and behavior model (leaders, laggards or survivors).

The main result of the study is the development of tools for evaluating industrial enterprises in order to allocate state support measures to them. This will significantly increase the efficiency of interaction between government and business while implementing industrial policy, achieving goals and objectives at the regional level.

Based on the research results, the following recommendations for practitioners and policymakers can be provided. The authors' methodology can be recommended to be applied in the process of industrial policy development, as well as for the evaluation and comparison of industrial enterprises' performance indicators.

The vector of further author's research lies in the direction of studying the results of the use of state support measures based on the application of the proposed integrated indicator for evaluating industrial enterprises, as well as the search for new forms that enhance the efficiency and transparency of interaction between business and the state.

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